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CONFERENCE ABSTRACTS

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Pharmaceutical Practice: Academic Pharmacy

A case-based approach to teach pharmacogenetics as part of pharmacology course in undergraduate curriculum

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Background: Pharmacogenetics (PGx) testing is a rapidly evolving subject in precision medicine, regarding scientific development, translation into clinical practice and expected benefits in patient outcomes. The main purpose is to analyse how the genetic makeup of patients will uniquely affect their response to medication (Haga & Moaddeb, 2014). Pharmacists are a key stakeholder in the delivery of PGx testing. Thus, the need to put more educational effort into this field is necessary and recommended by professional organisations (Jenkins *et al*., 2001; ACPE, 2016), yet underrated in pharmacy curricula (Giri *et al*., 2018; Ta, Cayabyab & Coloso, 2019).

Purpose: To develop and evaluate a pilot case-based learning (CBL) course, on the advancements in PGx and their impact on patient-oriented decisions as part of the Pharmacology Course in the undergraduate Pharmacy curriculum.

Method: Previous relevant publications were retrieved from databases and reviewed in order to design a robust teaching and evaluation method.

Results: Currently, PGx is commonly taught by conventional lecture-based methods. We cannot completely substitute them with CBL; but it can supplement and reinforce the subjects (Hagga & Muaddeb, 2019), as students work in small groups, actively building their knowledge. Students' perceptions of the importance of PGx in clinical decision-making, the appropriateness of CBL approach in the context, and their satisfaction with the course should be assessed by qualitative surveys.

Conclusion: The course will be developed based on situations where PGx testing affect decision making about patients' drug therapy. Well-designed investigations are needed to assess the feasibility, appropriateness and educational value of using a CBL approach to bring such situations in PGx testing to the Pharmacology Course.

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Longer term reflections and outcomes of pharmacy and medicine participants following undergraduate IPE

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Background: Many studies have reported satisfaction with and learning from undergraduate inter-professional education (IPE) IPE. However, there is a lack of research reporting any longer-term effects of IPE.

Purpose: The study aimed to explore the application of the learning of third/fourth year undergraduate pharmacy and medical students 12-24 months after case-based prescribing/ therapeutics IPE.

Method: Following ethics approval participants were interviewed face-to-face, by telephone or Skype. Verbatim transcripts were thematically analysed inductively, and deductively using Kirkpatrick's (K) training evaluation model (Praslova, 2010).

Results: Nineteen (19) medicine and 14 pharmacy interviews were conducted. Six themes were identified inductively: 1-preparedness; 2-students as learners & teachers; 3-knowledge/ skills development; 4-application of learning, 5-session value; 6-suggestions for change. Participants recalled the session as enjoyable and interesting (K level 1-reaction), attitude modification (level 2a), skills/knowledge acquisition (level 2b) and some examples of behavioural change (level 3).

Conclusion: Participants reported learning with, about and often from each other. Examples of K level 3 outcomes were from those in employment. No organisational change (level 4) or improved patient outcomes (level 5) were reported, which was not unexpected. Potential limitations include recall bias and it is possible that experiences post-IPE may have influenced recall. Additional IPE has now been embedded and so it would now useful to evaluate the IPE curriculum as a whole.

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Closing the gap on global competencies for pharmacy education using ASHP and EAHP statements

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Background: FIP Workforce Development Goals (WDGs) are focused on multiple facets of the profession, including education, while American Society Health-System Pharmacists (ASHP) and European Statements on Hospital Pharmacy (EAHP) statements are focused on clinical practice. Mapping the relationship is valuable as workforce development and practice are inextricably linked.

Purpose: To identify similarities and differences between the FIP WDGs, ASHP and EAHP statements.

Method: Five educators conducted the research project, four of whom are global leads for FIP WDGs. Reviewers compared ASHP statements and EAHP statements, all to FIP WDGs. A final reviewer evaluated the maps for appropriateness and external validity. Using a likert scale of 0-3 (0 =no match, 1=application to context only; 2=partial match, 3=complete match), the reviewers assessed competency similarities.

Results: There are 13 WDGs, 38 ASHP statements, and 44 EAHP statements. Of 38 ASHP statements, there were only 3.6% matches ranking '3', 22.8% matches ranking '2', and 73.5% that did not match, but reflected the intent of the WDGs (ranking '1). Of 44 EAHP statements, there were 34.1 % matches ranking '3', 38.6% matches ranking '2', and 81.8 % ranking '1'. More than one WDG was allowed to be mapped to each ASHP and EAHP statement.

Conclusion: These maps provide insight into how current pharmacy WDGs may impact broader practice goals for the workforce. Given the majority of ASHP statements and only one third of EAHP statements mapped to FIP WDGs, future work can focus on unifying the direction between workforce development and practice, and elevating the role of educating student pharmacists as part of a workforce development effort.

Creating global health leaders in pharmacy by evolving postgraduate training

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Background: There has been a push for increasing global health education and training opportunities within pharmacy (Cudmore, 2005; Merson, & Page, 2009; Hanson, Harms, & Plamondon, 2010; Pinto *et al*., 2014). Global health postgraduate learning opportunities are necessary to define pharmacy career paths and develop leadership in global health. There are many challenges to starting a global health postgraduate training programme.

Purpose: The purpose is to propose methods to increase opportunities for global health career and leadership development in pharmacy.

Method: A literature review and internet search were completed to identify existing postgraduate global health training opportunities in pharmacy. Evidence-based methods to modify existing postgraduate training opportunities to include global health topics and leadership development were proposed.

Results: Some postgraduate global health training opportunities do exist in pharmacy (Thompson, 2008; Miller *et al*., 2016; American College of Clinical Pharmacy, 2020; Commonwealth Pharmacists Association, 2020). Few programmes are explicitly marketed as global health. Different strategies can be used to incorporate global health into existing postgraduate training opportunities. Possible solutions include relating local health to global health, expanding upon existing partnerships to provide international global health experiences, use of technology and simulation for virtual global health interaction, and emphasis of implementation science principles to connect and translate local health interventions to a global scale.

Conclusion: Postgraduate training programmes can incorporate global health topics to promote global health career development and leadership opportunities in pharmacy.

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Interactive interview preparation topic discussions: Preparing students to discuss global health experiences

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Background: In 2003, the Purdue University College of Pharmacy established an eight-week global health Advanced Pharmacy Practice Experience (APPE) in Eldoret, Kenya. Students have reported difficulty summarising their experiences when questioned during interviews, often failing to connect the experience to skills needed in United States-based careers.

Purpose: The purpose of this project was to assess the impact of interview preparation topic discussions designed to train student pharmacists to effectively reflect and articulate on clinical, inter-professional, communication and cultural skills gained in a global health APPE

Method: A 19-question survey was distributed via Qualtrics to 59 students who participated in the topic discussions over a three year period. Baseline demographics and postgraduate plans were collected. Additional questions were formulated using a 5-point Likert scale and addressed the effectiveness of the discussions and application in interviews.

Results: Of the 59 students who received the survey, 42 students provided complete responses. Thirty-two (32) students 'strongly agreed' that they were able to apply their experiences

in Kenya to typical interview questions. twenty-nine (29) students either 'strongly agreed' or 'agreed' that the discussions helped them to be overall more successful with interviews. Thirty Five (35) students 'strongly agreed' or 'agreed' that the topic discussion should be continued for future students.

Conclusion: Students who participated in the topic discussions demonstrated confidence and an ability to articulate their global health experiences when asked about their APPE in an interview. In general, students agreed the discussions should be continued in future years.

Designing a work-integrated problem-based workshop: Collaboration of academia and industry

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Background: Transition from being a student to a pharmacist is challenging, as there might be a gap between the theory and practice. Work-integrated learning (WIL) can support students in this identity transition by enabling them to use their knowledge in a real-world setting (Noble, McKauge, & Clavarino, 2019). Problem-based learning (PBL) is a pedagogical approach which focuses on active student-centred learning through the experience of solving a meaningful problem (Wood, 2003).

Purpose: To combine PBL and WIL in order to develop a workshop for student pharmacists who aim to pursue a career in the pharmaceutical industry.

Method: We will ask our partners in the industry to help us design problem cases from actual issues they face in work setting, including Regulatory, Marketing, Quality Control, etc., with respect to the confidentiality. These cases will be brought to a collaborative workshop. The workshop needs to be evaluated using a robust method such as Kirkpatrick's framework (Tamkin, Yarnall, & Kerrin, 2002).

Results: During the workshop, cases will be randomly assigned to small groups of student volunteers. Each group has to work on their case and this process involves teamwork, self-directed learning, cooperation and finally presentation skills. According to Kirkpatrick's framework, evaluation of reaction can be conducted by course-rating features at the end. Learning level can be assessed by performing pre- and post-tests in the first and last day, assessing participants' knowledge (Tamkin, Yarnall, & Kerrin, 2002).

Conclusion: A well-organised design to carry out all the processes as planned is feasible and will be conducted. Confidentiality, collaborative approach and assessment of the efficacy are the main features of this study.

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Retrieving pharmacological knowledge through a modified version of mind palace technique

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Background: The *method of loci* (MOL) is probably the most versatile mnemonic tool (Bellezza, 1981) arranging and recalling the memorial content, based on the spatial relationship between 'mind palaces' (Dalgeish *et al.*, 2013). In an earlier study the use of MOL has been shown to lead to a better information recall in medical students (Qureshi *et al*., 2014).

Purpose: High efficacy of MOL to enhance memory introduces an evident potential to help pharmacy students recall drug-related concepts. Before designing such a device, its pros and cons should be evaluated.

Method: Relevant literature between the years 1990 and 2020 were identified by searching electronic databases such as PubMed and SCOPUS.

Results: MOL facilitates recall by creating associations between new items and already stored items in the long-term memory. The process of implementing MOL in teaching is time-consuming unless students have a common familiar place to use as the *loci*. It can be virtual (Legge *et al*., 2012). To assess the effectiveness of the method in the context, a pilot study should be designed. There's also a need to assess if it encourages students' interest and stimulates active learning.

Conclusion: To eliminate the required mental effort to create the *loci* and link them to the new items (in our case, drug-related concepts), which reduces students' compliance, virtual reality of a hospital will be used. It needs to have well-organized details with many eye catchers and drug-related concepts integrated/ dispersed by experts. A pilot study should be performed and evaluated using The Kirkpatrick Four-Level Training Evaluation Model (Smidt *et al.*, 2009) to evaluate the designed programme and improve it accordingly. The authors will implement the modified version of the model according to the findings of this study.

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Education and training in veterinary pharmaceutical sciences

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Background: The responsibility to provide high-quality pharmaceutical care for animal patients challenges pharmacist knowledge regarding indications, dosages and drug administration in animals.

Purpose: To develop a training programme for pharmacists in veterinary pharmaceutical sciences.

Method: Three questionnaires were developed and disseminated to veterinary surgeons, pharmacists and pet owners to identify challenges of access to medicines and the perception and contribution of the pharmacist in the treatment of animals. Data collected were used to design a training programme for pharmacists. The training programme was validated using a modified e-Delphi method.

Results: Respondents consisted of 92 pharmacists, 21 veterinary surgeons and 231 pet owners. Seventeen (17) veterinary surgeons prescribed human medicines for use in animals because the veterinary medicinal product needed was not available. Pharmacists were perceived as unprepared to safely dispense and provide advice for medication use in animals by 61 pharmacists, 16 veterinary surgeons and 122 pet owners. Pharmacists (68) and veterinary surgeons (16) agreed that pharmacists should be trained in veterinary pharmaceutical sciences. Pet owners (n=171) would be more willing to ask a pharmacist for advice if they could be sure the pharmacist is knowledgeable. The validated training programme consisted of three main areas, namely veterinary disease states, veterinary pharmacotherapy and regulation of veterinary medicinal products.

Conclusion: The perception on the skills of pharmacist with regards to veterinary pharmaceutical care remains a challenge and a barrier to the optimisation of veterinary pharmacy services.

Podcasting as an asynchronous e-learning tool for pharmacists

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Background: As health professionals, pharmacists must maintain their knowledge and skills up to date. Currently, the most common way to provide education in our organisation is through attendance-based courses. A limitation of these courses is the requirement of attendance at established times. This situation calls for new approaches to make education more accessible. Podcasting is an asynchronous e-learning tool that allows access to educational material at anytime and any place.

Purpose: To assess the impact and the utility of podcasting as an asynchronous e-learning tool for pharmacists

Method: To design this project four steps were followed: analysis, design, develop, and evaluation. The analysis of the situation found that the number of pharmacists attending in-class courses was low. Our organisation decided to record a podcast on a monthly basis to be posted on our website so that registered pharmacists could click to listen or download each episode at any time. An analysis was performed by Google Analytics and the utility was assessed trough an on-line questionnaire.

Results: During the first year, 12 podcasts were posted. Analysis showed that the total number of downloads were 6,139 with an average of 453 per podcast (SD135). Downloads occurred mainly during the first month of release (78%, SD7.31). An on-line questionnaire was e-mailed to all registered pharmacists. It was completed by 123 (5.5%). Of the respondents, 95% agreed with the length, 96% considered the contents appropriate, 94% declared to apply these contents to their working routine and 96% would recommend the podcasts to others.

Conclusion: The number of downloads and the pharmacists feedback suggest that podcasting is a helpful e-learning tool.

SMART Innovation Workshop: Uncovering educational needs of Armenian pharmacists

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Background: Delivery of quality pharmaceutical care depends on pharmaceutical professionals (Rouse *et al*., 2016). The shortage of competent pharmacists, and evolution of the profession require identification of priority areas for improvements to address locally determined needs (FIP, 2016; FIP 2017).

Purpose: The study reveals the viewpoint of key stakeholders concerning the main areas for change in education and practice.

Method: Brainstorming, SWOT analysis, and prioritisation. Learning, based on the Pillars and Foundations of Educational Quality incorporated in the SMART Pharmacist Programme (Meštrović & Rouse, 2015).

Results: As a result of interactive sessions (October, 2018), with the participation of 80 stakeholders, and facilitated by international experts (ACPE, Pharma Expert) the priority areas for change were identified by participants as:

1. Setting and implementation of monitoring and evaluation systems for professional practice.
2. Separation of the roles of pharmacists, clinical pharmacists and technicians; development of competency frameworks, and concordant changes in professional curricula.
3. Actualisation of the Continuing Professional Development (CPD) model of learning, and provision and availability of pharmaceutical information in the Armenian language.
4. Enhancing the capabilities of pharmacists to provide integrated care, with focus on non-communicable diseases and the introduction of new services.
5. Adaptation of curricula and professional recognition systems for all stages of careers.

Conclusion: Many Armenian priorities revealed map to challenges faced by the pharmacy profession internationally. Weak implementation of existing legislation underlines the main difference in the Armenian context.

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Specialisation and advanced practice in Armenia

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Background: The terms 'advanced practice' and 'specialisation' should reflect the stages of knowledge, skills, experience and performance (FIP, 2017). Evidence from other countries confirms that tools and frameworks for advancement are limited, often within the boundaries of curricula (FIP, 2015).

Purpose: To examine the perspectives of Armenian pharmacists for vertical advancement from initial education towards advanced practice and specialisation.

Method: Boundaries outlined by Armenian legislation for pharmacists and technicians were mapped with their educational pathway.

Results: 'Scope of Practices' mainly originate from foundation training. For example: technician - dispensing and compounding etc.; bachelor - also general practice, marketing, analysis etc.; additionally for masters - counselling, management; on top of that for pharmacist-specialists - research and supervision of 'pharmacists without masters degree'. 'Specialisation' refers to a narrow scope of practice for graduates of non-medical universities, for example: research for pharmacist-chemists. There are four specialisations for pharmaceutical residents graduated from medical universities. However, these lack competency frameworks, elements of vertical advancement or practices that extend beyond initial education. Professional development requirements (mandatory Continuing Professional Development) are not interrelated to real advancement and specialist development.

Conclusion: Defined requirements for a formal professional ladder exist only in academic pharmacy (associate professor, professor, corresponding member of academy, academician). In other sectors there is a lack of prerequisites for specialisation and professional advancement of pharmacists.

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Attitudes and perceptions for additional residency training: The value of postgraduate year three residency

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Background: While postgraduate year one (PGY-1) residencies offer entry-level exposure to pharmacy and PGY-2 provides an advanced specialty focus, PGY-3 residencies could fill in the gaps in key training areas. Presently there is a paucity of postgraduate year three pharmacy programmes, a question of its value in practice, and lack of standardisation for training.

Purpose: To determine the attitudes and perceptions of pharmacy residency members for PGY-3 residency training compared to other avenues of career advancement.

Method: A 28-item online questionnaire was emailed to all accredited residency programme members between January to March 2019. Questions were anonymous and assessed participant's perceptions for PGY-3 programmes regarding familiarity with concept, benefits and limitations, and programme structure.

Results: Eight hundred and forty-five (845) individuals participated in the survey with a 22.47% response rate. Only 288 pharmacists were familiar with PGY-3 training (34.4%). Benefits of PGY-3 training included job specialisation (34.41%), additional training (19.93%), and research skills (5.44%). Limitations of a PGY-3 included finances (21.62%), lack of justification (13.83%), and time commitments (12.94%). Board certifications (49.5%), scholarly activity (19.8%), and pharmacy organisational leadership (19.2%) were higher rated areas for career advancement over PGY-3 training. The majority of participants were opposed to the standardisation of PGY-3 programmes and had negative preconceptions of its implications on the job market.

Conclusion: Pharmacists were opposed to the concept of PGY-3 residency and noted limited benefits of the position professionally. Participants favoured on-the-job training and other areas for career advancement over PGY-3 residency.

A curriculum designed for disadvantaged, minority pharmacy graduates in medically underserved communities

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Background: Sixteen point two percent (16.2%) of pharmacy graduates are from underrepresented minorities (URM) or educationally, economically disadvantaged (DA) backgrounds. However, these students are more likely to practice in medically underserved communities (MUCs). As healthcare providers reflecting the nation's changing demographics, pharmacists from URM or DA backgrounds can be better equipped to tackle minority health issues, rural needs, and work in MUCs.

Purpose: To develop a pharmacy curriculum designed to increase the diversity of pharmacy graduates from DA and URM backgrounds that practice in MUCs.

Method: Didactic curriculum focused on MUC training through cultural awareness, diversity, and special health needs of unique populations. Strategic partnerships and collaborations were formed with healthcare entities and health departments in MUCs to allow exposure to diverse patients. Student support services included traditional components such as peer tutoring and faculty mentoring programmes, and novel stress management and family-oriented support services to ensure retention of DA and URM students.

Results: From 2016-2019, 75% of graduates were from DA backgrounds and 61% were URMs. Tracking of student retention with both academic and social support allowed for a 79% on-time graduation rate and 88% NAPLEX first-time pass rate. Over 57% of students had clinical rotations in MUCs, with 65% of those completing two or more rotations in MUCs. Out of 178 students, this approach led to 40% of graduates practicing in MUCs.

Conclusion: Creation of a didactic and experiential curriculum that focuses on recruiting, retaining, and graduating DA and URMs with enhanced exposure to MUCs allows for more students to continue serving in MUCs after graduation.

Critical moments for learning transformation on international pharmacy placements

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Background: International placements have been shown to be transformative for developing students personally and professionally in areas such as communication, empathy, self-efficacy, and cultural awareness. Mezirow's transformative learning theory suggests that students need to face a disorienting dilemma to prompt reflection of beliefs and construction of learning and perspectives.

Purpose: To evaluate self-perceived critical moments that were transformative to learning in students who participated in an international pharmacy placement.

Method: Final year students who went on an international placement participated in a one-hour focus group where they reflected on critical moments that were transformative for their learning. Focus groups were transcribed verbatim and went through a two-cycle, two coder open coding process using a conventional content analysis approach.

Results: Twenty-two (22) students across three schools of pharmacy opted to participate. Students went to high income (18%) and low-to-middle (LMIC) income (82%) country locations. Critical moment themes in the high-income group involved witnessing an innovative patient care technique and experiencing negative healthcare team dynamics. Themes in the LMIC group involved engaging in a sensitive patient interaction, experiencing healthcare system barriers, going out of their comfort zone, and making a difference.

Conclusion: International placements put students in unfamiliar environments that created disorienting experiences to transform students' personal and professional perspectives. A majority of critical moments evoked strong feelings that may have influenced self-reflection of values and beliefs.

Development of rural/underserved core curriculum for pharmacy students

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Background: East Tennessee State University, Bill Gatton College of Pharmacy is located in the south central Appalachian region of the United States, and has a mission to develop progressive, team-oriented pharmacists that improve healthcare, focusing on rural and underserved communities. Processes to formalise and better document the College's activities impacting rural and underserved communities began in 2017.

Purpose: To describe the early development and implementation of a core rural/underserved curriculum for Doctor of Pharmacy students within the overall curricular structure. Didactic, laboratory/simulation, and experiential components were designed with the goal of preparing all graduates for entry-level practice caring for rural and/or underserved patients.

Method: Descriptive analysis of strategic planning and implementation process that included administration, faculty, students, and external stakeholders using a Plan-Do-Study-Act implementation science approach.

Results: A Rural Health Initiative Strategic Plan was developed; competencies, learning experiences, and assessment plans have been implemented. All students participate in at least one high impact rural/underserved learning experience each year. Collectively over 800 rural/underserved experiential service learning hours were completed in the 2019-2020 academic year.

Conclusion: Core rural/underserved education is now in a quality assessment and improvement phase. Next steps in strategic implementation are to capitalise further on strategic partnerships, develop additional opportunities for specialisation, and expand upon related scholarship and assessment activities.

Use of World Café in a paediatrics and geriatrics course to address social health concerns

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Background: World Café was developed as a relaxed environment to engage participants in dialogue that would be strategic, transformational, and result in social innovation. Paediatric and geriatric pharmaceutical care is influenced by multiple social health concerns thus pharmacists must acknowledge these to provide holistic care. World Café provides a method of teaching that challenges students to actively engage in identifying these concerns and working towards solutions.

Purpose: World Café seeks to expand the perspective of pharmacy students beyond medication management to consideration of social, behavioural, and socioeconomic factors. Engaging in active dialogue and shared problem-solving encourages development of potential solutions to address contemporary issues in paediatric and geriatric populations.

Method: Faculty dedicated a three and a half hour class session each year to conduct a Paediatric and Geriatric World Café. Faculty provided a relaxed café environment and moved students through a series of questions as groups shuffle. Issues and related interventions are harvested from full class discussions at the end.

Results: For paediatric populations, students routinely identify immunisation concerns and advocate for community-pharmacy based interventions. For geriatric populations, students routinely identified fall risks and advocated for home assessment and educational interventions. Other issues varied based on current issues in the news and surrounding community.

Conclusion: The World Café requires significant planning, time, and space however it allows students a unique environment to engage in shared problem-solving related to contemporary issues impacting paediatric and geriatric patients.

Global health area of concentration in the Pharm.D. curriculum: Student perspectives

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Background: At the University of Pittsburgh School of Pharmacy, students can personalise their education by joining an area of concentration in global health (ARCO-GH). The ARCO-GH provides in-depth exposure to global health pharmacy practice through coursework, experiential placements, and research.

Purpose: To describe current students' global health interest, experiences in global health, as well as perceptions on cultural sensitivity and health disparities while participating in the ARCO-GH.

Method: This qualitative study recruited second to fourth year Doctor of Pharmacy (Pharm.D.) students currently enrolled in the ARCO-GH. Two focus groups were conducted with seven to nine participants in each session. The focus groups were audio-recorded, transcribed *verbatim*, and independently coded through an iterative process to determine major themes.

Results: A total of 16 students participated in two focus groups, including at least one participant from each academic year. Three major themes revealed that: 1) the ARCO-GH provided varied opportunities to personalise education, 2) students gained in-depth global health insight through hands-on experience, and 3) students developed new perspectives on approaching underserved care.

Conclusion: Students find value in the ability to their tailor interests in the area of global health. A concentrated experience in global health provides students the opportunity to grow professionally and understand the complex obstacles marginalised populations face locally and globally. This programme is a meaningful strategy to support Pharm.D. students in global health.

Development of a simulation centre escape room for third year Doctor of Pharmacy students

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Background: Gamification uses game mechanics to promote engagement and problem-solving. Over past years gamification has become widely used in both industry and academia as a tool for training and education.

Purpose: To describe the development and planning of a simulation centre escape room experience for Doctor of Pharmacy Students.

Method: Howard University College of Pharmacy (HUCOP) collaborated with the Howard University Health Sciences Simulation Centre to develop an escape room learning activity. Clinical cases were developed that focused on opioid withdrawal, diabetes, anxiety, and asthma. Each case requires students to apply didactic knowledge and demonstrate techniques like intramuscular injection, insulin dosing and injection, and appropriate inhaler use. Meetings with the simulation centre staff occurred in the autumn of 2019. All cases and lab parameters had to be provided to the simulation centre six weeks in advance and multiple meetings were required to ensure simulation centre staff understood the setup of the activity.

Results: Collaboration between HUCOP and the simulation centre allowed for true simulation of leisure escape room environments because the faculty can unobtrusively observe students in the room whilst also interacting with students from a distance. The simulation centre was equipped with an interactive health care mannequin and necessary equipment to simulate standard health care environments.

Conclusion: Increased utilisation of gamification allows for innovation in the delivery of activities for pharmacy learners. Collaboration with a simulation centre to conduct escape room activities for healthcare students is possible and provides a unique learning experience for student pharmacists.

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Inter-professional experiential learning in pharmacy education: A global scope review

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Background: For a change in healthcare services, a change in health training is necessary. Inter-professional education (IPE) and experiential learning (EL) have been pointed as crucial to provide patient-centred care through the building of effective collaborative health care teams.

Purpose: To analyse IPE experiences in pharmacy education described in recent literature.

Method: Scope review in six databases, including publications from the past five years on IPE experiences involving pharmacists or pharmacy students. Here are presented results

related to the teaching modality, learning scenario and methods of the experiences included in the review.

Results: One-hundred and forty-seven (147) articles were included. Experiences took place exclusively in person (124), exclusively e-learning (10) and blended (12). As for the scenarios, the experiences took place in the classroom (53), ambulatory/ hospital/clinic (33), in a mixed scenario (15), online (9), community (10) or specialised simulation centre (6). The most used methods were: education based on clinical practice (39), mixed methods (44), education based on simulation (32), education based on problems (21), seminar (11). 46 involved real patients.

Conclusion: Inter-professional experiential activities have been implemented using clinical and community workplaces, providing experiences with real and simulated patients. The articles indicate the methodological diversity of inter-professional education experiences being offered to pharmacists and pharmacy students in conjunction with other health and social service professionals.

Through the students' eyes: The perceived benefits of final year international pharmacy rotations

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Background: More than 200 St. Louis College of Pharmacy (STLCOP) students have participated in international Advanced Pharmacy Practice Experience (APPE) rotations in 16 countries. After rotations, students reflected on their international experiences.

Purpose: To gain insight into student perception of how international learning experiences impact personal and professional growth, their rotation site, and STLCOP.

Method: Researchers compiled, de-identified, and reviewed one year's worth (n=32) of written international rotation reflections. Researchers created a mutually agreed upon codebook of operationalised themes; each reflection may have multiple themes. Two researchers coded each reflection separately; a third researcher reconciled discrepancies.

Results: Reflecting on personal learning, the most frequent themes were expanded knowledge of: international health systems (n=15), pharmacy practice differences (n=11) and other cultures (n=10).

Themes on learnings that helped the rotation site included: perspectives on U.S.A. pharmacy (n=16), disease and drug updates (n=10), participation in clinical care and pharmacy tasks (n=4) and experiential opportunities for local students (n=2).

Themes related to STLCOP benefits included internationalisation of campus (n=16), ambassadorship (n=4), marketing (n=2) and diversification of the curriculum (n=2). Some students struggled to provide complete or adequate responses to some reflection questions.

Conclusion: Analysis demonstrated that international rotations result in a perceived positive impact on students' personal and professional growth as future pharmacists and benefits for both the rotation site and STLCOP as an institution of higher learning.

Innovative experiential learning and clinical skills preparing APPE and practice-ready student pharmacists

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Background: The University of Pittsburgh School of Pharmacy offers a four-year professional degree programme (PittPharmacy) offering personalised education through innovative experiential learning, curricular assessment, and patient care documentation. PittPharmacy prepares students to be both Advanced Pharmacy Practice Experience (APPE)- and practice-ready.

Purpose: To describe how patient-centered experiential learning and clinical skills shape APPE- and practice-ready student pharmacists.

Method: Data describing the experiential learning curriculum were collected from a database of simulated, standardized, and real patient encounters. We defined 'APPE-ready' as applying knowledge, skills, and attitudes learned in pre-APPE settings and 'practice-ready' as clinical competence to provide medication management in practice. To assess APPE- and practice-readiness, we described patient encounter data in the pre-APPE and APPE curriculum, data from post-graduate residency match rates, and graduating student survey responses.

Results: The Pharm.D. Class of 2019 (n=113) encountered on average 61 patients (range, 32-92) patients in the pre-APPE curriculum, compared to 266 patients (range, 110-636) in the APPE curriculum. PittPharmacy's 2019 residency match rate was 84.7% (n=59) compared to the national average 67.0% (n=4,617). Data from the 2019 graduating class showed that 71.6% of students strongly agreed that APPEs were of high quality. Likewise, 94.1% students agreed that their IPPEs were valuable to prepare for APPEs.

Conclusion: PittPharmacy students collaborate as competent members of interdisciplinary teams to advance patient care. Student readiness can be attributed to the unique clinical preparatory experiences embedded in the University of Pittsburgh curriculum.

Minors/concentrations in pharmaceutical care (PC)

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Background: The Minor are curricular itineraries made up of optional subjects. Pharmaceutical Care minor (PC), has a consolidated training approach in the field of healthcare, is built as a strong programme based on the experience of our institution and an extensive network in the healthcare sector.

Purpose: To offer to undergraduates a preparation in specialised skill in pharmacy practice

Method: PC concentration has the following features:

- All the subjects have Master's level which allows the students to direct access to Ph.D.
- All the subjects are mandatory within the concentration.
- There are four theoretical subjects and practical training with a total of 36 ECTS.
- Minor-oriented practical placing is mandatory and performed for a period of three months at a related institution.
- Include subjects not common in undergraduate; Quality and Safety in Drug Use, Evidence-based Pharmacy, Organisation of community pharmacy services and Pharmacy practice in chronic disease.
- Within the framework of different subjects, workshops are included and involve the participation of professionals from different sectors of pharmacy practice.
- Students participate in clinical simulations that allows them to work differently skills.

Results: During 2019-2020, 15 students have chosen PC. Placements are distributed in 1 scientific/regulatory consultancy, 2 research institutions, 9 hospitals and 2 pharmacy administration. There were 8 workshop (ex. orthopaedics, pharmacogenetics in patient safety, digital strategy in pharmacy).

Conclusion: It gives to the student an important degree of specialization and approach to the professional environment. This methodology allows the student to integrate other important skills in pharmacy practice.

Resource use assessment for pharmacy skills labs involving Pharmacists' Patient Care Process (PPCP) activities

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Background: The Pharmacists' Patient Care Process (PPCP) is a fundamental component throughout pharmacy the programme curricula in developing practice-ready pharmacists. Currently, no data exists regarding resources needed to successfully implement and support PPCP-related learning in pharmacy skills lab courses.

Purpose: To evaluate resources allocated towards skills-based lab courses focused on PPCP-related, direct patient care activities.

Method: A 44-item, benchmark, pilot survey consisting of multiple-choice, open-ended and Likert scale questions was created by skills lab faculty from five Big Ten pharmacy schools. Surveys evaluated skills lab course structure, curricular design, PPCP-related skills education and assessment, and resources. Surveys were completed electronically. Data were analysed using descriptive statistics.

Results: Most (8/9) of the Big Ten schools assessed have stand-alone lab courses, while one is integrated with pharmacotherapy lecture. On average, PPCP content is taught across five courses (range: 4-6). Students spend about 160 minutes weekly in labs with 48 students (average) per session. Common lab personnel support across all programmes include pharmacy residents and Advanced Pharmacy Practice Experience students. On average, faculty spend twice as much time preparing for (1096 hours) than teaching (695 hours) labs. Most faculties have adequate space, funding, and supplies to run courses. Personnel and time to adequately teach PPCP were identified as areas of need.

Conclusion: Although resources for teaching and assessing PPCP-related content in skills labs vary across peer Big Ten institutions, personnel support and time are common areas of need. Future research will further assess lab skills resource needs and use across United States pharmacy schools.

Meeting educational needs of pharmaceutical stakeholders: Community practice

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Background: A relevant level of competence of the community pharmacy working team is essential to meet the expanding scope of patient-focused practice.

Purpose: To describe pharmacy support staff structures in community pharmacies in Malta and to identify education and training needs for pharmacy support staff.

Method: A validated self-administered questionnaire was disseminated to 30 managing pharmacists practicing in pharmacies which are part of a group and 30 managing pharmacists practicing in independent pharmacies. The questionnaire addressed pharmacy support staff structure, expected skills, health care services which pharmacy support staff could be trained on, and additional educational and training needs.

Results: Forty-five (45) responses were received. The pharmacy support staff structure consists of salespersons in 42 pharmacies, pharmacy student trainees in 22 pharmacies and pharmacy technicians in ten pharmacies. Motivation to learn (n=38), to be patient-focused (n=36), enthusiastic (n=34) and accurate (n=32) were rated as 'very important' pharmacy support staff skills. An area identified by the majority of the respondents (n=41) where support staff could receive additional training is related to reducing drug wastage and educating patients on drug waste management. Thirty-one (31) pharmacists considered that improving pharmacy-related knowledge of pharmacy support staff would free up time for community pharmacists which they can dedicate for clinical tasks.

Conclusion: Respondents identified areas that are relevant in the elaboration of short-courses intended for pharmacy support staff such as accuracy, documentation and patient education campaigns.

Navigating the science, the myths and the realities of COVID-19 pandemic

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Background: A number of challenges are faced by health systems and academia as the SARS-CoV-2 viral infection spreads to pandemic levels.

Purpose: To develop webinars presenting scientific evidence and reflecting on the challenges in navigating the science, myths and realities of COVID-19 pandemic. The webinars were intended to develop an inter-professional dimension to the discussion by analysing current research, practices and applications proposed by institutions within the international scenario.

Method: A series of webinars was prepared and presented every week, each of a duration of 45 minutes with 15 minutes discussion. For each webinar, a panel of experts including virologists, immunologists, specialists in infectious disease, internal medicine and intensive care, pharmaceutical and public health regulators.

Results: Eight webinar topics were presented covering the presentation of the infection, the rationale for re-positioning of medicines, on-going clinical trials, medical devices and use of personal protective equipment, scientific-evidence related to containment measures, laboratory investigations and interpretation, development of vaccines and the consequences of lockdown such as affordability, social health and well-being. Each webinar was followed by an average of 250 participants. Participants consisted mainly of health professionals including students and academics from the University of Malta and other international academic institutions.

Conclusion: The webinars served to present an analysis of scientific evidence within an inter-professional discussion and sharing of experiences and data.

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CONFERENCE ABSTRACTS

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Pharmaceutical Practice: Community Pharmacy

Community pharmacists' views of postgraduate Quality Improvement (QI) training and impact on practice

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Background: As pharmacists continue to extend their professional roles and deliver new services, there is growing debate on how pharmacies can maintain service quality within a clinical governance framework.

Purpose: It was hypothesised that a postgraduate Quality Improvement (QI) module that provided pharmacists with methodological training in the principles of QI, could be used to support service safety, effectiveness and patient experience.

Method: In collaboration with four Local Pharmaceutical Committees (LPCs), one university developed a QI training module; 28 community pharmacists enrolled on the module. Focus groups were used to explore motivation to undertake the learning, organisational support, impact on knowledge and outcomes on practice. Focus groups were audio recorded, transcribed and analysed thematically.

Results: Six focus groups were held involving 21 community pharmacists. The findings showed that pharmacists' experience of the QI learning was positive with significant improvements in comprehension and application in practice. However, some pharmacists reported a lack of time to undertake the learning. There was a perceived lack of organisational support and pharmacists considered it too soon to make an assessment on patient outcomes as their improvements required time to fully embed in practice.

Conclusion: Despite the barriers to learning, pharmacists demonstrated improved knowledge of QI methods and reported using these approaches with their teams to improve practice. With an expectation on pharmacists to extend their roles, there is a pressing need to effectively promote QI skills to deliver change, ensure quality and transform services.

COVID-19 – seen through the eyes of the pharmacy interns

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Background: One hundred and thirty (130) pharmacy students from the University of Copenhagen were doing their pharmacy internship in community pharmacy. Here they are to acquire knowledge of, as well as skills and competencies in, areas such as organisation, leadership, ethics, economy, patient counselling, patient safety, cooperation etc. The COVID-19 pandemic hit the entire world and created an extra steep learning curve for the interns. And why not try and combine the two: the pharmacy internship learning and the COVID-19 crisis? It is important to explore how pharmacies manage their customary and newly emerging roles during the COVID-19 outbreak.

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Purpose: The purpose of the study is to reveal how the COVID-19 pandemic influences pharmacy organisation, leadership, ethics, economy, patient counselling, patient safety, and cooperation seen through the eyes of the pharmacy interns.

Method: A two-page long questionnaire on how COVID-19 influences the above mentioned areas was uploaded to the internship webpage, hopefully inspiring the interns, who were tasked with handing in a nine-page long report as part of their exam. A content analysis of the reports will be done.

Results: Since the interns hand in their reports by June 19 2020, no results are available yet. If all interns write about COVID-19 in their report, though, more than 1,000 pages on their COVID-19 experiences will exist. Answers with the most insightful learning potential for pharmacy practice globally will be presented and discussed.

Conclusion: Having successfully carried out pharmacy internship-based research for more than 20 years in Denmark, we are convinced that the study will reveal useful results.

Vaccinating pharmacist in Italy: Why still a taboo?

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Background: The administration of vaccines by pharmacists is a reality in a number of countries. This provision leads to an increase in the immunisation rate and a notable gain in consensus amongst the population. In Italy, this service has not yet been started.

Purpose: To evaluate the opinion of pharmacists and pharmacy customers regarding vaccines, and the proposal to authorise Italian pharmacists to administer vaccines. Based on data from a first-wave investigation that was carried out in a rural area, we have extended the study to a metropolitan area.

Method: Data were gathered from direct interviews by means of questionnaires in ten pharmacies located in Turin (Italy).

Results: Eight hundred (800) pharmacy customers were interviewed and 79% of them were found to be in favour of the introduction vaccinating pharmacist. Moreover, 76% affirmed that vaccines are safe and effective. The questionnaires of 111 pharmacists were also collected. Only half of the interviewed pharmacists were in favour of being authorised to administer vaccines. Many were concerned about the management of potential adverse reactions following immunisation. About 90% of the pharmacists were in favour of vaccines.

Conclusion: The data confirm the results of the first wave as to the particularly positive feedback, from pharmacy customers, regarding the subject of pharmacists being authorised to administer vaccines. The uncertainties shown by the pharmacists on this subject can be solved thanks to specific training on injection techniques and the management of potential adverse events following immunisation, as implemented in countries in which vaccinating pharmacists are already a reality.

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Virtual integration of the Shared Pharmaceutical Record with medicines related e-health services in Belgium

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Background: E-health services, such as electronic prescriptions, the Shared Pharmaceutical Record (SPR), digital medication plans, and reimbursement procedures have been implemented progressively in Belgium. Uniform standards were developed and introduced in collaboration with authorities, service providers and software vendors.

Purpose: Integration of medicine related e-health services allows sharing and re-use of data, once-only data entry and interdisciplinary collaboration through common tools. It supports the family pharmacist's function in patients' medication management.

Method: A national e-health action plan was launched in 2012 creating common objectives, overarching governance and coordination among e-health projects in Belgium. Those regarding medication were brought together in a Virtual Integrated Drug Information System (VIDIS) (Project Team VIDIS, 2020). Community pharmacists participated since they provide e-health services for sharing dispensing and medication plans through FarmaFlux (Farmaflux, 2020).

Results: In 2012 MyCareNet, a e-health service providing reimbursement information became mandatory in pharmacy. In

2017 the family pharmacist service was launched: 835,000 patients have applied since. In 2019 electronic prescribing became mandatory and the roll out of the SPR was almost complete: 99.9% of registered pharmacies were connected. In 2020 sharing digital medication plans will be developed by FarmaFlux and the VIDIS web application will be released.

Conclusion: Common standards and procedures amplify virtual integration of medicines related e-health services into a comprehensive web application, allowing access for citizens and interdisciplinary collaboration, thus anchoring the family pharmacist in patients' medication management.

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A pharmacist's view of the impact/management of medicines shortages in the pharmaceutical supply chain (Spain)

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Background: Access to medicines, or lack of it, is a global phenomenon which is an increasing problem for healthcare professionals. Patient health and wellbeing can be adversely affected by this issue and it adds to pharmacist workload and stress levels.

Purpose: To analyse the impact of medicines shortages (MedS) on the pharmaceutical supply chain (PSC) as reported by pharmacists in Spain and to examine current management strategies.

Method: An e-questionnaire was piloted and completed by 271 pharmacists. The questionnaire was deployed in August 2019 and circulated via social media networks. Ethical approval was obtained from the University of Bradford Ethics Committee.

Results: Seventy-five percent (75%) of respondents were community pharmacists, 85% of which said that medicines shortages occurred daily. Medicines unavailability caused delays in patient care, inability to provide treatments and alternative medicines to be sourced. MedS caused extra work (1-2 hours/day as reported by 63%) and 79% confirmed that they had suffered adverse financial repercussions. A large proportion of respondents (85%), were aware of the national reporting system for medicines shortages but felt that it did not work effectively. Approximately 60% said that they were unaware of key policies guiding this activity and advocated greater stakeholder communication.

Conclusion: Surveyed pharmacists demonstrate great resilience, determination and adaptability in managing the impact of medicines shortages. They do this to better serve their patients. Further exploration needs to be undertaken to identify and share good practice in medicines shortages management strategies and to provide additional support and guidance.

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Pharmacy Space

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Background: Pharmacists in Egypt and developing countries suffer from difficulties in communication, the lack of opportunities to develop their skills, the lack of opportunities for interaction and expression of opinions, and few provided opportunities to work and continue in education.

Purpose: Facilitate communication between pharmacists by creating a social networking site for pharmacists.

Method: 'Pharmacy Space' is a network that connects specifically pharmacy professionals; it has many features including chatting, presenting topics for discussion, showing the latest news in the field of pharmacy from reliable sources, it offers online courses and job opportunities. A prototype of the site was made and tested on a group consisting of more than 100 pharmacists from five different regions in Egypt, to test the effectiveness of the website.

Results: The website proved to be very effective in improving communication between pharmacists and providing some opportunities for courses or jobs, and some effective discussions were held on the current pharmacy situation in Egypt and ways to develop it.

Conclusion: 'Pharmacy Space' is an effective way to reduce the distance between pharmacists in developing countries for one goal, which is to develop pharmacists themselves and the pharmacy profession as a whole.

FIT - the right training at the right dose

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Background: The FIT Programme is a new concept of professional training for community pharmacy teams with both e-learning and face-to-face training components. It was launched in September 2018 by the National Association of Pharmacies (ANFs) Post-Graduate School in Health and Management. FIT is based on three pillars: mentoring of participants, training content is tailored to the pharmacy's reality, and an assessment. FIT helps to up-skill the pharmacy teams in four knowledge areas: Technical and Scientific, Operational Efficiency, Soft Skills, and Technological.

Purpose: Describe the implementation and quantitative and qualitative results of the new pharmacy training model - FIT from October 2018 to October 2019.

Method: FIT was launched on the 18th October 2018. FIT continued in 2019 featuring decentralised sessions. The programme data were collected and analysed with Microsoft Office tools - Power BI that aggregates the data from the participants and pharmacy management platforms - Humantrain and Percepium e-learning platform, and reporting results from it.

Results: In the first year 49% of Portuguese pharmacies and 7,300 participants were enrolled (3,635 participants were involved in face-to-face training sessions and 3,400 participants completed the programme). Satisfaction surveys showed that 97% of the participants were 'very satisfied' or 'satisfied' regarding the relevance to professional activity.

Conclusion: Fifty percent (50%) of Portuguese pharmacies have joined FIT, suggesting that it met their expectations and needs. Being able to 'do it' is much more than just knowing how to 'do it'. FIT goal has enhanced these two concepts, allowing a professional qualification closer to the challenges of the pharmacy and the health sector.

Operação Luz Verde: A new light for patients during COVID-19 pandemic

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Background: During coronavirus disease (COVID-19) pandemic, avoiding hospital visits only to obtain medication was crucial to protect patients and to ensure hospital responsiveness. Portuguese pharmacies have national coverage.

Purpose: To establish a nationwide response that allows patients to receive their specialty medicines (SM) in a community pharmacy of their convenience or at home, ensuring treatment continuity and avoiding unnecessary travelling to and from a hospital.

Method: Community pharmacies, hospitals and pharmaceutical wholesalers collaborated in a structured, multidisciplinary operation, involving healthcare professionals and pharmaceutical stakeholders, endorsed by Pharmaceutical and Medical Societies: Operação Luz Verde (OLV). Hospitals, patient associations, community pharmacies and patients themselves can ask for the dispensing of SM at a community pharmacy. Requests are received by a pharmacist specialised support line (LAF), which ensures communication between all stakeholders. Hospital pharmacists prepare the medicines and wholesalers provide transportation to ensure good practice. Community pharmacists scheduled for medicines to be dispensed with patients, ensuring electronic records and reports of eventual problems were sent to the hospital. OLV is free of charge for patients and hospitals, at least until the end of May 2020.

Results: From the 23rd March until the 15th May 15, 12,229 patient requests were approved by a total of 33 hospitals; 2,189 participating pharmacies and 20 patient associations endorsed the initiative. Final results will be presented at a later date.

Conclusion: Community pharmacies may have an important role in the dispensing of SM. OLV may improve access to these medicines and reinforce potential for reducing inequities.

Characterisation of cardiovascular risk patients: A useful professional service in community pharmacy

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Background: Currently, different professional services are being incorporated into community pharmacies in order to optimise the personalised management of patients. The characterisation and monitoring of patients with cardiovascular risk (CVR) is one of them.

Purpose: To determine the characteristics of patients with CVR in the community pharmacy in order to detect their health needs, and from there, to establish the most appropriate and effective intervention guidelines.

Method: A validated questionnaire was used to facilitate the storage and processing of data from patients with CVR from four community pharmacies, two in Seville and two in Badajoz (Spain), which were recorded through personal interviews. An observational and cross-sectional descriptive study was conducted between January 2016 up until July 2017.

Results: A sample of 100 patients was evaluated, 51% were men, older (61.5 ± 10.1 years) with a low educational level (53.1%) and most of whom living accompanied (88.0%). The 74.5% were primary prevention patients with a moderate level of CVR (2.51±1.89). Hypertension (83.7%), dyslipidemia (64.4%), diabetes type-II (38.8%) and obesity (52.0%) were the most prevalent factors of CVR. Nearly half of the patients (48.5%) engaged in regular physical exercise and 23.5% were smokers. The most commonly used drugs were lipid modifiers (59.4%), oral antidiabetics (37.5%), antithrombotics (32.2%), followed by beta-blockers (28.1%).

Conclusion: The characterisation of patients with CVR through structured and agreed questionnaires can help the pharmacists to provide a professional service adapted to their needs and to develop more effective prevention programmes.

Three-dimensional printing: A new approach for the manufacture of individualised medicines

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Background: Three-dimensional printing (3DP) has been recently identified as an opportunity to make a significant technological leap over traditional pharmaceutical manufacturing processes, especially regarding individualisation of medicines.

Purpose: This work aims to envision the future of the design and manufacture of 3DP individualised medicines.

Method: A SWOT analysis is performed considering the state of the art in multiple perspectives.

Results:

Strengths - Design and development of individualised medicines with flexible and precise doses for specific patient groups (e.g. paediatrics/geriatrics) or patients with specific conditions or diseases (e.g. kidney/hepatic damage; chronic diseases); Manufacture of medicines closer to patients; Advantages when compared to traditional industrial manufacture (e.g. scale up not required); Promotion of pharmacists on prescription evaluation and patient counselling.

Weaknesses - Requirement of trained personnel and qualified technical resources; Initial investment of equipment and software in compounding pharmacies; Running costs may increase; Daily professional practice must change.

Opportunities - 3DP re-centres compounding pharmacy; Better articulation between manufacture and pharmaceutical advice; Higher involvement of patients and patients' associations in medicines' usage; Larger benefits in compliance and health literacy.

Threats - Physicians and pharmacists must change daily practice because medicines are designed, manufactured and prescribed for patients in a tailored way; Stakeholders connected to medicines may resist to changes.

Conclusion: In sum, emergent 3DP can potentially contribute to better, patient driven medicines reinforcing the pharmacist role as a healthcare provider.

Attitudes of Estonian public towards pharmacy-based flu vaccination

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Background: In 2017 Estonia had one of the lowest vaccination rates in Europe for seasonal influenza. Previous studies have shown reluctance towards influenza vaccinations as the vaccine is considered to be ineffective and influenza is regarded as a well-tolerated disease, therefore vaccination is seen as redundant.

Purpose: To determine the attitudes of the Estonian public towards pharmacy-based vaccination and pharmacies as a place to administer vaccines and pharmacists as vaccinators.

Method: A survey was conducted among people who were vaccinated at pharmacies during 2018 and 2019 within the pharmacy-based vaccination programme. The anonymous questionnaire consisted of 25 questions; 850 persons participated. Descriptive statistics with Microsoft Excel were performed for data analysis.

Results: Most of the participants presented to the pharmacy with the aim to get vaccinated and about half had never been vaccinated against influenza. Almost half of the respondents regarded visiting their general practitioner as difficult during working hours and over 95% would use the pharmacy-based vaccination programme again. Almost 90% would accept pharmacists as vaccinators and 97% consider pharmacy a suitable environment for vaccination. During the 2018 pharmacy-based influenza vaccination campaign in 15 pharmacies, about 10% and during the 2019 campaign in 23 pharmacies, about 11% of all influenza vaccines were administered. Vaccination rates have increased from 4% in 2017 to 7% in 2018 and 9% in 2019.

Conclusion: Positive attitudes followed by an increase in numbers of vaccinated people shows the large potential that pharmacies have to reach the members of community who would otherwise be left aside.

Effects of poor prescription handwriting on patients' health: Experiences of community pharmacists in Nigeria

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Background: Therapeutic problems have been linked to, among other things, illegible prescriptions. These result in misinterpretation of prescription orders and consequent medical implications.

Purpose: To assess the effects of poor prescription handwriting on patients' health and possible solutions.

Method: A purposive sample of 104 community pharmacists participated in the study. A well-structured self-administered questionnaire of 14 questions was developed using Google Forms and was administered through various social media platforms by the investigators to community pharmacists in the Lagos metropolis. Descriptive statistics were carried out using Statistical Package for Social Sciences (SPSS) version 25. Data access was managed and restricted to only the investigators.

Results: About 62.5% of the respondents strongly agree that the clarity of a written prescription can affect patients' health. Also, 93% of respondents indicated that poor prescription handwriting has led to a delay in pharmaceutical services. Some indicated that it has caused wrong dispensing (74%), poor health outcomes (62.5%), disagreement with the prescriber (49%), and situations such as confidence loss, death, adverse drug reactions and claims of incompetence (11.5%). Suggested solutions for the problem of illegible prescriptions include; improved handwriting (33.7%), typed (E-) prescriptions (28.8%) and educating prescribers (15.4%).

Conclusion: The study shows that illegible prescriptions can negatively affect a patients' health. There is a need to adopt legible writing, electronic prescriptions and educating prescribers to ensure patient safety.

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SFVETI Project – Training patients at community pharmacies improves their inhalation technique

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Background: Inhalers are the cornerstone treatment for Asthma and Chronic Obstructive Pulmonary Disease (COPD), being a crucial tool for the successful management of the disease.

Purpose: To evaluate the impact of Pharmaceutical Service of Verification and Instruction of Inhalation Technique (SFVETI), a pharmaceutical service to test patients' inhalation techniques performed in community pharmacies.

Method: The results from a prospective study which took place in 15 community pharmacies in Portugal over the period of one year (November 2018 until November 2019) included patients who already used inhalers and patients who were new to using an inhaler. The service consisted of a pharmacist-led educational method, based on watching demonstration videos on correct inhalation technique and evaluation of patient's performance. Additional explanation was also given in case of errors detected. Data from the intervention were registered.

Results: A total of 175 patients (64% were more than 60 years old), 63% (111/175) female gender, were included. The predominant diagnostic was chronic respiratory diseases (n=90, 52%), specifically asthma (n=45, 26%) and COPD (n=45, 26%). Fifteen percent (n=26) of the patients had prescription for two or more inhalers. Under the SFVETI protocol we evaluated a total of 211 inhalation techniques, of which 59 (59/211, 28%) were performed with some errors by patients. After the pharmaceutical explanations, 51 of the patients (51/59, 86%) correctly repeated the inhalation technique.

Conclusion: Pharmaceutical services like SFVETI have a preponderant impact, improving patients' knowledge about the use of medicines like inhalers, which has a big therapy efficiency gains, resulting in better symptom control of respiratory diseases.

The project evaluation of implementing public anti-drug and protecting public health

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Background: Drug abuse not only leads to harm of personal physical and mental health, but also the corruption of social security which results in increasing social cost.

Purpose: Anti-drug education in communities involves holding anti-drug abuse educational activities to strengthen the knowledge of drug abuse prevention among the public.

Method: E-Da Hospital is one of the eight resource centres for anti-drug education. The group includes psychiatrists, hospital/ community pharmacists and school teachers.

The authors held workshops for teacher training, the target populations identified were the high risk groups such as students, factory workers and long-working hours staff. The principles of the teaching materials confirmed by reliability and validity: 'love your own life, drug abuse prevention and resistance, drug and anti-drug understanding, and care and assistance'. The authors utilised Perceived Stress Scale (PSS) and a drug abuse cognition questionnaire to evaluate learning effectiveness and evaluated learning satisfaction.

Results: A total of 450 people were enrolled and 300 valid questionnaires were obtained and the participants were found to have mild-grade score (1.76±0.49 points). Cognition evaluation were scored 70% before education and 89% after education. The statistically significant results include: (a) The first time taking drugs and asking for professional help can be exempted from legal liability (65%/85%, $p<0.05$); (b) Smoking and alcohol are often the entry substance for taking addictive drugs (78.5%/ 92.1%, $p<0.05$). The satisfaction is up to 4.85 points.

Conclusion: Through the campaign, we found out that drug-related awareness of the public still has to be strengthened, and the audience have given a high evaluation feedback to the professionals.

Development of evidence-led competency framework for community pharmacists in the Philippines

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Background: A competency framework for community pharmacists in the Philippines serves its key function in demonstrating the roles and activities that are encompassed within the scope of practice.

Purpose: This framework comprises standards for pharmacists in community pharmacy practice; includes standards intended to promote growth and development along the practice continuum to achieve advanced level practice.

Method: Methods include assessment of the acceptability and extent of utilisation of the different practice standards for

pharmacists. Community pharmacists' views on continuing professional development (CPD) and activities that can promote career progression were also studied. Fourteen (14) study sites across the country were chosen with 30-40 community pharmacists at each site who participated in questionnaire completion, focus group discussion,s and attendance of a seminar-workshop.

Results: The community pharmacists are aware of the existence of copies of the national standards, but not all consult them on a regular basis. Around 60% of the respondents are 'mostly' performing the set competencies. Assessment of the Filipino pharmacists' views on CPD programmes and other career progression activities was done for relevance to each pharmacist's professional need. Seventy-two percent (72%) of the respondents stated that most programmes they attended were not tailored to their required competencies. Majority sought career progression in the community practice similar to other practice sites, through continuing education, online study, peer evaluation and specialisation programmes.

Conclusion: Community pharmacists in the country practice well with their general and specific competencies, and look for development where their active participation is involved.

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Medication safety talks at a veterans' home in southern Taiwan

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Background: 'Veterans' Home' is a state-run home for aged or disabled retired soldiers. The authors regularly run health talks at the centre, including medication safety talks. Most retired veterans are in their senior ages and many of them suffer from a combination of chronic diseases and need a variety of medications. It is, therefore, important for them to have medication safety education.

Purpose: To let veterans and their caregivers have a correct concept of medication usage and are able to use medicines safely and correctly.

Method: The researchers annually deliver a medication safety talk at the Veterans' Home to promote five core skills (expression, check, understand, control, ask) that lead to medication safety. Before the talk, veterans and caregivers were tested for their understanding on medication safety. During the talk, prizes were given to encourage learning. After the talk, participants took a quick test to evaluate the learning outcomes. Throughout the talk, based on the test results and participants' reactions, researchers gave feedback immediately hoping to further their understanding on medication safety.

Results: Between 2016 and 2019, there were 211 valid questionnaires. The average scores of pre-talk tests were 70.0, 65.2, 71.0 and 90.0, after talk were 92.6, 85, 83.5 and 97.5 in each year, respectively. Based on the *t*-test, they had a significant improvement after the talk (*p*-value 0.01). The research found that the concepts veterans need to have corrected are two core skills: 'understand' and 'ask'.

Conclusion: Recently veterans and their caregivers obtained better results before our talks, which means our medication safety talk is successful. The participants now comprehend that 'to see a doctor for illness, to see a pharmacist for medication usage'.

Knowledge, attitudes and practices related to antibiotics among community and hospital pharmacists in Sri Lanka

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Background: Pharmacists' knowledge about and attitudes towards antibiotics (ABs) impact on appropriate AB supplies. Knowledge of this is, however, lacking in the Sri Lankan context.

Purpose: The authors aimed to evaluate the knowledge, attitudes and practices of AB use and antibiotic resistance (ABR) among community pharmacists (CPs) and hospital pharmacists (HPs) in Galle District, Sri Lanka.

Method: A cross-sectional study using a self-administered questionnaire was conducted among CPs and HPs in Galle to assess their knowledge about AB use and ABR causes, attitudes towards AB use, and dispensing practice. Data were analysed using descriptive and inferential statistics.

Results: Total 90% pharmacists (n=90/100) responded, comprising CPs (n=43) with efficiency qualifications and HPs with proficiency (n=45) or B.Pharm. (n=2) qualifications. The HPs' knowledge about consequences of inappropriate AB use which were ineffective treatment (100%) and ABR (100%) were

significantly higher than CPs' (91% and 86%; *p*=0.048 and 0.010 respectively). The knowledge about ABR causes; for example, AB use for non-bacterial infections, was also significantly higher in HPs (92%) than CPs (74%), *p*=0.030. About 84% of respondents had positive responses on all attitude statements. Most of the participants (98%) denied non-prescription AB supply. Overall, greater knowledge about AB use increased the likelihood of higher knowledge about ABR (Adj. OR=3.94; 95%CI: 1.57-9.88; *p*=0.003) and positive attitude towards AB use (Adj. OR=3.71; 95%CI: 1.54-8.92; *p*=0.003).

Conclusion: Extent of pharmacy qualification could impact pharmacists' knowledge about AB use and ABR. Improving pharmacists' knowledge about AB use may enhance their ABR knowledge and attitudes towards AB use.

Knowledge and consumption patterns of paracetamol among school teachers in Sri Lanka

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Background: Rational use of paracetamol (PCM), which is the most common over-the-counter drug, can avoid unnecessary health risks. Knowledge of this is, however, still lacking in the Sri Lankan context

Purpose: We aimed to evaluate the consumption pattern and knowledge regarding PCM among school teachers in Sri Lanka.

Method: This was a cross-sectional study involving 259 school teachers from three randomly selected government schools in Galle District, Sri Lanka. Data were collected using a validated questionnaire. The data were analysed using descriptive and inferential statistics using SPSS version 20.

Results: About 71% (185/259) of school teachers had taken PCM within the past three months. Most of the participants took PCM at the right dose (99%) and for headache (84%). Self-prescribing of PCM was more prominent (76%) among teachers due to the confidence in their knowledge (37%). PCM was obtained mainly from retail pharmacies (66%). Respondents showed low overall knowledge levels related to PCM (mean=5.35/10, SD=1.27). Only 23% of respondents could mention correctly at least one of PCM's side effects, and nearly half of the teachers (43%) were aware of severe liver damage among the most serious health problems. Teachers who studied subjects related to health sciences had significantly higher knowledge about PCM (mean=5.56) than those who did not (mean=5.22), (*p*=0.034). Pharmacists' contributions to patient counselling on PCM's use (35%) and side effects (8%) were limited.

Conclusion: Lack of knowledge about PCM may contribute to inappropriate use of PCM among teachers. Pharmacists' contribution is lacking in educating patients related to PCM.

Online community pharmacy practice: A cohort pilot survey in Lagos state, Nigeria

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Background: In 2017, a global study projected that by 2020, online pharmacies' drug sales will exceed $30 billion, signalling the future direction of community pharmacy practice. For growing economies in low-middle income countries, there is an increasing demand for online pharmacies due to several reasons, including heavy road traffic and busy schedules. There is currently no information on online pharmacy practice in Nigeria and this study will fill the gap.

Purpose: To study the influence of online community pharmacy practice in Nigeria.

Method: We conducted an online random questionnaire survey of members of the innovative 'my-medicine.com' platform. Bivariate analyses were carried out using Fisher's Exact Test to describe associations between socio-demographic characteristics and use of the platform, at significance of 95% and *p*-values <0.05.

Results: Twenty-seven (27) respondents completed the online survey. Majority 20 (74%) were females aged 26-50 years. Most (88%) admitted to partnering with my-medicine online platform solely for sales of their drugs. Most (19, 70%) admitted to having performed an assessment for drug interactions before online sale of drugs. Education (*p*=0.002) and age (*p*=0.000) showed a significant association with an increase of drug sales via online platform. Similarly, age (*p*=0.014) was the only socio-demographic characteristic with a significant association with the possibility of signing up with other reliable online pharmacy platforms.

Conclusion: The online purchase of goods and services is increasingly becoming popular in Nigeria. Policies to regulate this novel online community practice are needed to ensure the safety of consumers as well as distinguish the profession from regular drug sellers.

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Opportunities and barriers to implementing COVID-19 testing in community pharmacies

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Background: The World Health Organisation sent a clear message to the world, to 'test, test, and test' for early identification, isolation, and limiting the spread of coronavirus disease 2019 (COVID-19). Dismal testing rates have been the biggest barrier to understanding the spread of this disease. Community pharmacists and pharmacies provide an accessible and reliable avenue to increase testing rates.

Purpose: To identify opportunities and barriers to implementing COVID-19 testing in community pharmacies.

Method: Review of worldwide literature from 2019 and onwards was completed to review guidance documents and expert opinions on COVID-19 testing by community pharmacists.

Results: So far, only 32 states in the USA have provided community pharmacists with the independent ability to order and administer COVID-19 tests in community pharmacies. Opportunities are: fast and reliable access to testing; improved testing rate, data collection, and patient-pharmacists relationships; provide personalised follow-ups and new services; and leverage opportunity for future government collaboration. Barriers are: government buy-in, regulations and bylaw compliance, training, personal protective equipment, staffing needs, workflow optimisation, processes for collaboration with public health authorities, and pharmacists' willingness.

Conclusion: COVID-19 testing in community pharmacies can improve testing rates, and provide new avenues to collaborate on public health initiatives. There is a scarcity of evidence and literature around this topic and future work should explore success of testing in community pharmacies, and pharmacists and public perceptions of provision of such services in community pharmacy setting.

Can COVID-19 outbreak be anticipated by community pharmacy sales? A retrospective analysis

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Background: In large-scale community transmission, such as severe acute respiratory syndrome of the COVID-19, monitoring geographic trends and estimating the transmission intensity is critical to support decisions on actions to be taken. Though major efforts are concentrated on testing the populations, the availability and timing of this data pose a clear limitation to real-time monitoring.

Purpose: This study proposes a retrospective analysis to develop a novel methodology to detect and monitor the COVID-19 epidemiological activity using a selected subset of over-the-counter (OTC) products sold in community pharmacies in Portugal. Previous studies have successfully demonstrated this approach to different epidemiological outbreaks as individuals tend to self-manage the symptoms.

Method: The subset of OTC products was selected considering therapeutic indication for symptoms of infection by SARS-CoV-2 and the trends observed for diagnosed cases in Portugal. The similarities between the trends of the subset of products and the daily new-suspected and new-confirmed cases of COVID-19, respectively, were assessed using lagged spearman correlation analysis.

The trend of the subset of products selected presented high and statistically significant correlations to new- suspected and new-confirmed cases lagging 14-16 days (correl.>0.82; p<0.001). Highest correlation to both new- suspected and new-confirmed cases was found lagging 15 days (0.879 and 0.888, respectively; p<0.001).

Conclusion: The study supports the use of the methodology presented to anticipate the trends of COVID-19 outbreaks in Portugal, both locally and nationwide, considering representativity of the presence of community pharmacies to the distribution of populations.

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Antimicrobial resistance: Perception and behaviour from a local perspective (Northwest Italy)

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Background: Antibiotic resistance is a serious threat to public health that causes around 33,000 deaths in Europe annually. Moreover, it has consequences in economic terms; Italy will spend

€12 billion over the next 30 years to deal with these types of infections.

The mode and volume of antibiotics consumption may provide a plausible forecast for this issue in the future.

Purpose: To investigate the consumption of antibiotics and knowledge of antibiotic resistance from a local perspective.

Method: Data were collected by means of a questionnaire that was originally used by the World Health Organisation (WHO) and appropriately modified. The survey was carried out in two ways:

- questionnaires were self-administered by 327 students on degree courses at the University of Turin
- questionnaires were administered by a trained interviewer to 240 pharmacy customers in two different urban areas.

Results: On average, 20% of the University population admit to taking antibiotics without a prescription; a value that increases to 27% among the customers interviewed. About 15%, in both populations, admit to sometimes interrupting treatment when they feel better. Moreover, 62% of students provide the correct definition of antibiotic resistance, while only 39% of customers showed that they are aware of the phenomenon.

Conclusion: Healthcare students have greater knowledge of antibiotics and antibiotic resistance, as expected. Too many people stop antibiotic therapy prematurely. The phenomenon of antibiotic resistance is best known among young people, but is still a highly neglected issue. Greater control by healthcare professionals can stem the problem, and pharmacies may be a strategic place for the education of the population.

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Disease prevention in community pharmacies: What, when, who, why, where and how

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Background: According to the World Health Organisation (WHO), disease prevention concerns the measures sanctioned to counteract the development, progress and consequences of disease. This is an essential topic nowadays, both with regards to non-communicable diseases, which kill 41 million people each year, and infectious diseases, some of which have recently shocked world healthcare. Community pharmacies are excellently placed to carry out a number of disease-prevention actions thanks to their widespread presence across territories and the everyday relationship that have with hundreds of people.

Purpose: To investigate what type of prevention activities are performed in community pharmacies worldwide, how they are carried out, and their effectiveness.

Method: Comprehensive literature searches using the terms 'community pharmacy' and 'disease prevention' in online databases.

Results: More than 2,000 articles were found, and the most frequently implemented services seem to be:

- Primary prevention: actions linked to cardiovascular-disease prevention, diabetes prevention, smoking cessation, alcohol reduction, weight management, the administration of vaccines
- Secondary prevention: actions linked to screening for HIV, colorectal cancer, HPV, osteoporosis
- Tertiary prevention: actions linked to the management of COPD, diabetes, hypertension

Conclusion: Prevention interventions carried out in community pharmacies are a reality in many countries. Some studies have reported that these activities are effective for the health of the population and can help to reduce costs to National Health Services. However, these services are frequently not integrated with other health-system interventions and are, incorrectly, often not remunerated.

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Community pharmacists promoting the correct use of medicine in elderly people: The results of a survey

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Background: The Health Education Programme on the Correct Use of Medicines for Elderly people (PESGG) is an initiative consisting of talks given by community pharmacists in Catalonia with the aim of increasing awareness and improving the skills and knowledge about their medicine's management among the elderly people.

Purpose: To evaluate the quality of the programme and the attendant's satisfaction and its effectiveness related to their use of medicines.

Method: This study employed descriptive qualitative design. A sample was selected based on a total of 378 participants. Participants were contacted through phone calls. A total of 19 questions were set during the survey. Most of the questions were multiple choice type. Results were compared to the results obtained with the same survey pursued in 2016.

Results: The results showed that quality of the sessions and satisfaction of the attendants were very positive. Pharmacists are promoting the sessions better, as the participation during the sessions in 2019 compared to 2016's results was much greater. In the question on whether attendants had changed any habits related to the use of medicine after attending the session, results both in 2019 and 2016's showed that people up to 64 years old and people with worst health self-perception are the groups on which this programme could have more impact.

Conclusion: PESGG has a very good opinion and high satisfaction among the attendants. The authors conclude that this programme seems to be more effective in people up to 64 years old rather than very old people and people with worst health self-perception. For the upcoming programmes it has been suggested to target further younger people.

Generic medicines in Italy: Perception among pharmacy customers, pharmacists and pharmacy students

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Background: While people in other countries are increasingly choosing generic medicines, Italy still lags behind in their consumption despite the positive increase seen in the last few years.

Purpose: This work intends to examine the reason for the limited diffusion of generics in Italy and to investigate the population's perception of them.

Method: A survey was carried out in the northwest of Piedmont by administering face-to-face interviews.

Results: Four hundred (400) customers were interviewed in four pharmacies, as were 56 pharmacy students and lastly 61 pharmacists. The data revealed that a significant number of people have a negative perception of generics; customers are the most suspicious (46%) about the quality of generics, compared to pharmacists (15%) and students (0%). Forty-six percent (46%) of customers think that generics and originators have different probabilities of causing adverse drug reaction (ADR), while this is 12% for pharmacists and 13% for students. Forty-six percent (46%) of customers doubt the effectiveness of generics, as do 8% of pharmacists and none of the students. Finally, 43% of customers are not prone to generic substitution.

Conclusion: Despite promotional campaigns for the diffusion of generics, attitudes of mistrust persist both in the general population and in health professionals. It is fundamental that investment in constant training for pharmacists is maintained as they are the healthcare professionals that most frequently come into contact with the population and, through proper counselling, have the greatest opportunity to overcome this mistrust. It is important to underline that each pharmacist makes the difference in this matter thanks to their direct relationship with the patient.

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Smoking prevention and tobacco control - the role of community pharmacists

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Background: Tobacco use is still the principle preventable cause of morbidity and mortality worldwide. Smoking is responsible for the outbreak of many diseases and for about eight million deaths per year and is thus responsible for high healthcare costs. It is therefore crucial to facilitate smokers' access to smoking-cessation programmes.

Purpose: To evaluate the possible role of Italian community pharmacists in smoking prevention and cessation.

Method: The research was based on two questionnaires that targeted pharmacy customers and pharmacists. The survey was led by trained interviewers between October and December 2018, in 108 pharmacies in Piedmont (Italy).

Results: The results collected from the 431 clients interviewed identified that 35% were smokers; 65% of smokers have tried to stop smoking at least once, and 63% of these did so for health reasons. It is very worrying that just 12% indicated that health professionals were the main source of information for smoking-related damage. Among the 108 pharmacists interviewed, just 36% and 16% were aware of the rates of smokers in Italy and of tobacco-related diseases, respectively. Nevertheless, 76% thought that training on the topic would be useful and 92% sought to be involved in a smoking- cessation programme.

Conclusion: This data stresses the necessity to reinforce the role of healthcare professionals in handling nicotine addiction. Thanks to the data gathered, a 5As (Ask, Advice, Assess, Assist, Arrange) Protocol for pharmacists has been developed. In this way, Italian community pharmacies may become a crucial point for tobacco control. Future studies on the application and evaluation of Protocol efficacy will be needed.

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Danish pharmacy customers' beliefs about medication

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Background: Patients' perspectives on using medication affects the degree of their adherence to the medication. The counselling of patients in healthcare should take patients' perspective into consideration to secure the safe and effective use of medicines. In Danish community pharmacies, pharmacy technicians are the primary group counselling the patient. During their education they are taught about patient perspectives.

Purpose: The purpose of the study was to investigate patient perspectives, by pharmacy technician students.

Method: Pharmacy technician students each recruited 4 patients. Recruited patients had to take medication for a chronic disease and these patients completed the Beliefs about Medication Questionnaire (BMQ).

Results: For customers' general view on medication, an average for general-overuse and general-harm was calculated. In total 304 community pharmacy customers completed the BMQ. The analysis showed averages of 11.6 for overuse and 10.1 for harm (scale 4-20) indicating that neither worry about overuse or harm is a major worry. Also, the analysis showed averages of 13.9 for specific concerns and 19.8 for specific necessity (scale 5-25) indicating that patients find the use of medication necessary. This is further supported by a positive score of 5.92 for the necessity-concern score.

Conclusion: The analysis shows that community pharmacy customers in general consider medication necessary and are less concerned about overuse and harm. Patients' perspective on use of medication must be addressed by pharmacy staff in counselling to optimise patients' efficient and safe use of medication.

Pharmacy technician students are valid data collectors, and the data are qualifying the understanding of patient perspective among the students.

Using real-life data to strengthen the education of pharmacy technician students

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Background: Pharmacy technicians are the main professional group in community pharmacies in Denmark. Their primary task is counselling patients on safe and effective use of medication. The pharmacy technician programme is a three-year education programme, which consists of interaction between theory at the college and practice at the tutoring pharmacy. In the programme, the students have the elective course 'Clinical Pharmacy in Community Pharmacy', which targets students who wish to work in-depth with patient communication.

Purpose: The purpose was to demonstrate, how pharmacy technician students can expand their perspectives on patient safety by using real-life, student-gathered patient data.

Method: Students were introduced to using a questionnaire, register data in a web-based survey tool and asked to recruit six patients each during their pharmacy placement.

Results: The results from the analyses was introduced to the students through a plenary session. In groups, students worked with the results and discussed how to use their new knowledge to generate questions, to identify patients' perspectives on their use of medication. In a final plenary session, the groups presented their work and received feedback from teachers and other students.

Conclusion: In conclusion, involving pharmacy technician students in data collection has strengthened the students' awareness of their responsibility to ensure patient safety. Students collected data that can be used for teaching as well as research and, when discussing the data, demonstrated an advanced level of understanding of how optimal counselling can uncover and accommodate patients' concerns and beliefs about the necessity of using medication.

Innovative regulatory framework in community pharmacy

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Background: The evolution of regulatory sciences introduced the need for a patient-centred regulatory framework.

Purpose: To establish a regulatory self-audit (RSA) model in community pharmacy aiming at satisfying regulatory requirements while meeting patient needs.

Method: The methodology included:

1. Design of a Pharmacist Competencies Self-Assessment (PCSA)
2. Regulatory risk-based assessment
3. RSA, regulatory audit (RA), PCSA implementation in 61 community pharmacies.

Results: The PCSA was designed to evaluate professional strengths, interests, goals and opportunities for improvement (OFI). RSA and RA compliance were measured as a percentage of criteria accomplished (N=76). The number of minor (n=19), major (n=34) and critical (n=23) findings defined pharmacies high (1 minor or above 5 major), medium (1-5 major) and low-risk (only minor) categories. In the RSA, pharmacies declared higher compliance (94.7%±4.65) and were classified in lower risk-category (high-risk pharmacies=16) than in RAs (82.7%±8.14; high-risk pharmacies=46). The pharmacists managing the 61 pharmacies (56 were female, aged between 25-73 years, mean age 43 years) showed a difference between age groups. Pharmacists below-30 and over-60 years-old gave a lower RSA-pharmacy-risk compared to intermediate age-categories (*p*-value=0.041). In the PCSA, pharmacists reported understanding patient needs (57.4%) and patient-orientation (49.2%)) as the two highest strengths. Personalised healthcare (44.3%) was identified as the major area of interest, service optimisation (49.5%) as the main goal and continuous education (63.9%) as an opportunity for improvement.

Conclusion: A regulatory self-audit showed significant differences from the established inspection audit.

Empathic communication as a pharmaceutical tool to involve customers in their treatment

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Background: Brædstrup Pharmacy has a focus on pharmaceutical conversations with customers, 'The New Medicine Service' (NMS). NMS is purposed to increase the customer's knowledge of their medicine, provide important safety and remove concerns about the treatment and medication.

Purpose: Focus on using an empathic communication method to better the outcome of NMS, specifically with regards to the customer's understanding of the purpose of NMS, thus bettering compliance and the overall experience.

Method: Two pharmaceutical students observed the conversations and afterwards interviewed costumers about their experience with NMS. The focus was the customers response and their understanding of the purpose of NMS and the interaction with the pharmacist.

The conversations were recorded, and a professional coach, in empathic communication, evaluated the body language of the pharmacists during the conversations.

Results: The coach observed empathy and charisma in the conversations, both customers and pharmacists had enough time to listen and ask questions. Eye contact, smile and giving and getting customer attention, was rated as the strongest sign of an empathic communication.

Overall customers were very satisfied. Some of them were not clear about the purpose of NMS; but had a clearer understanding after the conversation. Some were courteous and obliging, and some were reserved because of concerns about privacy.

Conclusion: Using empathic communication improves the outcome of NMS, especially for customers who are reluctant to talk to the pharmacists. The aspiration is to use empathic communication throughout the pharmacy, thus increasing the chance of involving the customers in their treatment.

In-pharmacy administration of Streptococcus pyogenes point-of-care testing: Data from New Zealand and Portugal

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Background: Sore throat is a common, predominantly viral condition and patients often receive inappropriate antibiotics due to a variety of factors, including diagnostic uncertainty. Such inappropriate usage contributes to antibiotic resistance.

Purpose: This small-scale study evaluated the administration of point-of-care diagnostic swab tests for beta *Streptococcus pyogenes* Group A (Strep A) infection in the primary care setting in New Zealand and Portugal as a potential mechanism to reduce diagnostic uncertainty and patient demand for inappropriate antibiotics.

Method: During the 2018–2019 winter season, sore throat patients visiting participating pharmacies were offered locally available throat swab tests undertaken by trained pharmacy staff. Following pre-screening, those deemed at high risk were directed to their physician. Test results and patient satisfaction data were gathered by pharmacy staff.

Results: New Zealand: Data capture proved resource intensive for staff and so results were not available for every test administered. Where a result was recorded (n=400), 4.3% were positive for Strep A. Portugal: Although a lower number of tests were administered (n=51), 17.6% were positive for Strep A. Patient and pharmacist satisfaction with the service were high in both countries. The majority of patients did not need a referral to their physician for antibiotics and were recommended symptomatic relief.

Conclusion: The provision of point-of-care diagnostics for sore throats in the pharmacy can address patients' need for knowing the cause of their sore throat, reduce pressure on physicians to prescribe inappropriate antibiotics, and facilitate the provision of symptomatic relief as first-line treatment.

'Loures Tem+ Saúde' - The role of community pharmacies in local health policies and social cooperation

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Background: Demographic and social indicators show that Portugal has an ageing population, with a low fertility rate, new health problems and chronic diseases are an increasing challenge to the National Health System. In this context, health systems need to adapt to the new needs of people with proximity, humanisation of services and considering patients as the centres of the system.

Purpose: To allow a better access to health and reduce inequalities, in the Municipality of Loures, near Lisbon, since May 2018, community pharmacies are implementing the 'Loures Tem+ Saúde' (More Health for Loures) project.

Method: This is a collaborative project that establishes a strategy of articulation with the Municipality, public health centres and other local entities to improve the quality of life and health of all citizens, through the pharmacy network.

Results: With this project, all local entities, together, seek to serve their patients in a more inclusive way that is more adapted

to their needs, through initiatives like health literacy campaigns, elementary school visits or integrated flu vaccination, which leads to improved access to health in the community.

Conclusion: Based on real outcomes of the 'Loures Tem+ Saúde' services, this work shows that community pharmacies, in a closer relationship with Municipalities, the National Health Service and all other partners, have a social role, in the context of health intervention, indispensable at a local and regional level, constituting itself as a genuine service of public interest and leaving no one behind.

Tackling the COVID-19 crisis by monitoring medication dispensing data in Belgium

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Background: FarmaFlux is a non-profit organisation providing e-health services to community pharmacists in Belgium. When the pandemic struck a new service was launched to collect relevant data to tackle strategic issues with regard to the COVID-19 crisis.

Purpose: The COVID-19 Monitor was launched to detect pharmacy activity and drop out. Dispensing volume of relevant medicines was monitored to be able to prevent shortages. Afterwards they were used for outbreak detection and follow up of adherence.

Method: Professional associations of community pharmacists participated in the national task force 'Shortages' and collected data about dispensing volumes of relevant medicines. Pharmacy activity data were provided at province level. Dispensing data were cross linked with medical data, mobility indicators, financial transactions and absenteeism during the exit phase. Volumes of metformin dispensing were used as an indicator for follow up of chronic treatment.

Results: Community pharmacy drop out rose up to 3% in early April; but dropped afterwards and gradually went back to normal. Shortages of midazolam and oxygen were the most critical in ambulatory care. They were mitigated by the national task force. Dispensing data were shared with and processed by the federal scientific institution Sciensano. Results of the analysis were shared with the Group of Experts for the Exit Strategy (GEES). Metformin showed a stock piling peak the days before lockdown and an important drop afterwards.

Conclusion: Dispensing data, collected by FarmaFlux, provided useful information to detect: community pharmacy drop out, medicines shortages in ambulatory care, follow up of adherence and early outbreak detection during the COVID19 crisis.

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CONFERENCE ABSTRACTS

FIP VIRTUAL 2020

Pharmaceutical Practice: Health & Medicines Information

Awareness and knowledge of chronic kidney disease among the Lebanese community: A cross-sectional study

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Background: The global burden of chronic kidney disease (CKD) is rising significantly and is associated with substantial morbidity and mortality. Despite this, proper public awareness and education on CKD is limited (GBD 2013 Mortality and Causes of Death Collaborators, 2015; Global Burden of Disease Study 2013 Collaborators, 2015).

Purpose: To assess the level of awareness and knowledge of the Lebanese population towards CKD in a community setting.

Method: A cross-sectional study was conducted among the Lebanese general population between July and September 2019. Adult patients or customers (aged ≥18 years old) presenting to community pharmacies were included after explaining the study protocol and obtaining their informed consent. A pre-designed questionnaire was used to collect information on participants' demographics and their knowledge about CKD and its management. Data were analysed using SPSS version 22.0.

Results: A total of 1,308 participants completed the questionnaire. Their mean age was 37.15 with 55.4% being females. Out of them, 325 (24.8%) had hypertension, 209 (16%) had diabetes mellitus, and 121 (9.3%) had CKD, with 33.7% had never tested for their renal function. Hypertension and diabetes mellitus were identified as risk factors for CKD in 75.8% and 57% of the participants, respectively. As for the leading cause of death in CKD patients, 49.5% believed that it is due to kidney disease itself, while less than half (46.3%) assumed to be heart disease. Results revealed that 78.3% of participants knew that CKD can be treated by dialysis, 64.1% by transplantation, and 61.2% by drugs.

Conclusion: Lebanese population's general knowledge about CKD is unsatisfactory. Future efforts should be implemented on improving health education and awareness on CKD, its risk factors and preventative strategies.

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Evaluating available pharmacist-recommended medicines for paediatric patients

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Background: Availability and scientific data for products that may be recommended by pharmacists upon presentation of symptoms for paediatric patients varies.

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Purpose: To identify products, available for paediatrics, which are pharmacist-recommended, and to assess scientific evidence on safety and efficacy of these products.

Method: Scenario analysis was carried out by reviewing all the SPCs of non-prescription medications available on the Malta Medicines Authority website having a marketing authorisation for the market under study. The age range used for this study was that of neonates up to 12 years. The product's safety was assessed by reviewing pharmacodynamic and pharmacokinetic properties. Medicinal products available and their intended use, information on the safety and efficacy data for the products were also identified.

Results: A total of 163 medicinal products, contributing to 196 formulations are available on the Maltese market for paediatric use as non-prescription medicines. Cough and cold preparations (n=21) are the most available non-prescription products for paediatric patients. The most common side-effects are those affecting the gastro-intestinal system (n=27). There is a total of 31 products that have no pharmacokinetic data available on the SPC. The pharmacokinetic data that is mostly included is drug elimination data (n=44).

Conclusion: This study identifies pharmacist-recommended products, available for paediatric use and the symptomatology they cover. Details on pharmacokinetic and pharmacodynamic data on these products are weak.

Meeting educational needs of pharmaceutical stakeholders: Veterinary medicine

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Background: Continuing Professional Development (CPD) is critical for veterinary professionals to be updated with new techniques, research and trends whilst meeting both personal and professional goals. Pharmaceutical stakeholders in this study refer to veterinary surgeons, domestic pet and farm animal owners and the veterinary team, including veterinary nurses, veterinary technicians and veterinary assistants.

Purpose: To address educational needs of the veterinary team by providing short courses locally.

Method: The study was divided into two phases. Phase one consisted of a systematic literature search of peer-reviewed articles published from 2005 to 2020. The syllabus of four different academic institutions were reviewed and a common topic from each institution was chosen. Phase two involved the development and validation of a questionnaire entitled, 'Questionnaire for Veterinary Stakeholders' (QVS) aimed to identify the educational needs of the veterinary team and was disseminated to different stakeholders. An expert panel validated the questionnaire.

Results: The content of the short courses drawn up from topics common to the academic institutions studied included veterinary pharmacology, regulation of veterinary medicinal products and veterinary anatomy and physiology. QVS has four sections: Section A demographics, Section B determines perception of stakeholders towards conducting short courses, Section C assesses the relevance of the topics, and Section D is aimed at the veterinary team to discuss the organisation of the short courses.

Conclusion: The questionnaire investigates needs to conduct CPD for the veterinary team.

Activities of the Drug Information Centre of the Portuguese Pharmaceutical Society: 1984-2020

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Background: The Centro de Informação do Medicamento (CIM) is the Drug Information Centre of the Portuguese Pharmaceutical Society (PPS). It was created in 1984, with the purpose of providing objective and independent information about medicines to Portuguese pharmacists.

Purpose: To perform a retrospective and descriptive study of the activities developed by CIM over the last 36 years.

Method: The details of the requests registered in a database programme were analysed. Specific analysis was conducted for the period: May 2017 to April 2020. The active information activities and all other additional activities are also described.

Results: Since May 1984 until April 2020 CIM has received 45,598 inquiries. From the 1889 requests received between May 2017 and April 2020, the following parameters were analysed: category of the requests, pharmacists' professional activity, time required to elaborate the response, response communication channel and response communication time frame. Most of the requests came from community (41.0%) and hospital (33.1%) pharmacists, and 88.5% were answered within 24 hours, mostly by email (68.6%).

Active information is accomplished by editing a Bulletin and producing articles and documents, regarding pharmacotherapy and professional practice, published on the PPS website. The

Centre also participates in educational activities and collaborates in internal and external projects.

Conclusion: CIM's current activities are the culmination and evolution of those initiated 36 years ago. The development of new activities tries to keep up with the technological changes and the evolving needs and expectations of pharmacists. CIM will continue to support Portuguese pharmacists' everyday practice.

Exercise intervention time in meta-analysis of exercise for type 2 diabetes mellitus

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Background: Type 2 diabetes is one of the major diseases around the world; exercise can improve a patient's blood glucose management.

Purpose: To find exercise intervention times and calculate their effects on blood glucose.

Method: The keywords 'type 2 diabetes mellitus', 'exercise' and 'randomised controlled trial' were used to search electronic databases, such as Cochrane Library and ProQuest. After screening, there were 19 empirical research documents that met the requirements. Of the 19 articles, eight of them were found to have blood glucose as dependent variables. Next comprehensive meta-analysis (CMA) software was used to calculate the mean effect size.

Results: Taking 12 weeks as the document classification interval. The mean effect size for less than 12 weeks was -0.259; the mean effect size for more than 12 weeks was -1.350.

Conclusion: Exercise intervention time for blood sugar control, less than 12 weeks has a small effect size; more than 12 weeks has a large effect size.

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Medication training and its improvement for the blind and deaf in South Korea

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Background: People with disabilities require tailored medication training contents and methods based on the features of their own disabilities. Pharmacists can play a key role in tackling information asymmetry and secure disabled people's rights to choose appropriate services.

Purpose: This study aims to propose improved medication training contents and methods tailored to the blind and deaf by investigating their actual needs and finding existing educational resources.

Method: A literature review was conducted to explore current medication training. A 'focus group interview' (FGI) and thematic analysis were implemented to identify demands for medication training. The participants of this FGI were four blind people from the Korea Blind Union and four deaf people from the Gyeonggi-do Association of The Deaf.

Results: The Korean Ministry of Food and Drug Safety (MFDS) published educational booklets in 2011, 2012 and 2013. The booklets had voice-codes printed on them to guide the rational use of over the counter medicines for blind people. MFDS also offers sign language videos for the deaf. Thematic analysis shows that the first global theme addresses their needs for disabled-centred technical materials and contents. The second global theme focuses on their craving characteristics of training methods.

Conclusion: People with blind and deaf need more disabled-centred medication training in terms of methods and contents. Pharmacists should comprehend the disabled to offer practical service and information. Meeting the needs of the disabled can enable them to take medications accurately and promote their health outcomes.

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Actions of the medicines information centre in the COVID-19 crisis

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Background: The pandemic of coronavirus disease 2019 has led to a health crisis situation in which all healthcare sector have set up information mechanisms aimed at their own professionals, as well as the population. Among them, the General Pharmaceutical Council of Spain has carried out different actions to improve knowledge of the pandemic.

Purpose: Ensuring that the General Council conveys the information to pharmacists, other health professionals and patients.

Method: The General Council has set up a specific information centre on COVID-19, aimed at centralising the information activities carried out in this area, such as direct resolution of queries from professionals and the general public, publication of technical reports, creation of an information website, issuance of official communications or production of information videos.

Results: Since the outbreak of the crisis, a total of 198 queries have been received; 35% were from Provincial Pharmacists' Chambers, 51% from pharmacists, and 14% from other professionals and citizens. The most consulted topics were about prevention of contagion through hydroalcoholic solutions, use of masks and action procedure in community pharmacy.

Conclusion: The General Council has positioned itself as an information reference for this health crisis management. The implementation of a landline for telephone queries and real concerns allowed the information issued to be tailored to the demands of health professionals and citizens.

Health information dissemination to the population: YouTube channel #Yourpharmacistreports

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Background: The general population is showing increasing interest in health issues, hence the internet serves as a fast and convenient information channel. However, this information is not always good in terms of quality, and there are many hoaxes. The General Pharmaceutical Council of Spain has therefore decided to develop its own channel on YouTube to disseminate evidence-based and reliable information on medicines and diseases.

Purpose: Developing a YouTube channel to provide health information to both pharmaceutical professionals and patients, on an independent and reliable basis.

Method: The General Council has created the channel #YourPharmacistReports (#TuFarmaceuticoInforma), where videos on the rational use of medicines, healthy lifestyles, information on diseases, and health advice are regularly posted. The videos are produced by pharmacists, in collaboration with a journalist specialising in social networks and communication with the public.

Results: Since it was launched in October 2016, a total of 184 videos have been published, reaching over 14 million views, with an average of 7,300 per day. The most watched video is on metformin, with a total of 1.6 million views. The channel accounts for more than 77,000 subscribers and more than 16,000 likes.

Conclusion: New technologies, such as YouTube, are an important way of transmitting health information, provided that this information comes from a reliable source. The channel #YourPharmacistReports received an overwhelming response by both patients and pharmacists.

Medicines and food supplements: Screening interactions

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Background: Combined use of food supplements with medication may create a risk of medicine interaction. There are several patients undergoing chronic treatments who rely on the use of food supplements without knowing the negative side effects it could have on the effectiveness of their medication or on their own health, since most of these products do not reflect the potential appearance of this type of interaction.

Purpose: To provide new information in this area, as well as to provide the pharmaceutical professional with the necessary information through the BOT PLUS database.

Method: A codification of the existing interactions between medicines and food supplements has been carried out in BOT PLUS, the database of the General Pharmaceutical Council of Spain, in which the consequence of the interactions are reported (decrease of the effect, appearance of toxicity, etc.), its clinical importance (from slight to potentially serious), and the recommendation of measures to take (such as avoiding the combination, monitoring the patient or distancing the administration).

Results: To date, a total of 1,670 interactions have been coded, corresponding to 147 ingredients present in food supplements. Some 25% of them have been classified as potentially serious and it is recommended to avoid their association.

Conclusion: The resulting data reflects the importance of these interactions being codified and available to health professionals in order to avoid possible negative side effects on the patient.

Food allergies and intolerance prevention

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Background: BOT PLUS, the medicines database developed by the General Pharmaceutical Council of Spain, collects information on the composition of medicines approved by the AEMPS, including both active substances and excipients used in its compounding.

Purpose: To analyse the percentage of available medicines in community pharmacies containing excipients, as well as the importance of their knowledge and of being provided with search tools to find presentations that do not contain any specific excipient.

Method: The excipient information has been coded in BOT PLUS by reviewing the information available in the data sheet. This coding allows later searching for presentations without a specific excipient.

Results: Seventy-one percent (71%) of dispensable community pharmacy presentations contain at least one notifiable excipient (make up 79% of oral presentations). The most common excipient is lactose (46% of presentations). Furthermore, patients with hereditary fructose intolerance (HFI) or Glucose-galactose malabsorption would present problems with 15% of these presentations, as they contain some sugar in their composition.

Conclusion: According to the findings obtained in this analysis, it is important to know the allergies and intolerances of the patients at the time of dispensing, as well as to have specific search tools to be able to prevent a specific excipient when dispensing the medication to these patients.

Global terminology related to professional development in the Armenian context

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Background: Aligning national nomenclature with the global professional glossary is a prerequisite for country-level transformation of the pharmaceutical workforce (FIP, 2015).

Purpose: This study benchmarks global definitions with terminology in Armenia's practice and professional development.

Method: Content analysis (FIP documents, Armenian legislation and educational frameworks), classification, and conceptual matching.

Results: In Armenia, the terms 'specialisation' and 'advanced practice' lack elements of vertical advancement proposed in the Global Advancement Development Framework (GADF) (FIP, 2019). No formal evidence exists of 'expert professional practice' beyond 'specialisation'. In the Armenian context 'credentialing' (documented professional qualification), stemming from a professional curriculum and continuing professional development (CPD), is not synonymous with 'professional recognition' (endowing formal titles) used in academic, scientific and regulatory sectors. 'Extended practice' may apply to military pharmacists, who must take specialised courses at medical university. 'Privileging' has no formal definition in Armenia, but only pharmaceutical professionals with a master's degree post-internship may manage a pharmacy.

Conclusion: Gaps in alignment of Armenian terminology with global professional nomenclature are obstacles to disseminating international best practices, and for consolidating initial education and advanced practice.

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#FightingCOVID19 (mis)information - the relevance of a communication strategy

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Background: Managing communication during a health crisis is essential to meet the population's needs. Therefore, regarding the COVID-19 outbreak, the National Association of Pharmacies (ANF) developed, since the beginning, a strategy of communication in order to support such needs.

Purpose: To support the management and communication of a health crisis.

Method: Several documents were developed:

- On January 24th 2020, while there weren't cases in Europe, ANF published a CEDIME Informa (Scientific and Technical Information, headed to the pharmacy team);
- On January 30th 2020, after the first cases were described in Europe, it was released an updated CEDIME Informa and an iSaúde (leaflet addressed to the population), and, the following day, an action flowchart for pharmacies (adapted and translated by FIP into six languages). In February 2020, two new iSaúde and Guidelines were published: 'Preventive Measures' and 'Pharmacy Intervention Towards a Suspected Case';
- On March 4th 2020, after the first case was confirmed in Portugal, a Contingency Plan for pharmacies was released. Since then, six new CEDIME Informa and one iSaúde were released, and it was constantly assured that the population was informed, through digital media.

Results: The progressive delivery of accurate information allowed a reality-adjusted response to the pharmacies and population's needs.

Conclusion: Crisis management and communication are essential in situations like this outbreak. With a 2,750 pharmacies' network and about 3,517 inhabitants per pharmacy, it is time we question: wouldn't the integration of pharmacies in the health system be a means to ensure timely credible and understandable communication between health authorities and the population?

Community dialogue: Information to empower communities to access medicines in the public health system

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Background: Access to medicines is a major requirement to achieve universal health coverage. Its multidimensional feature demands strategies and policies to promote collaboration with different sectors and stakeholders. User information is one of those strategies that plays a key role in social participation.

Purpose: To report the use of community dialogue to discuss pharmaceutical assistance in the public health system in a Brazilian municipality.

Method: Communities dialogues took place at primary health care units and were led by an observer and a facilitator (pharmacy students or a pharmacist) using a pre-structured guide including 13 questions related to the organisation of pharmaceutical assistance. After discussions, a report was made and posteriorly reviewed by all the project members present at the activity. Then, thematic analysis of reports was conducted.

Results: Community dialogues were held at 21 health units from October 2018 to October 2019, lasting from 20 to 60 minutes. The number of participants ranged from 5 to 23, reaching 227 persons in total. When asked about the State's responsibility, most of the participants believed that governments should provide all the medicines available for all the diseases. Participants also declared that the low income population should be preferentially assisted. The most frequent complaint was related to drug shortage.

Conclusion: Community dialogues were implemented to improve access to information about pharmaceutical assistance in public health sector. The approach allowed participants to openly express their opinions and contributed to elucidate questions about how to obtain medicines.

Bringing health promotion and education into school settings – Healthy Generation Project

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Background: Educating children on health issues plays an essential role for them to stay healthy later in life. 'Healthy Generation Project' emerged as a public health promotion and education project.

Purpose: Evaluate the Project's general impact, through direct assessment of students' knowledge on the addressed topics.

Method: The project promotes trainings on 'Diabetes' and the 'Rational Use of Medicines' topics to children aged 10-14 years old. Trainings were held in an especially adapted bus by young pharmacists and Pharm.D. students who were trained by specialists to deliver the referred trainings.

To evaluate the trainings, students were randomly selected to answer a survey on the covered topics. The survey was composed of nine multiple choice questions, with one out of four the correct answer. By the end of the school year, a descriptive analysis was conducted to characterise the level of children knowledge, according to the main variable: with/ without training. The number of students, teachers and schools covered was also analysed.

Results: Data from the last five years of the project (2014-2019), shows that, on average, the number of correct answers to the survey was higher in the group that had already received training (7 in 9) in comparison to the group without training (5 in 9). The project was evaluated with an average of 18 points (scale from 0 to 20), by the Portuguese professors.

Conclusion: Data shows that training sessions have had a positive impact on students' knowledge. Nationwide, since the beginning of the project in 2012, 509 schools had been visited, covering 101,963 students and 4,787 teachers.

Online education of citizens for health prevention and promotion

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Background: The huge flow of information that exists nowadays, makes it essential to have a reliable source of information on health that is easily accessed by communities.

Purpose: By making health information accessible to communities, using digital technology, we are guaranteeing that citizens are more capable of making better decisions in order to improve their health and engage with community action on these topics.

Method: A massive open online course on Healthcare Security was developed by an inter-professional and interdisciplinary team of the Portuguese Pharmaceutical Society and the Portuguese Directorate-General for Health. It was comprised of six courses, namely, 'Safe and Rational Use of Medicines', 'Hygiene of the hands in the prevention of infections', 'Prevention of Infections and Antibiotic resistance', 'Surgical Safety', 'Prevention of pressure ulcers' and 'Prevention of the occurrence of falls'.

The courses were available on the Online Learning National Platform (Platform Project NAU, a national initiative held by the Foundation for Science and Technology), which can be accessed for free. Courses were made available one at a time, whereby, until the end of the 2019, only three courses were published. The remaining three courses are expected to be launched during the year of 2020.

Results: Since the launch of the health literacy programme in June 2019, the three available courses had on average, 2,700 registrations per course and a conclusion rate of 72%.

Conclusion: The literacy programme on Healthcare Safety has produced great results in terms of both registrations and conclusion rates which contributes to more and better-informed citizens.

Evolution of sun-protection habits in the Balearic population over the last decade

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Background: Pharmacists play a relevant role in the promotion of health in the population and in health education; in the field of sun-protection it is essential to avoid the risks associated with uncontrolled exposure to reduce skin damage in both the short- and long term.

Purpose: The aim of this study was to analyse the evolution of sun-protection habits and compliance with pharmaceutical recommendations among the population of the Balearic Islands over the last decade.

Method: From May 2010 to May 2019, 5,680 people were surveyed. Their sun-protection habits were assessed through self-designed surveys, and skin pigmentation determinations were carried out using a Skintone Pen TP 20 probe from Microcaya. User data were included from the islands of Mallorca, Menorca, Ibiza, and Formentera.

Results: Most respondents were women (75.0%±1.25%) between 20 and 30 years old (19.1%±2.30%). An analysis of the results indicated that the chemist is the place they trust the most for the purchase of sunscreens. The preferred pharmaceutical forms were emulsions and sprays. As for skin care measures after sun exposure, 59.6%±1.70% of users used after-sun moisturising products. These trends did not change significantly over the ten years of the study. However, the data did reveal a significant rise in the use of very high sun protection factors (50+) in the last six years.

Conclusion: Health education in sun-protection continues to be necessary as only 4/10 users who need it use SPF 30, and only 1/2 users needing SPF 50+ use it correctly.

Systematic reviews about medicinal cannabis dosage forms

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Background: Studies about cannabis dosage forms, with the inclusion of perspectives of users, lead to understanding of medicinal cannabis better.

Purpose: To review studies focusing on medicinal cannabis dosage forms.

Method: A comprehensive systematic review was conducted between February and March 2020, to identify studies published in the last ten years about medicinal cannabis dosage forms and opinions of medicinal cannabis users about cannabis dosage forms. HyDi, a tool offered by the University of Malta with access to different databases, was used for the search.

Results: Eighty-nine (89) articles were related to medicinal cannabis dosage forms and ten articles were based on opinions. Majority of the studies (n=97) were performed in a single country, more than half (n=61) in the US. Participants were cannabis recreational users (n=66), healthy volunteers (n=20) or medicinal cannabis users (n=13). Studies included one administration form (n=62) of cannabis mainly the smoked form (n=31), followed by the oral form (n=12). Some studies compared two forms (n=23) such as smoked versus vaped or oral, edible, oral versus oro-mucosal. Studies with multiple dosage forms (n=14) involved variety of forms including smoked, vaped, inhaled, oral, sublingual, edible, rectal and systemic forms. Scope in the studies were pharmacodynamics (n=41), pharmacokinetics (n=32), use patterns and opinions on medicinal cannabis dosage forms (n=26).

Conclusion: Various studies were conducted about medicinal cannabis dosage forms. There is still need for more studies related to patient perception.

Analysis of patient drug usage trends in the Pharmacy of your Choice scheme

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Background: The 'Pharmacy of your Choice' (POYC) scheme is a national pharmaceutical service in Malta which provides free medicines and pharmaceutical devices for chronic diseases through community pharmacies.

Purpose: To compile data on patient drug usage in POYC scheme.

Method: All data were taken from a community pharmacy in Malta. POYC patients who are registered with the pharmacy were assigned a number and were picked randomly using an online random number generator. Patient details and drug usage history were taken by accessing the POYC software. Drugs were categorised into their respective therapeutic class based on the outpatients' formulary list from the Ministry of Health.

Results: Drug usage data were obtained for 73 patients, 38 male and 35 female patients (mean age 70 years). The ten most commonly used drugs among POYC patients were Simvastatin (37), Amlodipine (23), Perindopril (22), Aspirin (21), Metformin (19), Valsartan (17), Omeprazole (16), Atenolol (13), Bendroflumethiazide (13), and Atorvastatin (12).

There has been an increase in the usage for seven out of the ten drugs. The greatest rise observed was of Atorvastatin use, with 1,064 tablets dispensed in 2019 up from 280 dispensed tablets in 2017, a 280% increase. Omeprazole and Valsartan have a 73% and 48.5% increase, respectively. The quantity dispensed for Simvastatin decreased from 2,632 in 2017 down to 2,352 in 2018 and remained so in 2019. Dispensing of aspirin and bendroflumethiazide has been steady with 1,256 and 728 dispensed tablets respectively for each year over the past three years.

Conclusion: The study captures a trends perspective of drug usage within the national health service.

Accuracy of clinical assessment of strep throat (CAST) to determine streptococcal infection

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Background: Sore throat in adults are predominantly caused by viral infections. Distinguishing between viral and bacterial sore throats based on clinical presentation is challenging.

Purpose: To determine the accuracy of CAST in evaluating the likelihood of Group A β-haemolytic streptococcal (GABHS) infection by comparison with throat culture results.

Method: Data from three clinical studies in adults with recent-onset sore throat were pooled. Patients had moderate/severe pain on the Throat Pain Scale, ≥1 symptom of an upper respiratory tract infection (URTI) on the URTI Questionnaire, and confirmed pharyngitis (≥5 on the Tonsillo-Pharyngitis Assessment). Using patient history, symptoms and physical findings, investigators utilised CAST to make a clinical judgement on the likelihood of GABHS infection using a 4-point categorical scale (unlikely to very likely). Throat swabs for culture provided definitive diagnosis of GABHS infections.

Results: Data from 840 patients were included. Investigators considered GABHS infection likely/very likely in 19.5% of patients. Throat cultures were available for 833 patients, of whom 5.4% were positive for GABHS. CAST correctly identified 13 of 45 confirmed GABHS infections (sensitivity: 28.9%; specificity: 65.4%). Using CAST, 19.2% of patients could have received antibiotics inappropriately owing to a misdiagnosis of GABHS infection.

Conclusion: Confirmed GABHS infection rate was low (5.4%). CAST assessment showed a 19.2% rate of misdiagnosis of GABHS infection. Clinical assessment of GABHS infection could result in inappropriate antibiotic use. Treatment decisions that address throat symptoms could avoid inappropriate antibiotic use.

Antihypertensive medicine use in The Baltic States between 2008 and 2018

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Background: High blood pressure is an important risk factor for cardiovascular death and disability. High prevalence of hypertension is seen in all three Baltic States, but little is known about use of antihypertensives.

Purpose: To compare utilisation of antihypertensive medicines in Estonia, Latvia and Lithuania from 2008 to 2018.

Method: Wholesale data from the national retail audit IQVIA was obtained. The ATC/DDD methodology was used to calculate utilisation of RAS inhibitors, beta receptor blockers, calcium channel blockers, diuretics and other antihypertensives. The results were expressed in DDD per thousand inhabitants per day (DDD/TID). Time series analysis, ANOVA and Kruskal-Wallis tests were used.

Results: The total use of antihypertensive drugs was 372 DDD/TID in Estonia, 267 DDD/TID in Latvia and 379.5 DDD/TID in Lithuania in 2018. From 2008 utilisation increased by 10.88 DDD/TID (95% CI: 7.13 - 14.63), 8.04 DDD/TID (95% CI: 4.57 - 11.52) and 6.42 DDD/TID (95% CI: 2.44 - 10.41) annually, respectively. The use of all classes increased, except calcium channel blockers. Most frequently used class in 2018 was RAS inhibitors in all three countries. The use of central acting antihypertensives was highest in Lithuania, 30.9 DDD/TID, compared to 3.01 DDD/TID in Estonia and 16.17 DDD/TID in Latvia in 2018. Use of fixed-dose combinations increased from 30.3 to 94.9 in Estonia, from 33.7 to 87.1 in Latvia and from 28.2 to 106.6 DDD/TID in Lithuania.

Conclusion: The use of antihypertensive medicines has increased in the Baltic states, mostly driven by RAS inhibitors, beta-blockers and fixed-dose combinations. Low overall use of antihypertensives in Latvia and high use of central acting substances in Lithuania were detected.

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Impact of high-risk medication training videos on the knowledge of community pharmacists in India

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Background: It is evident that there is deficient knowledge on high risk medications (HRMs) in community pharmacists, therefore there is a high demand for informative materials on HRM management. This may lead to several medication errors causing life threatening conditions or even death.

Purpose: To explore the baseline scores on increment in the knowledge of community pharmacist on various aspects of high-risk medications management after administration of pre- and post-intervention questionnaire.

Method: Informative videos involving four chapters such as introduction, dispensing, look alike and sound alike (LASA) and storage and labelling of high-risk medication were developed from literature review and expert input. The pre-questionnaire consisted of 24 sets of questions regarding HRMs and their management, this was administered to 263 community pharmacists. After which an intervention with informative materials occurred, and post-questionnaires were administered. The final result on increment in their knowledge was thus evaluated.

Results: On average, only 43.8% of the total answers were answered correctly in the pre-test. This showed that there was insufficient knowledge on HRMs. Interestingly, the post-test showed an increment factor of 16.5%, by attaining an average of 60.3%. The chapter-wise increments in knowledge were 19.7%, 17.7%, 15.6% and 13.3% for the above four chapters, respectively.

Conclusion: It is clear that insufficient knowledge is a contributing factor in pharmacists' involvement in dispensing errors, and the using of validated training videos on HRM will certainly be beneficial.

Comparison of prices of originator and generic medicines

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Background: Generic medicines have gained popularity in recent years since they allow cost savings and create competition contributing to improved medicines access.

Purpose: To compare the prices of originator medicines with their generic counterparts available on the Maltese markets.

Method: The study focused on solid oral dosage forms available from community pharmacy in Malta as of January 2020. A tally of originator medicines and their generic counterparts was generated. Each drug was classified based on the Anatomical Therapeutic Chemical (ATC) classification system. The ratio of originator to generic counterparts was identified. The prices of the originator and generic medicines were listed and compared. The percentage price difference for each class and the overall average percentage price difference was determined.

Results: The study included 76 originator medicines and their generic counterparts (n=148) covering nine ATC classes. For every originator medicine, an average of two generic alternatives were available (1:2). The average percentage price difference for all classes indicates a price reduction. Drugs for blood disorders showed the highest average price difference (-52%), followed by drugs for cardiovascular disorders (-46%). Drugs for respiratory conditions had the lowest price difference (-6%). The overall average price difference between originator and generic medicines among all ATC classes was -29%.

Conclusion: The results infer that generic alternatives are available with a varied price difference across pharmacological classes. Further study into the reasons behind the difference could support strategies that increase access to medicines.

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CONFERENCE ABSTRACTS

FIP VIRTUAL 2020

Pharmaceutical Practice: Hospital Pharmacy

Improving microbiological testing pass rate through the innovative teaching - audiovisual interactive mode

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Background: Sterile environment is important for chemotherapy dispensing. Several environmentally microbiological testing (EMT) failures have occurred in chemotherapy dispensing unit (CDU) and the main reason discovered by QCC is human cause.

Purpose: An innovative teaching programme 'Sterile Detective' improved the efficacy of sterile dispensing and reached the qualification of the EMT.

Method: Twenty (20) pharmacists from CDU have been included in this programme from July 2018 to September 2019 and the execution procedure is as follows: 1). Teaching scenarios have been made via questionnaires; 2). Teaching media has been changed from traditional slides to videos, both correct and incorrect demonstration versions have been recorded based upon the team consensus; 3) After having both video learning via multiple mobile devices and demonstration lectures by mentors, the trainees have to record their own post-training self-conduct process. In the end, to increase learning interest, Kahoot platform has been implemented to examine the training assessments including the pass rate of the EMT and learning satisfaction evaluation via Liker's scales.

Results: The pass EMT rate has been risen (75 to 100%). The high satisfaction score of this programme has been presented in the following: be useful for clinical operation (4.86 points), be helpful for elevating EMT pass rate (4.86 points), become more confident for dispensing (5 points), and overall training satisfaction (4.86 points).

Conclusion: Having become more systematic, interesting and helpful for blindside discovery, this innovative teaching programme not only promoted the learning satisfaction, but also boosted the pass rate of EMT to 100%.

Development of a remote model for pharmacist verification of chemotherapy during the COVID-19 pandemic

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Background: Dr Gray's Hospital Elgin provides an outpatient chemotherapy service as a satelite unit to Aberdeen Royal Infirmary (65 miles away). Treatment is ordered at Dr Gray's by a suitably trained and experienced clinical pharmacist, pending patient blood test results.

Purpose: The COVID-19 pandemic has brought with it many challenges. Anticipated staff shortages, coupled with the complete removal of shielded staff from the department, have necessitated changes to normal working practices.

Method: Remote access to the NHS Grampian network was enabled for a pharmacist, working at home on an NHS Grampian device. Subsequently it was possible to access Chemocare, the

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chemotherapy prescribing and administration system, and Trakcare, the electronic patient records system.

Following patient toxicity screening and reporting of their blood test results, the Macmillan nurses authorise the prescription, allowing final verification by the pharmacist. The technician then accuracy checks the chemotherapy and releases it for delivery to the unit, ready for administration to the patient.

Results: The clinical pharmacy service to the outpatient chemotherapy clinic has been safely maintained by an appropriately qualified pharmacist, while minimising the level of input required from pharmacy technicians.

Conclusion: There have been minimal alterations to the service. This has been possible through small adaptations to access existing electronic resources, and frequent communication between the pharmacist and technician. Through full utilisation of remote access to NHS systems it has been possible to implement this alteration to service whilst maintaining at all times patient confidentiality and full professional accountability.

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Reviewing patient harm and illegal online drug sellers: A contemporary examination

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Background: As the online marketplace exponentially expands, more patients are turning to the internet for medications. However, the internet is inundated with illegal drug sellers offering falsified and substandard products with the potential of causing harm to patients worldwide..

Purpose: This systematic review aims to find reports of death, hospitalisation or adverse events due to medications purchased online via targeted database searches.

Method: Keywords for this review were refined though a preliminary literature search. Literature for this systematic review was considered from 2009 and June 2019 using the Google Scholar, PubMed and International Pharmaceutical Abstracts databases. Articles selected for inclusion were subject to further review for cases of harm, drug class referenced, region of origin, and specific case details.

Results: One hundred and eighty-seven (187) articles were obtained pertaining to online drug sellers. Upon further review, 32 articles met the criteria for inclusion. Two articles referenced specific cases of harm. Twenty referenced a specific drug or drug class offered for sale online. Seventeen articles mentioned whether websites were operating under proper legal requirements, and seven articles mentioned regional trends or global importation of pharmaceuticals online.

Conclusion: This review emphasises the pervasiveness of illegally operating online pharmacies selling pharmaceuticals from multiple drug classes, while also describing regional trends in reporting of these topics. It is generally accepted that harm occurs from substandard and falsified products worldwide, however, this review highlights underreporting cases of harm and a need for additional examination of the patient safety impact.

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Roles and challenges of a Swiss hospital pharmacy during the COVID-19 pandemic

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Background: On March 16, 2020, because of the COVID-19 pandemic, the Swiss Federal Council declared an 'extraordinary situation' in terms of the Epidemics Act.

Purpose: To assess the roles of an inter-hospital pharmacy in the fight against SARS-CoV-2.

Method: All missions performed by our pharmacy were systematically collected and evaluated. They were also compared to its official duties.

Results: Specific missions, which have been mainly managed by the crisis unit and the four departments of the pharmacy (Pharmaceutical Logistics, Drug Manufacturing, Clinical Pharmacy and Nursing Homes Supply), were: 1) human resources continuity; 2) specific drug supply (for both hospitals and nursing homes; e.g. anaesthetics, sedatives, antiviral drugs, incl. for clinical trials); 3) clinical assistance (especially in the ICU of the main acute hospital); 4) individual drug manufacturing (e.g. hydroxychloroquine oral solution); 5) on-site pharmacies management; 6) own infrastructure securing (especially in term of hygiene); 7) hand disinfectant production; and 8) hygienic masks supply for healthcare professionals in the area. The two last missions were out of the traditional duties of our pharmacy and have been achieved with the support of staff from the Swiss civil protection. A particular challenge was the management of the shortage of various products and the identification of alternative therapeutic options.

Conclusion: Our pharmacy has faced various challenges during the acute pandemic situation. Some missions performed were even beyond our traditional ones. The disaster plan of our pharmacy has to be further developed, as well as the associated training of the staff, based on the lessons learned from this pandemic.

Survey of the prevention practices and the awareness in handling for anticancer drug injections in Japan

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Background: With an increase in the number of patients receiving chemotherapy, there has been an increase in the awareness of the risk of adverse health effects in medical personnel with occupational exposure to anticancer drugs (ADs).

Purpose: The major aim of this study is to clarify relations among the prevention practices in hospitals and the awareness of pharmacists while handling ADs.

Method: This survey involved 31 hospitals in Japan and included 523 pharmacists who routinely dispensed ADs. Two questionnaires were used: the investigations of the prevention practices employed in hospitals, and the pharmacist's awareness in handling ADs.

Results: We received valid responses from 31 hospitals and 428 pharmacists. Although the survey about the prevention practices showed that facilities were establishing an environment for the mixing of ADs, the survey evaluating individual awareness of pharmacists showed that more than half the responses had potential harmful effects, such as any damage to health and exposure while handling ADs. There were instances when the standard operating procedures were not observed. The health anxiety factors of pharmacists routinely handling ADs were calculated using logistic regression analysis; female (p<0.05, OR:0.151), experience exposure to ADs (p<0.05, OR:6.741), score of handling ADs (p<0.05, OR:1.043).

Conclusion: It is important to reduce occupational exposure to ADs and to decrease anxiety levels in pharmacists. To achieve these goals, attention should be paid not only to establish a safe facility in hospitals for drug dispensing, but also to ensure that standard operating procedures are being followed while handling ADs.

The use of quality control techniques reduces drug shortage

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Background: Drug shortage in hospital will not only reduce the quality of drug but also delay patient's treatment which might worsen the condition. What's worse, after the restoration of drug supplies, the hospital also needs to inform patients of getting their medicine by phone calls or send medicine to their home by post, which in turn increases hospital operating costs.

Purpose: The Department of Pharmacy hopes to find out the real causes of the problem through quality control circles and

QC methods, and to formulate appropriate countermeasures to reduce the rate of drug shortage, in order to improve the quality of medical care and patients' satisfaction to the pharmacy.

Method: According to Pareto principle, insufficient drug reserves and increased usage are the main causes of drug shortage. All colleagues put forward relevant countermeasures for the cause of the problem, and then selected 11 countermeasures for improvement by voting, such as standardising the drug request process and improving drug safety based on seasonal or special epidemics stock, etc.

Results: The drug shortage rate decreased from 0.28% before improvement to 0.048%; the improvement rate was 82.9%. The medicine turnover rate increased from 1.59 before improvement to 1.66. The patients' satisfaction with the pharmacy increased from 83.65% before improvement to 90%.

Conclusion: After the improvement of the quality control circle, the rate of drug shortages greatly decreases and the patients' satisfaction with the pharmacy is also improved. Finally, the Department of Pharmacy hopes to make the improvement constantly in the future to reach the goal to 0% in the rate of drug shortages and provide patients with the most comprehensive medical care services.

Incidence and influencing factors of rituximab-related hypersensitivity in inpatients: A case-control study

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Background: The increasing incidence of rituximab-related hypersensitivity (RRH) reactions has affected the application of rituximab as a first-line therapy. However, evidence of RRH reactions in the Chinese population is limited.

Purpose: This study aimed to understand the clinical application of rituximab and the occurrence characteristics of RRH reactions, to explore the influencing factors, and to provide references for clinical practice.

Method: With the aid of the Adverse Drug Events Active Surveillance and Assessment System (ADE-ASAS), the present study retrospectively monitored patients using rituximab among inpatients in the Chinese People's Liberation Army (PLA) General Hospital in Beijing from 2009 to 2019.

Results: Among 3,301 patients using rituximab, the indications mainly included B-cell non-Hodgkin's lymphoma (57.26%), neuromyelitis optica (14.00%), and nephrotic syndrome (10.45%). Among these groups, the incidence of RRH reactions was 2.65%, 2.16% and 4.35%, respectively. There were no statistically significant differences (p=0.142). Multivariate logistic regression results showed that allergy history (OR: 5.408; 95% CI: 1.310-22.320; p=0.02) and lymphocyte count before medication (OR: 3.260; 95% CI: 1.808-5.879; p< 0.001) were risk factors for RRH reaction, and prophylactic administration of antihistamines (OR: 0.156; 95% CI: 0.036-0.669; p=0.012) was a protective factor.

Conclusion: Most of the RRH reactions occurred during or after the first administration, especially in patients with an allergy history. Prophylactic administration of dexamethasone and promethazine could reduce the incidence. The effect of the premedication lymphocyte count needs to be further studied.

Association of prior antibiotic treatment with survival outcomes of immune checkpoint inhibitors in Asia

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Background: Several studies report that antibiotics may alter gut microbiota diversity and compromise the therapeutic response of immune checkpoint inhibitors (ICIs) in non-small cell lung cancer (NSCLC). Nevertheless, the data are lacking in Asia.

Purpose: To evaluate whether there is an association with survival between antibiotic therapy and ICI therapy.

Method: This retrospective cohort study analysed data from Chang Gung Research Database (CGRD), which comprising three medical centres and four regional hospitals in Taiwan. Patients with NSCLC who received ICIs between January 2016 and March 2019 were collected. We established two groups-exposed group received systemic antibiotics within 30 days prior to ICI therapy, and control group was without antibiotics. Overall survival (OS) was the goal of our study. Survival was estimated for each group, using Kaplan-Meier method and compared statistically using the log-rank test. Cox proportional model was used for univariate and multivariate analysis.

Results: A total of 340 patients were identified for analysis. These included 128 (38%) patients who received antibiotics and 212 (62%) patients were with no antibiotic use. Of 128 patients in exposed group, half of patients prescribed a single antibiotic. The median OS was 455 days for control group, and 226 days for antibiotic group (p=0.003). Multivariate analysis found that the use of antibiotics was the most significant factor in determining OS on ICI therapy (p=0.001).

Conclusion: Antibiotics use prior to ICIs is associated with poor OS for NSCLC patients in Taiwan. Further research is needed to examine the impact of the individual class of antibiotics on OS with ICI therapy.

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Effectiveness of drug cost control in medical centre

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Background: The proportion of drugs in medical centres can show the quality of hospital medical management and effectiveness of cost control, and highlight the ability of hospital management.

Purpose: The ideal drug proportion and rational use of clinical drugs can be achieved by controlling doctor's prescription, indications, inspection data and pharmacists' pre-audit methods.

Method: Data include relevant data for 2019 collected through the HIS system, including the ratio of drugs to all drug expenses and medical income; outpatient average drug cost; inpatient average drug cost. Annual average of the above data are compared with the annual average in 2018. Outcome of evaluation is based on the performance evaluation index of the municipal medical management centre as the evaluation result.

Results: By controlling strategies the prescription authority of proprietary Chinese traditional medicines, restricting the temporary buying of drugs, monitoring drugs use, regulating the testing values of albumin, limiting outpatient prescription days. Drug costs of Chinese traditional medicines decreased $216,638; average decrease of about 52%/m; focusing on monitoring the use of drugs decreased $67,780, average decrease of about 15%/m. Proportion of drugs decrease 0.5% about $953,334. In 2019 the average medical expenses per outpatient and inpatient were $28 and $799 respectively, an increase of 7.1% and -8.1% respectively all above compared with 2018.

Conclusion: Analysis show the decrease drug costs can be effectively and reasonably controlled by medical management strategies, but the control measures in clinics outpatient still need to find other irrational drug use, and relevant control strategies are formulated after analysis.

Importance of the pharmacist in the validation of treatments

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Background: During admission there is a risk of medication errors (ME). According to the ADE Prevention Study Group, the ME occur: 56% in prescription, 34% in administration, 6% in transcription and 4% in dispensation. Pharmacist validation can prevent these ME.

Purpose: Review the pharmaceutical actions carried out in order to avoid ME, as well as the degree of acceptance by the prescriber.

Method: All registered pharmaceutical interventions, and their acceptance, from January to April 2020 included through the ATHOS-Prisma programme were included.

Results: During the study period there were 3,055 admissions and 20,343 validations. A total of 320 intravenous to oral changes were proposed due to the high bioavailability of the drug and the patient's oral tolerance, 91 being accepted; 264 administration schedule adjustments were recommended, accepting 90; 102 duplicate treatments were suspended; 95 dose changes were proposed, accepting 25; 127 drug presentations were adapted to the prescribed dose; it was proposed to suspend 86 unnecessary treatments, accepting 20; 56 reconciliations were performed on admission, 11 without home treatment and 45 with treatment, 13 being accepted; 55 paediatric admission profiles were performed (diagnosis, allergies, age and weight); 22 pharmacological interactions were detected; 19 dose adjustments according to renal function were proposed, 6 were accepted; 15 treatments were modified to avoid nasogastric tube obstruction.

Conclusion: Pharmaceutical interventions during validation constitute a key tool to avoid possible ME, however, we consider that the non-integration of the pharmacist in the different clinical units may justify the low degree of acceptance of these interventions.

Influence of diabetes mellitus on the prognosis of patients hospitalised for COVID-19

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Background: Various studies have established a relationship between coronavirus infection (COVID-19) and diabetes mellitus (DM) as a factor of poor prognosis.

Purpose: To determine the influence of DM on the evolution of patients hospitalised by COVID-19.

Method: Retrospective observational study. All hospitalised patients with COVID-19 infection treated with Lopinavir/ Ritonavir and Hydroxychloroquine during March and April 2020 were included. Two cohorts were performed: patients with DM and patients without DM. Patients who were not discharged or exited until April 30th 2020, were excluded. The treatment guidelines used were: Lopinavir/Ritonavir 200/50 every 12 hours mg for 14 days and Hydroxychloroquine 400 mg every 12 hours on the first day, followed by 200 mg every 12 hours during four days. Data were obtained through the Athos-Prisma inpatient prescription programme and review of medical records at Diraya. The chi-square test of comparison between data series of the two patient subgroups was performed.

Results: Fifty-six (56) patients, 40 men and 16 women were included. The cohort of patients with DM (n=15) presented a mean of 66.7 years (53.8-79.6) vs 65.8 years (52.4-75.7) in the cohort of patients without DM (n=41). Mortality in the group with DM was 46.6% vs. 29.2% in the group without DM. After performing the chi-square test, a $p>0.05$ was obtained, so the differences between the two subgroups were not statistically significant.

Conclusion: Our results do not associate DM with a poor prognostic factor in COVID-19 infection, although they are conditioned to the small sample size available. New studies with a larger number of patients will be necessary.

Pharmacy services provided by clinical pharmacists for COVID-19 patients

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Background: In December 2019, a respiratory illness due to a novel coronavirus, SARS-CoV-2, was first identified in Wuhan, China. SARS-CoV-2, termed COVID-19, is now a worldwide pandemic and has been identified in 216 countries and areas or territories (WHO, 2020). As of May 15th, 2020, there have been more than 4.2 million confirmed cases and 294,190 deaths worldwide.

Purpose: Ensure patient safety, drug availability, and therapeutic efficacy for all COVID-19 patients. Implement a number of changes to urgently meet the institution's patient care needs.

Method: Data were collected from a 62-year-old male patient admitted with severe COVID-19 to the intensive care unit in April 2020. The following pharmacy services were then provided: first, constant review and interpretation of new clinical data; second, patient eligibility assessment and obtaining medication through compassionate use protocols; third, evidence-based interventions (e.g. drug-drug interaction, drug-disease interaction, and dose adjustments); fourth, limit unnecessary nebuliser use. Last but not least, educate patients and the public on effective strategies to prevent acquisition and further spread of infection (e.g. social distancing, optimal hand hygiene, and personal protective equipment).

Results: With standard care and the compassionate use of Hydroxychloroquine, Azithromycin, Zn supplements, and Tocilizumab under close monitoring, the patient successfully recovered and was discharged on May 4th, 2020.

Conclusion: Pharmacists play a vital role within a multi-disciplinary healthcare team to optimise patient care during this COVID-19 pandemic.

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Efficacy and safety of Imatinib: An old friend for the treatment of chronic myeloid leukaemia

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Background: Chronic myeloid leukaemia (CML) represents 20% of the leukemias. The commercialisation of Imatinib fully changed the prognosis of the disease at that moment and, years later, new selective inhibitors of the BCR-ABL tyrosine kinase (ITK) were developed and the use of Imatinib has decreased

Purpose: To analyse the efficacy and safety of Imatinib in patients with CML.

Method: A retrospective study covering the period from September 2015 to September 2019 was conducted in a University Hospital. Every patient diagnosed with CML in treatment with Imatinib in that period was included. Variables collected were: age, months of treatment, response and adverse events (AE), which were evaluated with the Karl-Lasagna modified algorithm and only accounted if ≥4points

Results: A total of 35 patients, with a median age of 60 (25-86) years, were included. The median of months on treatment was 32 (1-207). Among these patients, half of them (17 patients) were on treatment for a median of 165 (40-207) months and are still on treatment. On the one hand, 22 (63%) patients are on molecular remission (MM); 14 (40%) complete and 8 (23%) major.

On the other hand, 13 (37%) discontinued the treatment due to lack of response (9), AE (2), and exitus non-related (2). Regarding safety, 19 (54%) patients suffered AE. The most severe were neutropenia, thrombocytopenia, diarrhoea, and fatigue. The most frequent were diarrhoea, fatigue, vomiting, and periorbital oedema.

Conclusion: Imatinib has shown to be effective achieving MM in 63% of the patients, for very long periods of time. Also, half of the patients suffered AE but well described on the clinical trials and shared by all ITKs used for CML. As well as the new ITKs, Imatinib is still a good option to treat CML in first line.

CONCILIA MEDICAMENTOS 2: Results of the bond between levels of care in a province of Spain

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Background: According to the Institute for Safe Medication Practices, 50% of the errors involving medication occur during transitions of care.

Purpose: To analyse the medication discrepancies and to estimate the potential impact of pharmaceutical interventions after the implantation of a Reconciliation Service at hospital discharge coordinated between different levels of care.

Method: CONCILIA MEDICAMENTOS 2/Medication Council 2 is an observational, prospective study in which eight Spanish hospitals and their reference areas are participating. Patients are recruited while hospitalised and the hospital pharmacist (HP) reconciles their medication. After hospital discharge, patients are followed for two months by the community pharmacist (CP). A descriptive analysis was carried out with the data collected.

Results: A total of 113 patients were recruited. Only 25 met the inclusion criteria (91% excluded due to CP not collaborating in the study). The mean age was 61 (38-87) years, being 52% women, and the mean of prescribed drugs was 7 (3-19). Patients were hospitalised in the General Surgery department (23%), Pneumology (19%) and Internal Medicine (15%) mainly. Relevant discrepancies were solved in 20 (80%) patients; 11 omissions, 5 dosing errors and 4 wrong drug. In order to reconcile the patients, 47 messages were sent from the HP to the CP and 21 were received from the CP with discrepancies detected by them

Conclusion: Most of the patients had relevant discrepancies regarding the treatment, solved by the HP. They were reconciliated in the Surgery department and also departments like Internal Medicine and Pneumology where patients are heavily polymedicated. It's important to include most of the CP in order to offer more patients the opportunity to participate.

Monitoring the adverse effects of immune checkpoint inhibitors

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Background: By increasing the activity of the immune system, immune checkpoint inhibitors (ICPI) can have adverse inflammatory effects, which are often called immune-related adverse events (irAEs).

Purpose: To review some aspects related to the proper identification and treatment of irAEs associated with ICPI, with a view to increasing the safety and effectiveness of therapy with these drugs.

Method: A narrative review of the literature of scientific articles was carried out from the PubMed database using the search terms 'immune checkpoint inhibitors adverse effects', 'immune-related adverse events of checkpoint inhibitors.

Results: Most adverse events associated with ICPI are autoimmune in nature and generally occur during the first three months of therapy, although some can occur after the final dose has been administered. Inflammatory toxicities associated with ICPI tend to follow a predictable initial pattern affecting, in chronological order, the skin, the gastrointestinal tract, the liver and the endocrine glands. The respiratory system is also frequently affected by pneumonitis. Moderate to severe events require early detection and appropriate treatment, particularly in patients with a history of transplantation or pre-existing autoimmune disease. In most cases, adverse reactions can be

treated with interruption of treatment and/or supportive therapy, which includes, in the most serious adverse reactions, the administration of immunosuppressants (e.g. corticosteroids, infliximab, mycophenolate mofetil).

Conclusion: By increasing the awareness of the multidisciplinary health team and the patient and the immediate identification and early and appropriate treatment, many irAEs can be reversed.

Digital medication support systems for patients in home care

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Background: Home hospitalisation is hospital care provided to patients with acute or acute chronic and palliative disease. It is essential that the patient is properly monitored and that health professionals have the possibility to monitor adherence to therapeutic drugs.

Purpose: To analyse medical devices already authorised and marketed, which enable the prescribing physician and pharmacist to assess adherence to drug therapy under home hospitalisation.

Method: A literature review was performed through the search of articles in PubMed, in order to find digital medical devices to assess adherence to drug therapy under home hospitaliation. This research was conducted in September/October 2019.

Results: Two suitable digital systems were found to support medication taking at home hospitalisation. One system consists of a digestible sensor that is incorporated into solid oral dosage forms. After administration of the drug, the sensor emits a signal to a portable detector, which allows the time/date of the drug to be taken. Subsequently, these are transmitted via the network to a server that allows access to the patient and health professionals. The second system consists of a drug dispensing unit loaded with a tablet or capsule cassette. At the appropriate time, the system alerts the patient and is available to release the tablet. Subsequently, the patient presses the release button until the tablet falls directly into the tongue. Data are recorded and stored in a computer system

Conclusion: These systems are an innovative practice for assessing adherence to oral drug therapy in home hospitalisation, and have great potential to increase the efficacy and safety of drug therapy

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Shortages on viper anti-venom medicines calls for hospital pharmacists' intervention

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Background: The problems caused by medicines shortages are serious, threaten the well-being of patients and have far reaching consequences for European health systems. More precisely shortages of viper anti-venom medicines require hospital pharmacists to take action.

Purpose: The hospital pharmacists should be able to ensure therapy to all patients within the first four hours from the snake bite by supplying all public health care providers in his/her region with the adequate doses of viper anti-venom.

Method: All logistics were assigned to the reference hospital that was responsible for procurement, ordering, storing the antidote and supplying the rest of the region's hospitals. It is worth mentioning that those medicines require storage at 2-8°C. Furthermore a direct phone line between all pharmacists of the regional hospitals was established in order to register every incidence of viper bite and evaluate the whole procedure.

Results: The reference hospital responded to all calls by sending with EKAB on time, with the appropriate packaging, ensuring the cold-chain supply, the viper anti-venom to all hospitals within 40-60min driving distance. The viper anti-venom sera used during 2017 were doubled in 2018 and almost tripled in 2019.

Conclusion: Due to medicines shortage hospital pharmacists ought to ensure patient therapy and safety and reduce costs in health systems. Provided that if every hospital ordered its own medication the provider would take two days to supply them, which would not be compatible with the patient's treatment. Moreover since the new drug was ten times more expensive, difficulties may occur in stocking due to budget limitations. So by applying this practice not only was time saved but also money.

The impact of hospital pharmacy visits on pregnant women's knowledge and practices in Katsina State, Nigeria

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Background: Hospital pharmacists play a pivotal role in antenatal care and are key players in educating pregnant women on safe medicines use in pregnancy.

Purpose: To assess the impact of hospital pharmacy visits on pregnant women's knowledge of the dangers of indiscriminate drug use in pregnancy and practices; including the use of unprescribed medicines and herbal products.

Method: Two hundred and thirteen (213) women attending the antenatal clinic in two hospitals were interviewed using a semi-structured questionnaire. Questionnaires assessed pregnant women's demographics, knowledge of safe medicines use in pregnancy, current medicine use practices and the number of hospital pharmacy visits.

Results: One hundred and thirty-six (136) women attending the antenatal clinic had visited the pharmacy department at least once, while 77 women had never visited the pharmacy unit. From the responses, at least one antenatal pharmacy visit resulted in a 21% increase in the number of pregnant women aware of the dangers of indiscriminate drug use in pregnancy and a 72.9% decrease in the number of women using unprescribed medicines and herbal products in pregnancy.

Conclusion: Hospital pharmacy visits in antenatal care significantly improved pregnant women's knowledge of the dangers of indiscriminate drug use in pregnancy, and practice of safe medicines use.

Medication utilisation evaluation of prasugrel

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Background: Current guidelines suggest dual anti-platelet therapy with aspirin and prasugrel or ticagrelor is the treatment of choice in patients with acute coronary syndromes (ACS) and for those undergoing percutaneous coronary interventions (PCI). However, prasugrel for ACS patients who do not perform PCI or stent, the mortality control is slightly inferior clopidogrel. Old age and low body weight should be used with caution. Careful selection of patients who fit the prasugrel indication is crucial.

Purpose: This study analyses whether patients currently using prasugrel meet the indications approved by the FDA, whether to give appropriate loading dose, the incidence of cardiovascular events, and adverse reactions. It will serve as a reference for future.

Method: Patients using prasugrel between August 2019 and March 2020 were included in the study. We evaluate the appropriateness and safety of using this medicine

Results: The study included 127 adult patients, aged 26-85 years, with an average age of 62±13 years. Patients older than 75 years account for 84%. There were 93% of patients whose body weight was more than 50kg; 65.4% meet the indications approved by the FDA; 94% of patients used loading dose before PCI, 84.3% used prasugrel. Three patients discontinued due to bleeding, and due to mortality.

Conclusion: This study shows that most patients are properly administered the loading dose before PCI. However, 35% of patients not meet the usage specifications. Prasugrel may have a risk of bleeding. Therefore, monitoring the appropriateness must be strengthened to avoid bleeding events.

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Rapid infusion of daratumumab

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Background: The incidence of infusion reactions (IRs) in clinical trials have led to the recommended administration rates, which result in infusion times for the first, second, and subsequent infusions of 6.5, 4.0, and 3.25 hours, respectively.

Purpose: Previous experience with the infusion of monoclonal antibodies supports the hypothesis that infusion of daratumumab in less time than that indicated in the technical sheet would not increase the number of IRs.

Method: Retrospective observational study of patients treated with daratumumab from December 2017 to April 2020.

Results: Fourteen patients received treatment with daratumumab (six males, eight females, mean age: 68.2 years). Only five patients followed the recommended rates of infusion included

in the data sheet (starting at 50 mL/h to a maximum of 200mL/h). In the first infusion, two patients presented intense cough and dyspnoea requiring hospitalisation. Our protocol established initial infusion rate of 200 mL/h (over 30 min) and, if there were no IRs, increase up to 400 mL/h (total infusion time, 90 min) in those patients who did not present IRs in the first three doses of daratumumab. This protocol was carried out in nine patients and none reported IRs.

Conclusion: Daratumumab is well tolerated in most patients and it is therefore considered a safe treatment. The 400 mL/h rate resulted in a decrease of approximately two hours in the patient's stay at hospital. Further prospective stafety studies in clinical practice are required to confirm these preliminary data.

Can the online shopping model of 'lock-boxes' improve access to hepatitis C treatment in vulnerable adults?

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Background: Hepatitis C virus (HCV) predominantly affects vulnerable and disenfranchised individuals, including people who inject drugs (PWID) and people who are homeless (PWAH); prior work shows 5% attend hospital appointments.

Purpose: The medication home delivery model has been successful in our Sussex Hepatology Operational Delivery Network (ODN), but relies on clients having an address and/or ability to sign for deliveries. On-line shopping companies have adopted 'lock-box' systems for customers unable to sign so enabling convenient collection. We adopted this strategy to ensure safe provision of HCV medications for difficult-to-engage individuals.

Method: Lock-boxes were installed in two central Brighton hostels; a day hostel accessed by PWAH and a residential hostel (the latter enabling micro-elimination within the hostel). Access to lock-boxes was via individual key codes. Once clients were assessed to be eligible for HCV treatment at the weekly multi-disciplinary ODN meeting, the pharmacy team prescribed and managed delivery to the lock-boxes. Cost effective dispensing was guaranteed by using the hospital outpatient pharmacy and medication was dispensed in weekly blister-packs. Usage was monitored, when refilling the lock- boxes and via liaison with the treating nurse.

Results: This ongoing pilot started in January 2020. To date two PWAH and three hostel-resident clients have successfully completed HCV treatment. The feedback has been over-whelmingly positive from both clients and service providers. The pilot is currently reliant on one pharmacist.

Conclusion: Preliminary results from this pilot are favourable as regards improving access to HCV treatment in a difficult-to-engage cohort and merits further assessment.

Importance of the clinical interview in the medication reconciliation process

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Background: The Electronic Pharmaco-Therapeutic History (EPTH) can be a useful tool to reconcile medication.

Purpose: To evaluate the veracity of the EPTH in the medication reconciliation process.

Method: A uni-centre, prospective, interventional study in the Emergency Department (ED) of a third level hospital was conducted from November 2019 to January 2020. Poly-medicated (five or more chronic drugs) patients were included. The complete Pharmaco-Therapeutic History (PTH) was collected by the pharmacist through a patient/caregiver interview and the review of hospital consultation reports. Then, it was compared with the EPTH prescription.

Variables: age, sex, number of chronic drugs, discrepancies between the PTH collected by the pharmacist and the EPTH and drugs involved.

Type of discrepancies considered:

- Omission: EPTH does not collect drugs the patient is taking.
- Commission: EPTH collects drugs the patient does not take.
- Dose or frequency: EPTH collects drugs with different doses or frequency.
- Therapeutic duplication

Results: Two hundred and nine (209) interviews were conducted. Mean age: 74 years (28-95). 61% men. A total of 1,970 drugs were reviewed [9 drugs/patient (5-20)]. 108 discrepancies were recorded, with 35% of patients having at least one (mean: 1.5 discrepancies/patient). Types: commission (45%), omission (23%), dose (16%), frequency (9%) duplication (6%). Drugs most often involved were antidepressants.

Conclusion: Thirty-five percent (35%) of patients presented at least one discrepancy with their EPTH. The pharmacist in the ED is useful to obtain a true and complete PTH, thus avoiding possible medication errors.

Effectiveness of obeticolic acid in primary biliary cholangitis patients in a tertiary hospital

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Background: Obeticholic acid is a semi-synthetic bile acid analogue. It is used as a drug to treat primary biliary cholangitis (PBC).

Purpose: To evaluate the effectiveness of obeticolic acid in PBC patients at 48 weeks of treatment.

Method: Observational, retrospective study in a third level hospital, including all patients treated with obeticolic acid for at least 48 weeks (August 2018 to February 2020).
Collected variables were: age, sex, diagnosis, previous concomitant treatments, alkaline phosphatase (AF) value, total bilirubin (TBIL), total cholesterol (TC) and gamma glutamyl transferase (GGT) at the beginning and after 48 weeks of treatment.

Results: Five patients were included, 100% women with a mean age of 60 years (45-76). Previous treatments for BPC were all with ursodeoxycholic acid (UDCA) for at least one year and were maintained as a concomitant treatment in all of them. Starting treatment was with 5mg/day orally, and increased to 10mg for 2 of them. Mean treatment duration was 70 weeks (58-78).

The mean basal AF was 300U/L (214U/L-361U/L), with all patients having at least 1.67 times the upper limit (116U/L). The mean basal TBIL was 1.17mg/dL (0.6mg/dL-2mg/dL). The mean basal TC was 298.5mg/dl (238mg/dl-420mg/dl), and the mean basal GGT value was 259.2U/L (105U/L-367U/L). Mean values of AF, TBIL, TC and GGT after 48 weeks of treatment were 142U/L (211U/L-73U/L), 0.6mg/dL (0.4mg/dL-1.4mg/dL), 219.2mg/dL (180mg/dL-275mg/dL) and 55.2U/L (24U/L-101U/L) respectively, assuming a mean reduction in AF: 158U/L (52.6%); TBIL: 0.6mg/dl (49%); TC: 79.3mg/dl (27%) and GGT: 204U/L (79%).

Conclusion: Obeticolic acid was effective in patients who did not previously respond to UDCA monotherapy.

Medication-related problems and hospital admissions due to drug-related problems in the emergency department

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Background: Drugs are the most widely used therapeutic tool against diseases, and represent 90% of the patient therapies. Therefore, it is very important to pay attention to drugs-related problems (DRP), as they may involve visits to the Emergency Department (ED).

Purpose: To assess the incidence of ED admissions caused by DRP.

Method: Prospective, observational study in ED (November 2019 to January 2020) of a third-level hospital. Patients admitted for observation and pre-admission beds were included. A pharmacist was integrated in the healthcare team to validate the medical prescription.

Collected variables were: number of visits to the ED as a result of a DRP, patient age, patient sex, drug involved in the DRP detected. In addition, it were collected if the patient had to be hospitalised afterwards, and mean number of days spent in the observation area.

Results: Two hundred and twenty-eight (228) patients were admitted to the emergency observation area, 30 as a result of DRP (13%). Mean age: 68 years (19-89), mostly males (67%). Drugs involved: anti-agregants/anti-coagulants (17%), analgesics (17%), antiarrhythmics (10%), antineoplastics (10%), diuretics (7%), antihypertensives (7%), opioids (7%), benzodiazepines (7%) other (18%). 15 patients (50%) were hospitalized, and those who did not were under observation for an average of two days.

Conclusion: DRP in ED admissions are a significant health problem. This suggests that the detection and analysis of adverse events, followed by the implementation of prevention programmes, will lead to an improvement in healthcare and patient safety.

Immune checkpoint inhibitor (ICI)-induced acute hepatitis complicated by cytomegalovirus (CMV) hepatitis

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Background: Immune checkpoint inhibitors (ICIs) combination therapies are widely used in cancer treatment recently. One of the cons of drug combination strategies is hard to find the culprit drug once adverse drug events (ADEs) occur. We presented a case who developed acute hepatitis after receiving pembrolizumab plus lenvatinib (ICI plus targeted therapy), and described how we handled this issue.

Purpose: To identify the drug that causes ADEs and emphasise CMV reactivation in the hepatitis event.

Method: Exploit lymphocyte transformation test (LTT) and CMV polymerase chain reaction (PCR) test to investigate the case.

Results: This 58-year-old man was a hepatocellular carcinoma patient who received pembrolizumab plus lenvatinib. He developed acute hepatitis (ALT 281 U/L) three months later, and the regimen was switched to sorafenib. ALT still elevated to 797 U/L despite adding steroid. Then, we stopped sorafenib. However, ALT was still rising up to 1111 U/L, so steroid titrated and mycophenolate mofetil added. Two weeks later, ALT was still as high as 997 U/L. Hepatitis event did not resolve within six weeks after pembrolizumab withdrawal. Owing to CMV PCR test showed highly positive (6843 copies/mL), ganciclovir was introduced. Finally, ALT began to persistently decrease to 333 U/L within two weeks after adding ganciclovir. The tumor status was stable during the time period of hepatitis event. LTT results showed positive on pembrolizumab (6.54 fold) and sorafenib (15.01 fold), and negative on lenvatinib.

Conclusion: LTT is a useful tool for clinicians to identify causative drug. CMV aetiology should bear in mind in the hepatitis event that it does not resolve with appropriate treatment for ICIs users.

Commonwealth Pharmacist Partnership develops antimicrobial stewardship and infection control in Zambia

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Background: Misuse of antimicrobials combined with poor infection prevention and control (IPC) can result in antimicrobial resistance (AMR). Health partnerships are ideally placed to enhance antimicrobial stewardship (AMS) through sharing up-to-date evidence and implementing best practice.

Purpose: Brighton Lusaka Pharmacy Link (BLPL) was awarded a Commonwealth Partnerships for Antimicrobial Stewardships Scheme (CwPAMS) grant to implement AMS at University Teaching Hospital (UTH) (THET, 2020). Pharmacists-led AMS prescribing and monitoring activities aim to implement a robust data collection system and measure the impact of interventions reducing misuse and overuse of antibiotics while increasing knowledge about on IPC and AMS.

Method: BLPL conducted a three-day workshop in Zambia for pharmacists, physicians, nurses and allied healthcare professionals at UTH to enhance AMS and point prevalence surveillance (PPS). IPC training was provided by the experienced Ndola IPC team. Train the trainer workshops enables UTH to disseminate AMS, PPS, IPC and data collection standards.

Results:

- Proactive MDT committee to manage AMS and IPC activities at UTH was established
- Specialist AMS pharmacist appointed
- Two Global-PPS undertaken
- Modified antibiotic prescribing chart introduced and audited-UTH antimicrobial guidelines updated
- AMS modular training programme for health care accredited by UNZA for CPD recognition - 34 IPC trainers trained
- Bare-below-the-elbow dress code (BBE) adopted nationally by HOPAZ
- WHO hand-rub production expanded

Conclusion: This model of pharmacist-led AMS demonstrates sustainability in locally driven AMS knowledge and seeded national IPC capacity-building whilst instigating behavioural change pertinent during the COVID-19 pandemic.

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Impact of substitution of cardiovascular generic medicines on consumption and expenses

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Background: Under the healthcare reform policy, in order to ensure that all people have quality cheap price drugs following consistent evaluation and certificated generic drugs are adopted: the manufacturers who pass the evaluation of drugs declare at the lowest price through centralised purchase of low-cost drugs; the proportion of drugs in medical institutions is reduced; the mechanism of using drugs to support medical institutions is eliminated; the drugs with appropriate prices selected in the use of medical institutions are pushed forward; and the operating cost of public medical institutions is reduced.

Purpose: The study aims to explore the consumption and expenses of cardiovascular generic medicines in a hospital in Beijing, and estimate the potential savings of patients from switching originator drugs to generics.

Method: The data of a tertiary hospital in Beijing, China, were used to examine the consumption and expenses comparisons of 14 cardiovascular drugs from 23rd March 2019 until 22nd February 2020.

Results: The share of the 14 generic medicines studied was 37.86% for volume, but for the price ratio of generic to original drugs was between 0.0433 and 0.3023, 10.38% for value. The price ratio of generic to original drugs was between 0.34 and 0.98, and the volume price index of original to generic drugs was 14.11. The potential savings of patients from switching original to generic drugs was 82.15%.

Conclusion: Under the background of volume-based purchasing policy, substitution of cardiovascular generic medicines led to the drug expense decreasing largely. The hospital manager should take measures to promote the consumption of generic medicines, and the savings may be considerable.

Outcomes of pharmacist clinic for patient education on immune checkpoint inhibitors (ICIs) in Taiwan

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Background: In recent years, immune checkpoint inhibitors (ICIs) have brought revolutionary change to cancer treatment. Meanwhile immune-related adverse events (irAEs) due to ICIs therapy is getting increased. It is important to provide patient education for irAEs in order to improve patient self-care.

Purpose: The aim of our study is to increase patients' awareness of irAEs and ensure drug safety.

Method: We established a Pharmacist Clinic for cancer patients with ICIs treatment. Clinical pharmacists provided one-on-one services of ICIs introduction and treatment plan, irAEs manifestations and management. The ICIs Cognition Questionnaire was conducted before and after pharmacist counseling. At the end of three months follow-up, the patients' Satisfaction Questionnaire was surveyed.

Results: A total of 42 patients were evaluated. ICIs included nivolumab (72%), ipilimumab plus nivolumab (12%), pembrolizumab (14%) and atezolizumab (2%) between March 2019 and December 2019. The ICIs Cognition Questionnaire contained three sections of knowledge, attitude, and practice. Knowledge section: patients had insufficient knowledge to identify irAEs occurrence (88.1%) and irAEs management (76.2%). Attitude section: patients took positive attitude towards cancer immunotherapy (86%), and trusted pharmacist consultation (92%). Practice section: 71.4% of patients were aware of the hepatic or renal impairment due to ICIs. After the pharmacist instructions, the overall correct answer rate increased significantly from 50.6% to 95.3%. The overall patients' satisfaction was as high as 97%.

Conclusion: Results from our study show that Pharmacist Clinic markedly improves the recognition and management of irAEs in cancer patients with ICIs treatment.

Relationship between pharmaceutical care follow-up and short-term renal allograft and recipient survival

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Background: Non-adherence to immunosuppressants is common after kidney transplant, especially in resource poor settings with limited or no health insurance. It is estimated that up to 36% of cases per year are non-adherent to their immunosuppressants. A strong relationship has been established between medication non-adherence and outcomes in kidney transplant recipients.

Purpose: This study is aimed at determining the relationship between pharmaceutical care follow-up (PCF) and short-term renal allograft and recipient survival.

Method: This was a retrospective study of the follow-up pattern from the pharmacy department of the hospital. All patients who had undergone kidney transplant and followed up in the past one year period between September 2018 and September 2019 were included in the study. Follow up was conducted by making calls to the registered phone numbers of the patients and graft death was determined using the eGFR of the patients.

Results: The overall recipient and graft survival (RGS) rates was both 84%.The mean number of days that the first call was made post-transplant was 26.3±19.4 days (median=20days). The percentage of frequency of calls were 3% for 7 calls, 6% for 6 calls, 11% for 5 calls, 14% for 4 calls, 20% for 3 calls, 16% for 2 calls, 15% for 1 call and 15% for 0 calls. The post-transplant medication adherence increased with the number of calls made to each patient within the 1 year period.The RGS among those

who were never followed-up was 33.3%. RGS significantly increased with the frequency of calls made to the patients and calling a patient more than 4 times within the year is protective

Conclusion: PCF increases the survival rates of both graft and recipients after a successful kidney transplant.

Effectiveness of an oral suspension of viscous budesonide in patients with eosinophilic esophagitis

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Background: Eosinophilic esophagitis is an inflammatory and immune-mediated disease that constitutes the leading cause of food impaction and dysphagia. The principal treatment consists in pump protons inhibitors (PPI), diet and topic steroids.

Purpose: To evaluate the effectiveness of topic budesonide in patients with eosinophilic esophagitis.

Method: Budesonide at 0.2mg/ml was designed and developed. Sixteen (16) patients were dispensed from the Pharmacy Service of which 81.25% had been refractory to treatment with PPI. They were followed using clinical history and their efficacy was evaluated comparing the previous endoscopic images and at three months of treatment. Three patients were removed because they were not evaluable after three months of treatment. It was assumed as a total response to have a normal mucosa aspect and as a partial response the improvement in the previous aspect.

Results: The 13 patients at clinical follow-up: (84,62% men) were 18±10, 81 years old and have a body mass index of 20.35±6.32 kg/m2; 30.77% suffered from another atopic disease such as asthma or rhinitis and 53.85% had some food allergy. The treatment was started at 7.54±9.53 months after diagnosis and the average duration of treatment was 18.57±13.61 months, with only two patients suspended. No patient presented adverse effects and tolerability was good. At three months of treatment, 53.87% of patients presented total response and 29.41% achieved partial response, reaching two of these total response at 8 and 48 months. Only one patient did not respond.

Conclusion: Budesonide 0.2 mg/ml is a good alternative in patients who did not respond to treatment with PPI, resulting endoscopic improvement in most patients studied at three months of treatment.

Timely shift from IV to PO AB's and economic factors associated in hospitalised patients: An interventional study

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Background: This study was conducted to evaluate the practice of IV to PO conversion and to determine the impact of conversion on the economic and clinical outcome.

Purpose: Inappropriate antibiotic use causes antimicrobial resistance. Extended courses of IV antibiotics also are associated with increased hospital stay, medicine and increased labour, preparation, dispensing and administration of IV agents and the increased morbidity and mortality associated with IV line infections

Method: An interventional study was conducted for a period of one year in a tertiary care hospital in general wards. A total of 200 patients were included in this study, where 30 patients belonged to the control phase and 170 patients belonged to the test phase. The practice of conversion from IV to PO antibiotic therapy was evaluated and compared between the two phases. Economic analysis was carried out using cost saving analysis and cost burden analysis.

Results: The average length of stay (LOS) was found to be 6.0±1.5 and 4.4±0.7 days in phase I and phase II and the duration of IV therapy was 5.2±1.8 and 2.2±1.4 in phase I and phase II which showed a positive correlation. Cost burden analysis was carried out and it was observed that the cost incurred to patients was decreased from ₹1, 42,622 (USD 2056.75) in Phase I to ₹ 32, 333 (USD 466.27) in Phase II.

Conclusion: This study showed that conversion from IV to PO antibiotic therapy in eligible patients can result in early discharge and decrease the overall health costs. Therefore, appropriate guidelines for IV to PO conversion should be developed which can promote accurate, uniform and timely conversion in the hospital.

Status investigation and management of clinical pharmacy quality control in obstetrics and gynaecology hospital

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Background: Quality control for hospital pharmacy practice is a full-process dynamic supervision, to guarantee the quality of medication therapy and pharmacy practice. The obstetrics and gynaecology hospitals mostly serve pregnant and lactating women, and the safety of medication is of concern to patients and physicians. Therefore, improving the quality of pharmacy practice and ensuring safety of maternal drug use are the core issue in obstetrics and gynaecology hospitals.

Purpose: To investigate the current level of pharmacy quality control in maternal and child hospitals in China, and discuss improvements in pharmacy practice.

Method: A 17-indicator survey of pharmacy quality control were created by pharmacy experts, involving drug administration, rational drug supervision and pharmaceutical care. Involved hospitals scored for each indicator and data were recorded by Excel software and analysed by SPSS 20.

Results: Twenty-one (21) obstetrics and gynaecology hospitals in China were involved in the study. For personnel aspects, only one hospital reached the standard for personnel allocation ratio; for drug administration, 76.5% of the institution met the criteria on drug procurement and management. The compliance rate reached 73.7% for rational drug use supervision, and for pharmaceutical care, hospitals mainly conducted medication consultation service (94.7%), while other pharmacy services such as patient education and rug therapy co-management is below 20%.

Conclusion: Rational drug use supervision and pharmaceutical care are insufficient in obstetrics and gynaecology hospitals in China. Pharmacy quality control are required to improve the quality of pharmacy practice and medication safety in specialised hospitals.

Antibiotic utilisation analysis of a Chinese tertiary hospital in 2019

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Background: Optimising antibiotic prescription in hospital is a key strategy to combat antimicrobial resistance. In China, many indicators are employed to measure clinical use of antibacterial drugs.

Purpose: To implement better antimicrobial stewardship and promote the rational antibiotic use.

Method: A retrospective study was conducted on medical records of all the patients in 2019. The rationality of antibiotic utilisation is assessed by evaluating 25% randomly sampled inpatient cases. The criteria of assessment were established based on published guidelines and official documents.

Results: Proportion of outpatients receiving antibiotics was 7.47%. Proportion of inpatients receiving antibiotics was 39.31%. Antibiotic use density [AUD= DDDs*100/inpatient days. DDDs = Total drug consumption (g)/DDD.] was 37.96. The rate of inappropriate use was 12.92%, which leads to extra 2725 DDDs consumption and 348.8 thousand RMB cost. Antibiotic DDDs consumption data collected in department level showed that six surgical departments was ranked within top ten high consumption departments. Among the top ten drugs in the list of DDDs, there were five cephalosporins, two carbapenems, two quinolones, and one nitromidazole. They are all injections. Cefoperazone and sulbactam sodium was in first place, which consumed 14787 DDDs.

Conclusion: Although the goals set for regulating clinical antibiotic use in 2019 have been achieved, antibiotics misuse still exists. Further efforts of antimicrobial stewardship should focus on the containment of cephalosporin and the anti-infection training of doctors, especially surgeons.

Immunology and related genetic factors of fluoroquinolone-induced liver injury

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Background: Drug-induced liver injury (DILI) is a frequent adverse drug reaction (ADR) that may present multiple clinical manifestations and is also one of the most frequent reasons for drug non-approval or withdrawal from market. Unfortunately, the mechanism underlying DILI is not well understood. Immune and genetic factors have always been considered to play an important role in its occurrence and development.

Purpose: Analysing the mechanism of immune factors in liver injury induced by fluoroqinolones (FQNs) and finding susceptibility genes.

Method: Based on the Adverse Drug Events Active Surveillance and Assessment System (ADE-ASAS), a real-time automatic monitoring study was conducted. Blood samples were collected from cases and controls to detect immune cells and cytokines and complete HLA genotyping.

Results: A total of 12,623 hospitalised patients using FQNs were monitored in the study among which 34 patients were found developed liver injury and finally we got informed consents from 10 cases and 20 controls. The frequencies of CD4+ helper T cells (Th cells) were found significantly higher from cases than controls and significant increases of Th22 cells were also observed in cases group. There were no significant differences in cytokines expression and distribution of HLA between the cases and controls.

Conclusion: Th22 cell may play an important role in the development of DILI but more large sample studies are needed to identify what role does IL-22 plays and if DRB1*1501-DQB1*0602 is a risk haplotype of FQNs related DILI.

Risk factors of patients with drug-induced acute kidney injury in hospitalised patients: A case-control study

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Background: Drug-induced acute kidney injury (D-AKI) has been progressively common, thus extending length of stay and increasing mortality. However, risk factors leading to D-AKI under all medication conditions during hospitalisation had been rarely assessed.

Purpose: This study aimed to delve into the risk factors of patients with D-AKI in hospitalised patients in a multi-drug environment.

Method: Based on the Adverse Drug Events Active Surveillance and Assessment System that we developed. A retrospective study was conducted among hospitalised patients in July 2019. Four controls per case were matched in terms of the admission time and medication. The risk factors were identified by binary multivariate logistic regression of this adverse reaction.

Results: A total of 23,073 patients were hospitalised in July 2019, 21,131 of which satisfied the inclusion criteria; to be specific, 115 were classified as D-AKI (0.54%, 115/21,131). The independent risk factors for D-AKI consists of alcohol abuse (OR, 1.89; 95% CI, 1.12-3.17), use of NSAIDs (OR, 2.47; 95% CI, 1.36-4.88), use of diuretics (OR, 3.19; 95% CI, 1.85-5.54), prior anemia (OR, 3.75; 95% CI, 2.17-6.46), prior chronic kidney disease (OR, 2.16; 95% CI, 1.06-4.41) as well as higher neutrophil counts (OR, 1.19; 95% CI, 1.13-1.26).

Conclusion: The occurrence of D-AKI in hospitalized patients displays significant associations with alcohol abuse, combination therapy with NSAIDs or diuretics, prior anemia or chronic kidney disease, as well as higher neutrophil counts. Clinicians are required to pay rigorous attention to patients with the mentioned factors.

Analysis of influence factors of severe neutropenia induced by etoposide-based chemotherapy

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Background: Etoposide is a widely used antineoplastic drug, however, it can induce neutropenia which may compromise optimal cancer management. In addition, there has not much research on influence factors of severe neutropenia induced by etoposide-based chemotherapy (SNIEC).

Purpose: The aim of this study is to investigate the influence factors and clinical characteristics of SNIEC.

Method: This retrospective study used Adverse Drug Events Active Surveillance And Assessment System (ADE-ASAS) to extract data of patients receiving etoposide in PLA general hospital from January 1st 2009 to December 31st 2018. Each SNIEC case was matched with four controls that did not have neutropenia. Logistic regression analysis was used to test the associations of factors to severe neutropenia.

Results: A total of 14,557 patients were treated with etoposide. Finally, 45 patients were identified as SNIEC. Multivariate logistic regression analysis showed that the influence factors were: Karnofsky performance status(OR=0.88, 95%CI=0.81- 0.94, P<0.01), prior cardiovascular disease (OR=8.17, 95% CI=1.86-35.85, *p*<0.01), adrenal metastasis (OR=6.13, 95% CI=1.10-34.05, *p*=0.03), lymphocyte count <0.7×109/L (OR=3.46, 95% CI=1.12-10.66,P=0.02) as well as albumin<35 g/L (OR=11.08, 95% CI=3.55-34.57, *p*<0.01).

Conclusion: SNIEC was highly correlated with performance status, concomitant cardiovascular disease, adrenal metastasis, lower lymphocyte count and serum albumin. Thus, clinicians should use etoposide more carefully while their patients have above factors.

Evaluating medicines storage conditions in patients' home with sodium valproate granules in Japan

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Background: Sodium valproate granules (VPA granules) are hygroscopic formulations and can agglomerate under inappropriate management conditions. However, there is little known about patients' medicines storage after pharmacy dispensing.

Purpose: To evaluate the medicines storage of VPA granules at patients home temperature and humidity conditions after being dispensed at the pharmacy.

Method: This study was a prospective and observational study of outpatients who visited Kameda Medical Centre and were prescribed VPA granules; and agreed to participate in the study. A portable data logger capable of measuring temperature and humidity for 24 hours of the medicine storage conditions at a patient's home was delivered at the time of the first visit. At the following visit, the data logger was collected and data about temperature and humidity were obtained. We defined a suitable temperature of 1.0-30.0°C and a suitable humidity of 75.0% or less. Study period was from July 5th 2018 to February 20th 2019.

Results: Thirteen patients were included. Eighteen data loggers were distributed and return rate was 100%. The temperature was out of range of the storage condition in 0.8% of the total observation time. The humidity exceeded 75% relative humidity in 0.7% of the total observation time. For data loggers (22.2%) had temperature deviations and seven data loggers (38.9%) had humidity deviations. Nine data loggers (50.0%) showed no deviation in both temperature and humidity.

Conclusion: Storing a drug in an inappropriate environment changes the nature of the drug, affecting its efficacy and safety. Although patient education on drug management was delivered while dispensing, further patient education on oral medicines' storing methods are still necessary.

The preparedness of public hospitals and healthcare providers to face COVID-19 pandemic

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Background: The effective SARS-CoV-2 infection prevention and control in any country depends on awareness and training of healthcare practitioners (HCPs) in addition to the preparedness and protective measures of healthcare settings.

Purpose: The study aimed to measure the preparedness of public hospitals and healthcare providers to face COVID-19 pandemic in Iraq.

Method: This was a cross-sectional study based on an electronic survey (Qualtrics) in English distributed among HCPs working in public hospitals across the country. The survey was distributed via two professional Facebook groups between March 22nd to April 7th 2020. The author adopted with modifications the survey items from previous studies of Middle East Respiratory Syndrome (MERS).

Results: The authors received 347 completed surveys (52.2% pharmacists, 38.3% physicians and dentists 8.6%). All the seven items measuring HCP awareness of COVID-19 disease and preventive measures were above average with total mean of 27.91 (±4.21) out of 35 points. In contrast, 10 out of 12 items measuring the public hospital preparedness to COVID-19 were below average (between 1.73 and 2.7 out of 5) particularly those related to provide staff trainings and protective personal equipment (PPE). Additionally, 81.8% of the participants

Conclusion: Iraqi HCPs have adequate levels of awareness of COVID-19; however, the public hospitals need to enhance staff training and protective measures in addition to providing adequate PPE to HCPs. The Ministry of Health needs to provide adequate numbers of mechanical ventilators to public hospitals to face COVID-19 pandemic.

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Safety and effectiveness of erenumab in chronic refractory migraine

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Background: Erenumab is a human monoclonal antibody that inhibits the peptide receptor related to the calcitonin gene, a vasodilator associated with the physiopathology of migraine.

Purpose: To evaluate the effectiveness and safety of erenumab in chronic migraine of ≥8 days/month, with previous failure to three or more drugs, including botulinum toxin.

Method: Observational, retrospective study in a third level hospital, including patients with migraine diagnosis treated with erenumab (March 2019 to February 2020). Variables: age, sex, erenumab posology, and previous and concomitant treatments. Effectiveness was evaluated by comparing the number of days of migraine per month (DMM) at baseline and after 12 weeks of treatment. Adverse effects were collected.

Results: Six patients were included, all women with a mean age of 51 years and previously treated with an average of eight drugs (triptans, NSAIDs, topiramate and botulinum toxin). Erenumab posology in all cases at the beginning of treatment was 140 mg every 28 days. After 12 weeks of treatment, five patients reduced the DMM compared to the mean baseline of 18, being a reduction >60% in four of them and 26% in the remaining one. One of those patients achieved a 100% in reduction, dropping from 16 to 0 DMM and erenumab posology was reduced to 70 mg every 28 days at week 36. The sixth patient had to discontinue due to ineffectiveness of erenumab in week 22 (DDM reduction of 0%). Regards to the safety profile, only one patient presented itching.

Conclusion: Erenumab has shown to be effective and well tolerated in patients with few therapeutic options in real life clinical practice, although long-term follow-up studies are needed to confirm these results.

Influence of rational drug use planning on key monitoring drugs

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Background: Focus on monitoring the proportion of drug use plays an important role in all drug expenses. It can show the effects of rational drug use improvement plan in our hospital, which aimed to reduce the unreasonable medical expenditure and improve the level of rational drug use.

Purpose: Key monitoring drugs rational use and clinical drugs can be achieved by limiting doctors' prescription rights, as well as controlling the dosage, indication, laboratory index and the prescription days of key monitoring drugs, limiting the use of drugs that exceed the threshold, which is set according to its budget percentage.

Method: Data sources from 2017-2019 are collected through the HIS system and business intelligence of the hospital, including consumption expenses, and the ratio of key monitoring drugs to all drug expenses. The annual average of the above data are compared with the annual average in 2017 and 2018 year .

Results: By monitoring drug use, regulating albumin prescriptions. The consumption of key monitoring drugs decreased about 15.4% compared with 2018 and about 22.63% compared with 2017. Drug costs of key monitoring medicines decreased about 16.67% compared with 2018 and about 18.26% compared with 2017. Proportion of key monitoring drugs decrease from 18.08% to 8.09% during 2017-2019.

Conclusion: The results of study data analysis show that the control of key monitoring drugs in our hospital has made some progress, but more effective measures need to be taken to promote the rational use of the standard of key monitoring drugs.

Drug dosing in patients with renal impairment

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Background: Inappropriate prescribing (IP) is common in patients with poor renal function in hospital and in outpatient settings. The prevalence of acute kidney injury (AKI) has been reported to be 5-10% among hospitalised patients and up to 35% following major surgery (Chertow *et al*., 2005; Hansen *et al*, 2013).

Purpose: To assess prevalence of IP in surgical wards in a 400-bed acute care hospital and to identify the most common drug classes which are inappropriately prescribed.

Method: The retrospective descriptive study included patients 18 years and older admitted to surgical wards for more than 24 hours with documented estimated glomerular filtration rates (eGFR) less than 60 ml/min/1.73m2. Patients were selected using stratified random sampling method. Data about medications and eGFR results were collected using electronic health care records.

Results: One hundred and thirty-nine patients were included in the study (63% female; 37% male) with an average age of 78 (range 42-98) years and mean length of stay of 5 days. Chronic kidney disease and AKI were documented in 12.9% (n=18) and 10.8% (n=15) of the patients, respectively. The prevalence of IP among surgical patients was 38.3% (222 of 579 prescriptions). At least one inappropriate prescription was present in 83 (59.7%) patients and 23 (27.7%) of them received ≥3 inappropriate medications. One or more contraindicated medications according to renal function was prescribed for 29 (20.9%) patients. The most common drug classes which were inappropriately prescribed were antimicrobials (40.5%) and analgesics (66.0%).

Conclusion: Results of the study show that renal dosage adjustment is still an ongoing problem that needs to be addressed.

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Medical device: Patient safety

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Background: The staggering number of medical device-related incidents led the European Union to update the Directive for Medical Devices with a focus to increase safety and vigilance.

Purpose: To understand occurrence and handling of medical devices' incidents in a hospital procurement unit.

Method: A total of 150 observation hours were performed in the Quality Assurance Unit of the Hospital Central Procurement Unit. Devices involved in incidents were classified using Global Medical Device Nomenclature (GMDN, 2020). Root cause investigation and classification was carried out.

Results: A total of 333 medical device incidents were investigated and closed from January 2016 to July 2019. The leading devices with incidents were sutures (10.5%), dressings (9.61%) and gloves (6%). A root cause investigation tool (Amoore, 2014), was updated in this study by generating two new major failure groups (supplier and regulatory compliance). The updated tool was used to classify causes of incidents studied as device-related (35%), infrastructure (14%), supplier (9%), regulatory compliance (8%), no problem found (6%), operator (2%), clinical and patient factors (1%). For 24%, the cause was unknown.

Conclusion: The study led to an understanding of the medical device-related incidents handling and the required documentation for a structured analysis. The innovated tool for investigating causes of incidents is now implemented in the hospital procurement unit.

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Establishing a pharmacovigilance framework within a hospital centralised procurement system

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Background: In the effort to ensure access to medications which are not registered on the Maltese market, the hospital central procurement unit (CPSU) is responsible to register medicines via Article 126a of EU Directive 200/83/EC. The registration process also requires a pharmacovigilance framework for these medicines.

Purpose: The objective was to identify and establish a robust framework for pharmacovigilance for medicines registered by CPSU and to propose action plans for implementation of the framework.

Method: The study followed a qualitative research design of focus group discussion and interviews with CPSU and Medicines Authority, the medicines regulatory agency, management and staff, and a framework development.

Results: The focus group interview revealed six major themes, namely, challenges in procurement, roles in products registration, medication safety, adverse drug reaction (ADR) reporting, barriers to pharmacovigilance, and acknowledgment of pharmacist's role. Following the identification of the themes that required addressing, a framework of pharmacovigilance to be implemented in CPSU was developed to include ADR reporting, medication safety principles in procurement, legal perception, and establishment of a product recall process. Validation of the framework was conducted via focus group and the optimised system launched within CPSU.

Conclusion: The establishment of a pharmacovigilance system in CPSU is a patient safety focused system ensuring access to medicines for which there is shortage and access issues whilst ensuring quality, safety and efficacy of the medicinal products.

Sidra Pharmacy's evidence-based approach to meet changing demands on the service: COVID-19

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Background: From December 2019, the healthcare system as we know it changed, as the WHO declared a worldwide COVID-19 outbreak.

Purpose: Evidenced-based review of pharmacy emergency major incident plan, alongside internationally recognised policies, with government updates (Ministry of Public Health; 2019; ASHP, 2020; GPhC, 2020; Ministry of Public Health; 2020); RPS, 2020).

Method: Pharmacy leadership identified staff who could work remotely, split shifts; receive cross training. The clinical team worked closely with the infectious disease/antimicrobial stewardship team towards devising a clinical plan to manage those under our care.

Results: Service changes included: team members resorted to online or telephone discussions; verification of medication orders took place from home; activation of automation systems; changes to the pharmacy homecare service; communication moved to digital virtual platforms; measures such as the addition of floor markings and medication deliveries to clinics were implemented. Patient education leaflets and social media platforms were utilised to inform patients. Introduction of a drive-through pharmacy collection service, home delivery services, online medication request services, along with expansion of the telephone request infrastructure. Tailored 'ABC' analysis were performed to identify 'valuable' medicine. Non-formulary stocks were distributed to all patients, to prevent any panic or assumption about shortage. All 2021 medication supply plan was booked with manufacturers. The Pharmacy Director was able to create new 'just-in time' delivery channels..

Conclusion: It is important to reach out to approved evidenced-based guidance, and services must change in order to maintain high level patient care within a crisis. The question now arises - iIs there a need for further improvement?'.

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Effectiveness and safety of nivolumab in squamous cell cancer for head and neck patients

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Background: Nivolumab is a PD1 receptor inhibitor indicated for the treatment of patients with head and neck squamous cell carcinoma (HNSCC).

Purpose: Assess effectiveness and safety of nivolumab in monotherapy in recurrent or metastatic HNSCC who progresses during or after platinum-based treatment.

Method: Retrospective observational multi-centre study of patients treated with nivolumab from February 2018 to February 2020. The variables collected were: age, sex, functional status, previous treatment lines, number of cycles received, progression-free survival (PFS) and overall survival (OS). Adverse effects were recorded. Data were obtained from medical records (Diraya) and electronic prescription (Prisma and Oncofarm) applications.

Results: Twenty-nine (29) patients were included, 62.2 years was the mean age (range 52-79), of whom 79% were men. Patients presented an ECOG of 0-1. Fifteen patients were treated with nivolumab in second line, 11 in third, 2 in fourth and 1 patient in sixth line. The median treatment was 8.4 cycles. Eleven patients are still on nivolumab treatment, with a median response time of 7.5 months. The median PFS of the remaining

patients was 4.02 months. The median OS of these patients was 3.46 months. Adverse events registered included four patients presenting grade II-III asthenia, seven experienced loss of strength in lower and upper limbs and three had oropharyngeal candidiasis. No patients discontinued treatment due to adverse reactions

Conclusion: Nivolumab is presented as a therapeutic alternative in HNSCC´s patients who progress to platinum-based treatments. The effectiveness is very limited. The safety and tolerability profile was acceptable and similar to that recorded for the use of the drug in other indications.

Review of an alternative method of oral administration in oncohaematological pathology

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Background: Correct administration of oral drugs in patients with swallowing problems remains a challenge.

Purpose: To determinate alternative methods of oral administration of antineoplastic agents approved for oncohaematology therapy.

Method: Twenty-nine (29) antineoplastic agents included in the hospital pharmacotherapeutic guide were selected. The databases used in the bibliographic search were Pubmed, Cochrane, Embase and Uptodate. The criteria collected were: medicine´s brand name, active substance and the search terms 'difficult swallowing', 'nasogastric tub', 'crush', 'extemporaneous' and 'nasogastr*'. The search was completed with the information from the summary of product characteristic, the oncology pharmacy group (GEDEFO), the pharmacotherapy and paediatrics working group, belonging to the Spanish Society of Hospital Pharmacy, and the data provided by the manufacturing laboratories.

Results: Information was found on 22 consulted drugs. The main alternative methods of administration were: pharmaceutical compounding (7), dissolution (12) and crushing (2). Data were not found on 7 antineoplastic drugs and melphalan is the only unstable drug when manipulated. Simple syrup, water, Ora Plus and Ora Sweet are the main solvents. It is worth mentioning that nilotinib is stable only in applesauce. Manipulating a drug may alter its bioavailability, although its concentration in bioequivalence levels is maintained.

Conclusion: Despite the manipulating not being recommended in the summary of product characteristic, the limited literature available indicate that it is a good alternative to optimise the treatment in patients with swallowing difficulties or those who need the administration through nasogastric tube.

Effectiveness and safety of ocrelizumab in relapsing-remitting and primary progressive multiple sclerosis

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Background: Ocrelizumab is a recombinant humanised monoclonal antibody that acts selectively against B cells expressing CD20.

Purpose: Assess effectiveness and safety of ocrelizumab in patients with relapsing-remitting (RRMS) and primary progressive multiple sclerosis (PPMS).

Method: Retrospective observational multi-centre study of patients treated with ocrelizumab from February 2018 to December 2019. The variables collected were: sex, age, type of MS, functional status (according expanded disability status scale, EDSS), previous treatments, duration, clinical evolution (relapses, progression, improvement and stability of the disease) and magnetic resonance imaging (MRI) data. Adverse effects were recorded as number and degree of lymphopenia. Data were obtained from electronic prescription (Prisma) and medical records (Diraya) applications.

Results: (Twenty-six) 26 patients were included, mean age 41.5 years (range 26-61), of whom 61% were men. Eleven patients with RRMS and 15 with PPMS (mean of EDSS 4,7). Fifty percent (50%) of the patients had specific treatment for MS, of which 31% with immunomodulators and 15% with biological treatment. The median treatment was 33.5 weeks. Eight percent (8%) of patients showed improvement, 65% confirmed disease stability, 19% worsened, and two patients had an outbreak. MRI shows a decrease in number and size of lesions in one patient and stability of the disease in the rest. Adverse events registered included five patients with lymphopenia grade 1 and three patients with lymphopenia grade 2.

Conclusion: Ocrelizumab has been shown to be effective in slowing disease progression, controlling clinical and radiological activity in both RRMS and PPMS. The safety profile of ocrelizumab is consistent with that observed in clinical trials.

Analysis of antibiotic consumption in an intensive care unit

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Background: The follow-up of antibiotics and especially those of restricted use against multi-resistant bacteria is one of the pharmacist's main activities as a member of the Programme for Optimising the use of Antibiotics (PROA) in our hospital.

Purpose: To analyse the evolution of antibiotic consumption in the intensive care unit (ICU) of a university hospital.

Method: Retrospective, comparative study of antibiotic consumption (ATC J01-J02AX06) during 2017-2019. The data were obtained from the APD management programme. The variables collected were: global Defined Daily Dose (DDD) ATC J01-J02AX06 per 1000 stays, and consumption broken down by active principles. Excel Microsoft Office 2010 was used for statistical data processing.

Results: During the study period, the global DDD/1000 stays was 2390,24 (2017), 2540,72 (2018), 2563,02 (2019). In ICU was 1746,1 (2017), 1618,3 (2018), 1569,2 (2019). In 2019, 51 different active principles of antibiotics were dispensed in the hospital. Of the total DDD consumed in the hospital, 61% was in ICU. Main prescribed antibiotics in ICU expressed in DDD/1000 stays: meropenem (DDD 204,8), levofloxacin (DDD 170,9), erythromycin (DDD 118,9), piperacillin- tazobactam (DDD 112,8), linezolid (DDD 88), amoxicillin-clavulanic (DDD 64,2), ceftriaxone (DDD 59,8) and vancomycin (DDD 59,7), being similar in the other periods studied.

Conclusion: Although there is a tendency to reduce the overall consumption of antibiotics, this consumption is high. PROA teams contributes to improve the management of antibiotics (especially broad-spectrum), therefore, their implantation in ICU could optimise the pattern of antibiotics use and the quality of care.

Investigation of methotrexate-induced epidermal necrosis (MEN) at a single centre

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Background: Methotrexate (MTX), a folate antimetabolite, is widely used in rheumatoid arthritis and psoriasis. In general, oral MTX with weekly dosing is well tolerated. Of note, methotrexate-induced epidermal necrosis (MEN) is a life-threatening adverse drug reaction (ADR) although it is rare.

Purpose: To investigate the risk factors of MEN.

Method: We collected ADR reports of MEN cases between January 2009 and December 2019 at our hospital. Analysis of age, gender, renal function, mortality, initial MTX dose, cumulative MTX dose, and indications of MTX were examined for each MEN case.

Results: Total 11 MEN cases were identified. Among 11 cases, eight cases were older than 60 years, and the male was the majority (8 males). The indications of MTX were psoriasis (9 cases), rheumatoid arthritis (1 case), and one pemphigoid case. Six patients had stage 4 chronic kidney disease (CKD), and two patients were on intermittent hemodialysis (IHD) (i.e. total 8 cases had severe renal impairment). Four cases (36%) expired and they were all stage 4 CKD patients. Median initial MTX dose was 8.75mg (range 2.5-15), and median cumulative MTX dose was 20mg (7.5-45).

Conclusion: The results of our study showed that males older than 60 years with psoriasis could be victims of MEN for MTX users. Stage 4 CKD was the major risk factor for MEN occurrence and mortality due to MEN. Considering 36% mortality rate, for psoriatic patients with stage 4 CKD and IHD, we strongly recommended to choose alternative medicine other than MTX.

Development and effectiveness of a clinical pharmacist training programme in a medical centre of southern Taiwan

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Background: Mandatory structure for advanced pharmaceutical care for clinical pharmacists (CPs) was scarce in Taiwan. Therefore, a well-organised training programme on CPs is warranted for construction.

Purpose: Competency frameworks are being gradually applied as a template for a training roadmap. The aims of the study are composed of two parts: development of training course (TC) on CPs core competency, and effectiveness assessment through curriculum process.

Method: First of all, development of TC is derived from seven core competencies within the Taiwan Society of Health System Pharmacists (TSHP). Two-round consensus has been conducted utilising Delphi-method to select the final components of TC. Instruction mode has been attached on each TC. Second, 360-degree evaluation has been applied among teachers, patients

and trainees. Satisfaction survey using a 5-point Likert scale and in-depth interview have been conducted as evaluation manifested as effectiveness.

Results: Components of final TC can be divided into two categories: clinical service and healthcare quality. Clinical service contains ADR, TDM, nutrition, and SOAP documentation, and healthcare quality is composed of EBM and SDM integration. Four pharmacists have been recruited. Teachers show higher satisfaction to trainees (score: 4.82±0.04). During the patient education in wards, improved patient perceptions has been noted as well (score: from 3.27±0.03 to 4.72±0.02).

Conclusion: Novel lecture design has been developed tailored to unmet needs on CPs. Trainees have gained satisfaction from teachers and improved patient knowledge after intervention. The prototype of course package may pave the way to CPs accreditation in Taiwan.

The use of ICD-10-CM T codes in hospital claims data to identify adverse drug events in Taiwan

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Background: Adverse drug events (ADEs) are public health problem worldwide. Therefore, optimising medication use and reducing ADEs are priorities for public health. The way to monitor and improve medication safety is to identify ADEs.

Purpose: The aim of this study is to examine the potential usefulness of ICD-10-CM T codes in routine hospital data for the identification of ADEs and increase reported rate in Taiwan.

Method: We use administrative claims data of hospitalised patients from a medical centre in north Taiwan during July 1st 2016 to June 30th 2018. The definition of ADEs was the presence of an ICD-10-CM T codes. The inpatients who discharged with T codes could be caught by the computerised T-codes information platform and a review of the medical charts was done by pharmacists to confirm the ADEs.

Results: During the study period, a total of 1,384 inpatients who discharged with T-codes were identified. The codes that identified the highest percentage of ADEs were code T36 (56.6%), followed by code T42 (17.7%). Overall, 789 clinically significant ADEs were identified after chart review. Dermatologic symptoms are the most commonly involved. The overall Positive Predictive Values (PPVs) for a code representing an ADE was 57%. Furthermore, the number of ADE cases that confirmed using the T-code increased ADE reporting rate by 9.17%.

Conclusion: The PPV of ICD-10-CM T codes analysed in our study may be suitable to identify ADEs. In conclusion, the results confirm a potential resource of utilising ICD-10-CM T codes for detecting ADEs from administrative data to ensure medication safety surveillance.

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Suspected quetiapine-induced hyponatremia in a patient with prolonged mechanical ventilation

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Background: Quetiapine is often used to treat delirium. Some case reports have already showed that quetiapine may induce hyponatremia, which might relate to syndrome of inappropriate antidiuretic hormone secretion (SIADH). However, patients who are on mechanical ventilation may develop hyponatremia due to SIADH as well.

Purpose: There is a case of hyponatremia which had used both quetiapine and prolonged mechanical ventilation. Even though quetiapine-induced hyponatremia is rare than mechanical-ventilation-induced, we prefer to suspect the main reason for this case is quetiapine use. Why we suspect this and the progress of this case will be discussed below.

Method: It is a retrospective case report of a 52-year-old male who was admitted due to intracerebral hemorrhage. We survey this case according to the medical records in E-Da hospital from March 25th 2020 to May 8th 2020.

Results: This patient used mechanical ventilation from March 25th to April 18th and got extubation on April 20th. He started to use quetiapine for delirium since March 29th. High dose was given from April 02nd to April 9th. Hyponatremia was found on April 10th, therefore we added 5g salt in his diet daily. We changed to add 7g salt on APril 21st and tapered off quetiapine from April 22nd to April 23rd. Hyponatremia still existed on April 27th, so we changed to add 10g salt and restricted his daily water supply to 500ml. After that, hyponatremia finally got improved and he was discharged on May 8th.

Conclusion: Hyponatremia occurred after high dose quetiapine use. After he weaned off mechanical ventilation, hyponatremia did not improve. Thus, we consider the main reason for this case is quetiapine use. We also consider that using quetiapine and mechanical ventilation at the same time might increase the risk of hyponatremia.

Strategic plan of the Spanish Society of Hospital Pharmacy 2020-2023

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Background: The Spanish Society of Hospital Pharmacy (SSHP) has presented its Strategic Plan for the next four years in order to respond to the needs of a profession in the field of specialised health care.

Purpose: To expose the new strategic plan of the SSHP.

Method: The plan was designed after an analysis of professional needs for the coming years. It was presented to SSHP members who supported it in October 2019.

Results: The strategic plan motto is 'It's in our hands', and focuses on five strategic lines:
Alliances: To establish professional alliances, work with patients, healthcare professionals and administration, and strengthen national and international relationships.
Evidence: The pharmacist must know and provide the best available clinical evidence to the clinical team. Training in specific areas related to the care processes needs to be expanded.
Research: To promote research and innovation activities, actively, that contribute to scientific progress, to generate evidence and to improve the profile and recognition of the Hospital Pharmacy.
Optimisation: All growth expectations must be associated with optimisation and unlearning activities. It is not only a matter of not doing it, it is doing it more efficiently and with better results, and prioritising the activities in a healthcare system with limited resources.
Union: To work as pharmacists as a united and cohesive collective with an image of professionalism and prestige.

Conclusion: The SSHP has set out its roadmap for the coming years by outlining a clinical and research professional, committed to the patients' health, through the indicated and efficient use of medicines.

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Thinking of drug prescription management and environmental protection

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Background: It's been a long time since the hospitals established a system to avoid duplicate medication. However, it's difficult to obtain the patient medication administration record from another medical unit, and hard to prevent duplicate medication. Through the patient medication record system provided by National Health Insurance (NHI) Administration, we can enhance the effectiveness for doctors to lower the chances of duplicate medication and protect patient medication safety.

Purpose: We want to know that how many medication wastes can be reduced through this system.

Method: The in-hospital computerised system will operate three cross-validation checks with the patient's medication record from NHI: a)medicine with the same pharmacology mechanism; b) medicine with the same ingredients; c) the same medicine that is produced by the same company.
The data were collected between January 2017 and March 2019. We analysed prescription day overlap and number of prescribed pills to examine duplicate medication.

Results: During the research period, 189,905 cases of duplicate medication were found; 46,870 prescriptions were withdrawn after the system alerted duplicate medication. It suggests that 20,831 medicine bags made by paper and plastic were also not issued per year.
The result suggests that in 651,029 days of double issuance of medication between hospitals, 404,749 days were withdrawn. In terms of medication dosage, 691,656 tab/cap/vial/amp were reduced.

Conclusion: Using computerised system to control and cross-validate patents' medication prescriptions can reduce the chances of double issuance. This will effectively reduce unnecessary medication usage which might lead to abuse and contamination of the environment.

Incidence and risk factors of drug-induced liver injury in hospitalised patients

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Background: Drug-induced liver injury (DILI) is probably the most diagnostically challenging of all liver-related conditions. The importance is whether the agent is known to be hepatotoxic and has been implicated previously in cases of liver injury. However, there are differences in the types of drugs used in different hospitals, and the hepatotoxicity of many drugs is still unclear.

Purpose: Statistics on the incidence of drug-induced liver injury and the main suspected drugs in our hospital; find the risk factors that may affect DILI; to provide clinical risk points for reference.

Method: Adverse Drug Events Active Surveillance and Assessment System-2 (ADE-ASAS-2) was used to automatically monitor hospitalised patients from January to March 2019 in the first medical centre of PLA General Hospital, and the non-DILI hospitalised patients were included in the 1:2 ratio as a control group.

Results: One hundred and twenty-two (126 times) out of 35,083 inpatients were included in the DILI case group, with an incidence of about 0.36%, lysine aspirin (3.77%) had the highest incidence. We found that the distribution of DILI types of diverse drugs was different. The history of the hepatobiliary disease was statistically significant in the multivariate logistic regression of the control study, which may be a risk factor for DILI.

Conclusion: Compared with some European and American hospitals, the incidence rate in our hospital was lower. The statistics of hospital DILI information can improve the domestic data; The risk and harm of DILI can be reduced by initially judging suspicious drugs for different types of DILI and focusing on the corresponding indicators of patients with a history of hepatobiliary diseases.

Effectiveness evaluation of importing dose monitoring mechanism into antineoplastic prescription system

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Background: Advances in antineoplastic agents have greatly contributed to improving patient survival in recent years. The rationality of prescribing cancer treatments has a great correlation with the safety of patients' medication, and it is also one of the important indicators of the quality of cancer diagnosis and treatment.

Purpose: We aim to enhance the prescription appropriateness by developing the platform with antineoplastic dose monitoring mechanism.

Method: According to NCCN guideline, we set up the standard dose of antineoplastic agents in the system. Inappropriate dose prescriptions which have been prescribed over ±15% can be intercepted by the control mechanism and then the analysis of dose adjustment appropriateness will be performed.

Results: This system was launched in May 2019. Analyse the 233 chemotherapy prescriptions, total of 492 chemotherapy drugs, of which the proportion of prescriptions with doses less than 15% of the normal dose accounts for 13.9%, and the ratio of prescriptions above 15% of the normal dose is 0%. The results of this study found that the top three reasons for dose adjustment were, hepatic impairment accounting for 33%; age factor accounting for 30%; and renal impairment accounting for 23%. Further analysis of the 68 prescriptions with a dose reduction of more than 15%, a total of 28 (41%) chemotherapeutic drugs had to be adjusted without proper reasons, which was a suspected prescription with insufficient dosage.

Conclusion: In conclusion, we indeed enhance patient medication safety through integrating the intelligent dose management system and the professional competence of the pharmacists.

Pharmacist interventions to 311 oncology and hematology cases in a medical centre in Taipei, Taiwan

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Background: Pharmacists' interventions and contribution to the quality of a healthcare system are known to the world in recent decades (Reeves *et al*., 2017; Skjøt-Arkil *et al.*, 2018). The key to achieving the best performance relies on well established and fully functioning standard operation procedures among multi-disciplinary teams (Ervin *et al*., 2018).

Purpose: Pharmacists are expert in drug procurement process, medication reconciliation, reduce unnecessary healthcare expenses, facilitate shared decision making process and thus have a pivotal role in improving quality of care. This session will introduce how clinical pharmacists can assist in those areas by showcasing 311 patients' drug related problems (DRPs) and one case discussion on how pharmacists can contribute to avoid medical dispute.

Method: From January 1st 2018 to February 28th 2019, 311 inpatient cases age 18-96 with over 15 diagnosis were enrolled; 62.1% male (193) and 37.9% female (118), other patient characteristics are displayed in graph 1 [*not included*]. DRPs and interventions classified into nine categories are documented for future review and doctors were informed of these records.

Results: The results are shown in Graph 2 [*not included*]. One documentation was reviewed by authorities for a suicidal case died in 48hrs; as proof of adequate medical intervention, family later dropped lawsuits.

Conclusion: This research and result may serve as a reminder that healthcare providers are a team. Comprehensive documentation can strengthen the reason behind all medical decisions and actions to help to improve relationships between all healthcare workers, patients and the family. Potential pitfalls in the evaluation of DRPs and diseases can lead to an incorrect intervention; including pharmacists in medical decisions is fundamental to the successful of our clinical work.

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CONFERENCE ABSTRACTS

FIP VIRTUAL 2020

Pharmaceutical Practice: Social and Administrative Pharmacy

Pharmacist-led opioid stewardship in a General Practice - an innovative professional service

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Background: General Practice provides a common setting for all patients. As evidence of opioid-related harm accrues, Australian General Practioners (GPs) are encouraged to restrict prescribing regular opioids for chronic, non-cancer pain and after acute care. A pharmacist integrated into the practice team can help reduce the risk of harm.

Purpose: To assess the impact of a practice-based pharmacist on the management of opioids in people transitioning through care and to describe factors contributing to opioid reduction.

Method: An opioid policy was endorsed and a model for patient-pharmacist-GP consultation iteratively developed. Over nine months, all patients prescribed long-term opioids were reviewed by a second GP, referred to the pharmacist, and then had opioid agreements established and doses tapered if appropriate.

Data collected included demographics, opioid use at baseline, six and nine months and overall reduction. Pharmacist-initiated strategies that enabled tapering of opioid dose (converted to daily oral morphine equivalents (OMEs)) were documented.

Results: Overall, 100 patients aged 36-100 years (mean 67), 62.0% female, had pharmacist consultations; 18 were post-discharge. Prior opioid use was from two weeks to 20 years. Median daily OME was significantly reduced: 43mg (IQR= 30-90) at baseline, 12mg (IQR= 0-40) at six months and 6mg (IQR= 0-30) at nine months. Mean overall OME reduction was 65.0% (range= 0-100%): 41.0% no longer received regular opioids. Pharmacist-initiated strategies included use of alternate formulations, communicating with all prescribers and heeding patient needs.

Conclusion: Interdisciplinary clinical governance and patient engagement contributed to opioid reduction. These key stewardship principles may be transferable to other high-risk medicines.

Promoting community pharmacist's involvement in HIV/AIDS services through educational interventions in Nigeria

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Background: In Nigeria, studies on community pharmacists' involvement in the delivery of HIV testing services (HTS) are scarce and they have little involvement in antiretroviral (ARV) medication therapy management (MTM).

Purpose: This study evaluates the provision of HIV/AIDS services by community pharmacists in the southwest of Nigeria before and after they underwent training on HTS and ARV/ MTM.

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Method: Semi-structured questionnaires on a 5-point Likert scale were administered to selected community pharmacists in 2019 to assess their involvement in HTS and ARV/ MTM services before and after a training intervention. Participants' opinions about the training was also assessed to determine its adequacy. Data were analysed with both descriptive and inferential statistics.

Results: At baseline survey, 22.0% of the respondents were involved in the services with mean scores of 2.62+2.190 and 2.55+2.179 in HTS and ARV/ MTM respectively while 91.0% were willing to participate in the training to improve services. Barriers to integrating services into practice before the training, among others, were the lack of clinical tools (46.8%), lack of collaboration with other healthcare professionals (39.1%) and lack of information/training on services (36.2%). Participants' opinions based on the indicators measured during the training programme was 4.60+0.518 and all the participants agreed that the training was sufficient for them to provide services. After the training, an average of 60.0% of the respondents are involved in the provision of services as compared with 22.0% before the training (p<0.05).

Conclusion: Community pharmacists' involvement in HIV/AIDS services was low before training. However, training intervention was shown to improve services.

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A modified Delphi method to develop quality indicators for geriatric care by community pharmacists in Japan

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Background: National guidelines on geriatrics were introduced by the Ministry of Health, Labour and Welfare in Japan in 2018 and 2019 to improve the safety of geriatric pharmacotherapy. Currently there are no tools available to evaluate geriatric care in community pharmacy. Therefore, it is important to develop quality indicators (QIs) for geriatric care.

Purpose: To develop quality indicators for geriatric care provided by community pharmacists in Japan.

Method: This study involved two steps: 1) preparation of preliminary QIs based on guidelines and a review of literature; (2) evaluation of the appropriateness of QIs using a modified two-round Delphi method with a panel discussion between the rounds. Panellists (five physicians and five pharmacists) assessed the appropriateness of each QI developed in step 1, using a 9-point scale with the opportunity to provide free text comments. QIs with a median score of 7-9, without disagreement (at least three panellists scored 1-3 and at least three panellists 7-9) were considered 'appropriate'.

Results: In step 1, 143 preliminary QIs were prepared. In step 2, 133 QIs met the criteria and were assessed as 'appropriate' (110 process indicators, 23 outcome indicators). These QI were divided into 19 categories by disease state for example dementia (n=15), diabetes (n=11), COPD (n=11) and osteoporosis (n=11). In terms of drug-related problems, 27 QIs pertained to risk of adverse reactions and 23 QIs pertained to risk of drug-drug reactions.

Conclusion: Guideline-based QIs were developed. The use of QIs may be an effective strategy to improve geriatric care and address poly-pharmacy. Field testing is needed to evaluate QI measurement properties (e.g. feasibility, applicability, improvement potential).

Understanding educational needs of pharmaceutical stakeholders: Pharmacy operators

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Background: A capable, flexible, and adaptable workforce is crucial to meet the needs of patients (FIP, 2017). The educational needs of pharmaceutical operators and support personnel who are responsible for pharmacy operations involving the storage, inventory, manufacture, and distribution of medicines requires understanding.

Purpose: To identify the educational needs of operators.

Method: A questionnaire was developed and validated by a panel and disseminated to pharmacy operators and managers/ supervisors in different fields of pharmacy.

Results: The questionnaire has four sections. The first section is dedicated to demographics and the second section lists the course topics. Respondents must identify whether training about the topic has been received and to rate each topic according to its relevance to the operators' practice. In the third section, respondents evaluate perception towards training courses and the last section identifies preferred methods of delivery for the courses.

Conclusion: Understanding pharmaceutical operators' perceptions of having training courses and identification of their educational needs, presents opportunities for operators to perform additional duties and responsibilities, possibly increasing efficiency and best practice in operations.

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Pet owner perception of the role of the pharmacist in animal care

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Background: Pharmacists are uniquely positioned to counsel pet owners and collaborate with veterinary surgeons to provide the best care for animal patients.

Purpose: To identify the pet owners' perception of the role of the pharmacist in animal care.

Method: A questionnaire was developed, validated and disseminated to pet owners using social media platforms. The questionnaire consisted of three sections:

1. Demographic data
2. Challenges and barriers of access to medicines and good animal care
3. Perception of pharmacist interventions and the contribution towards the treatment of animals.

Results: Two hundred and thirty-two (232) pet owners answered the questionnaire. Fifty percent (n=116) agreed that pharmacists have the knowledge to give advice regarding human medicine use in animals. Fifty-three percent (n=122) disagreed that pharmacists can give advice on chronic medical conditions that affect their pets. Ninety-one percent (n=208) prefer to ask the veterinarian for advice rather than the pharmacist. Seventy-five percent (n=172) would be more willing to go to a pharmacist for advice if they can be sure pharmacists are knowledgeable and skilled with respect to animal care. Eighty-three percent (n=193) would like community pharmacies to stock veterinary medicines. Other services suggested by pet owners included urine testing (n=114), compounding medicinal products (n=94) and glucose checks (n=87) for their pets

Conclusion: Considering that 83% of pet owners would like pharmacies to stock veterinary products shows that access to medicines needs to be improved. The lack of trust towards pharmacists perceived by 53% of respondents indicates that pharmacists should strengthen their role with pet owners.

Pharmacy stewardship services - A conceptual framework

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Background: Pharmacists around the world are expanding their role in clinical care through formal and informal means. Pharmacy stewardship services that improve judicious use of medications are one example of role expansion in many different care settings. However, when a best practice in pharmacy stewardship is established, there is little guidance for

adaptation and implementation of innovation in different country sites or care settings. The guidance that does exist is typically narrowly focused, limiting use to specific service types and specific care settings.

Purpose: The aim of this research is to create a framework to guide adaptation and implementation of best practices in pharmacy stewardship. The framework will be used across country borders and care settings to improve judicious use of medicines and improve patient care around the world.

Method: An initial conceptual framework was drafted after discussion at the Tenth Biennial Monash Pharmacy Education Symposium in July 2019 in Prato, Italy. A systematic literature review was then conducted. Articles detailing conceptual models for pharmacy stewardship service implementation were included for in-depth review.

Results: Of the 152 articles returned in the systematic search, 81 articles were included for in-depth review. These articles were used to modify the domains and subsections of the initial framework.

Conclusion: A conceptual pharmacy stewardship services framework was constructed to help pharmacists adapt and implement international best practices in pharmacy. Further exploration with content experts is needed to increase the validity of this framework.

Implementation and evaluation of ward-based clinical pharmacy services in Malawi

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Background: Clinical pharmacy services have been shown to have a positive impact on patient outcomes, yet the transition from product-focused to patient-focused pharmacy practice has been slow in many low-income countries.

Purpose: To evaluate the implementation and impact of ward-based clinical pharmacy services in a 1000-bed tertiary referral hospital in Malawi.

Method: Clinical pharmacy services were implemented in the female adult medical ward from September 2019 to January 2020 using one-month Plan-Do-Study-Act cycles. Implementation barriers and strategies were documented during monthly meetings. Pharmacy recommendations and physician response were recorded. Changes in prescribing habits across rational prescribing and antimicrobial prescribing were evaluated in the intervention ward and a corresponding control ward. Logistic regression was used to evaluate differences in the probability of outcome attainment over time.

Results: Pharmacy interns made 321 recommendations across care optimisation (60%), antimicrobial stewardship (27%), and patient safety (13%) with 67% of recommendations accepted by physicians. There was a significantly greater increase in probability of rational prescribing in the intervention ward compared to the control ward (p=0.04), but no significant differences in antimicrobial prescribing (p=0.48). Barriers faced during implementation included physician resistance, inter-professional team dynamics, and clinical pharmacy knowledge and confidence.

Conclusion: This study demonstrated the feasibility and impact of implementing new clinical pharmacy services in a limited-resource setting. Barriers and strategies presented can be used to inform implementation of similar services in other settings.

Questionable use of preventive care among older multi-morbid adults: A cohort study protocol

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Background: Providing high value care and avoiding 'care overuse' is a challenge among older multi-morbid adults. Because preventive care has a lag-time to benefit, many guidelines recommend tailoring preventive care according to the estimated life expectancy (LE). However, because LE is difficult to estimate in elderly populations, questionable use of preventive care could be frequent.

Purpose: To assess the practice of cardiovascular diseases (CVD) preventive care and cancer screenings in older multi-morbid patients and to assess the association of preventive care with estimated LE and to identify questionable use.

Method: We conduct a prospective cohort study by extending the follow-up of 822 multi-morbid patients with poly-pharmacy (≥70 years, ≥3 chronic medical conditions, ≥5 drugs for >30 days) in Bern, Switzerland, included in the OPtimising thERapy to

prevent Avoidable hospital admissions in Multi-morbid older people (OPERAM) study over three years. We assess CVD preventive care by collecting information on antihypertensive, antihyper-lipidemic, antidiabetic, and anticoagulant medication. We also assess cancer screening practice. LE will be estimated based on Lee mortality index. Questionable preventive care will be defined based on guidelines and in case of estimated LE shorter than the lag-time to benefit.

Results: Preliminary results will be presented at the Congress.

Conclusion: The hypotheses are that questionable use of preventive care is frequent among older multi-morbid patients. Our study will eventually help physicians and pharmacists to personalise preventive care and optimise poly-pharmaceutical drug regimens of older multi-morbid patients.

Abem: Emergency COVID19 - when everybody must stay at home, Abem programme goes closer

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Background: Coronavirus disease 2019 (COVID-19) was classified by WHO as a global pandemic, and has gone on to affect millions of people worldwide with severe social and economic consequences.

Purpose: Due to the global crisis the international community has been facing, many people leave their homes to have access to the medicines they needed. Moreover, many Portuguese households lost their source of income, being in a very difficult situation. Abem: Emergency COVID-19 aims to help the economic deprived citizens to have access to the medicines, health products and healthcare services they need.

Method: Citizens in an unexpected situation of economic shortage due to the COVID-19 pandemic could be referred by local entities (Municipalities and Institutions of Social Solidarity) to be given access to their medications from local pharmacies. The beneficiaries belonging to risk groups received the medicines at their homes, through an articulation between our partners: pharmacies and local referral entities. Its transportation, articulated by pharmacies, was paid for by this initiative. The medicines and healthcare services were paid for by a Solidary Fund, to which many companies and citizens have contributed.

Results: The Abem: Emergency COVID-19 are putting efforts in place to present effective results by the time we present the poster at the FIP Virtual 2020.

Conclusion: This support shows the importance of pharmacies in their communities, as well as their synergic involvement with other partners, such as referral entities (Municipalities and Institutions of Social Solidarity), ANF, AFP, APIFARMA, ADIFA, Plataforma Saúde em Diálogo and other local entities helping citizens in need.

Health system and the appraisal of medicines for rare diseases in England and Brazil: A comparative analysis

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Background: Universal health systems have struggled to ensure access to expensive medicines. Technological and scientific practices pose a constant challenge for managers, in order to determine which technologies should be incorporated into health systems, and predicting all factors involved for incorporation. However, in many scenarios, decisions can differ in terms of the evidence presented and social and political interferences.

Purpose: The study aims to analyse recommendation reports for medicines for rare diseases (DR) performed by the National Commission for Incorporation of Technologies in Health (CONITEC) and the National Institute for Health and Clinical Excellence (NICE).

Method: Use the model of the European HTA network (EUnetHTA).

Results: The analysis of three selected medicines, sapropterin, nusinersen and elosulfase alfa, allowed researchers to identify that the reports from both agencies did not contemplate all the domains proposed in the analysis model, and, the decision making did not only involve scientific and technical judgments, but involved value judgments that, in many cases, overlap with technical-scientific and economic domains. Multiple layers of uncertainties can be observed in the reports, including clinical results, cost-effectiveness, well-being benefits, economy for health system and social pressure.

Conclusion: New mechanisms for evaluating DR medicines need to be developed and applied, proposing transparency and legitimacy of decisions, guaranteeing the preservation of the legality and legitimacy of HTA agencies.

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Health-related quality of life for patients with hypothyroidism

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Background: Hypothyroidism is a disorder where the thyroid gland does not produce enough thyroid hormones. The standard treatment for hypothyroidism is levothyroxine T4. In Denmark, some patients with hypothyroidism are treated with combination therapy with a supplement of T3. But still some patients with hypothyroidism continue to experience symptoms of hypothyroidism, despite receiving T4-hormone or combination therapy. There is a lack of knowledge about the health-related quality of life (HRQoL) for patients with hypothyroidism.

Purpose: To map the HRQoL for patients with hypothyroidism. The following two research questions were addressed: Do patients being treated for hypothyroidism have a deteriorated HRQoL? What influence does the choice of medical treatment have on the HRQoL for the patients, including patients with and without gene polymorphism in the deiodinase (DIO) enzymes?

Method: A thyroid-specific quality of life measurement tool (ThyPRO) based on patient-reported outcomes was used for structuring the online questionnaire used.

Results: Two Hundred and eighty-eight (288) questionnaire responses were collected. Hypothyroidism patients show a lower HRQoL compared to the general population, and patients treated with either T4 monotherapy or with combination therapy (T4 + T3) have a significantly lower HRQoL than patients treated with thyroid. For patients with a presumed gene polymorphism in DIO1/2, treated with T4 showed significantly lower HRQoL than patients treated with thyroid.

Conclusion: Patients with hypothyroidism have a significantly lower HRQoL compared to the general population in Denmark and the choice of medical treatment has an impact on the HRQoL for patient with hypothyroidism.

Pandemic modelling: The impact of social distancing in Nordic countries

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Background: Without pharmacologic interventions, the preferred strategy to combat COVID-19 is to slow the virus' spread via social distancing measures. The components of social distancing include: school closure, restrictions on gatherings, non-essential business closure, stay at home orders and limitations on travel. Most countries have implemented many of these restrictions. Conversely, Sweden has not initiated these restrictions and instead has recommended that citizens avoid mass gatherings, which presents an opportunity to examine the effects of the components of social distancing on mortality in Nordic countries.

Purpose: Investigate the impact of social distancing measures on fatalities associated with COVID-19.

Method: COVID-19 fatalities, as reported by the World Health Organisation, were recorded for each of the Nordic countries from 6th February 2020 to 30th April 2020. The fatalities were compared using a Cox proportional hazard regression analysis.

Results: The normalised fatalities ranged significantly (1.87 to 129 deaths/population/km2) in the Nordic countries. Sweden was found to have a significantly higher risk of COVID-19 related mortality at the α=0.05 level as compared to Finland (HR=0.15; p<0.001) and Norway and Denmark (HR=0.23; p=0.002).

Conclusion: The population-density normalised mortality in Sweden was significantly greater than other Nordic countries, possibly due to differences in the implementation of social distancing policies.

Exploring the effect of ethnic diversity on COVID-19-related mortality in the United States of America

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Background: In the setting of COVID-19, hypertension, diabetes, and obesity are postulated to contribute to adverse outcomes. Among different ethnic groups in the United States of America, African Americans have a higher incidence of the above conditions. It is hypothesised that the African American population in the United States may bear a disproportionate burden of COVID-19-related mortality.

Purpose: Evaluate the correlation between African American ethnicity and incidence of COVID-19-related mortality.

Method: COVID-19-related fatalities reported for Oregon, Missouri, and Georgia between the 6th February and 30th April 2020 were obtained from state health departments. These

states were selected due to similarities in the social distancing measures implemented but differences in their African American population (32.4% Georgia, 11.8% Missouri, 2.2% Oregon). Fatalities in each state were analysed using the Cox proportional hazard regression analysis.

Results: Of the reported fatalities in Georgia, Missouri, and Oregon, 51.0%, 38.0%, and 4.0% were in African Americans, respectively. This corresponds to a 2.1 to 2.8-fold increase in the risk of COVID-19-related mortality in African Americans as compared to all other ethnicities. The incidence of African American fatalities for the total population of each state ranged from 0.12 to 3.22 deaths/population/mile2. As compared to Oregon, the risk of COVID-19-related mortality was significantly higher in Georgia (hazard ratio (HR)=4.4; p<0.001) and Missouri (HR=2.2; p=0.001) at the α=0.05 level, proportional to the increased population of African Americans.

Conclusion: Initial results show that African American ethnicity may significantly contribute to an overall incidence of COVID-19-related mortality.

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The impact of pharmacy engagement with human resources on contract negotiations for prescription benefits

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Background: Historically, the PBM contract was negotiated by Human Resources. Pharmacy leadership rarely participates in this process. However, pharmacy has expertise in clinical and economic implications and can provide significant value to PBM contract negotiation.

Purpose: To describe the role that pharmacy leadership has in PBM contract negotiations and consider factors that determine PBM selection, especially those that involve economic savings.

Method: Pharmacy leadership and Human Resources prepared a Request for Proposal (RFP) for competitive analysis during contract renewal. The incumbent PBM agreed to accommodate client needs and contract re-negotiation was initiated. There were seven general contract topics and 56 Contract Review Findings identified for re-negotiation. The top three factors involved in PBM selection included the willingness to reduce administrative fees, customise pharmacy reimbursement formulas, and the client's pharmacy exclusivity to providing specialty pharmacy services.

Results: 'Pass through Retail Pricing' changed to a 'Pay as Submit' reimbursement model, reducing ingredient cost payments by the hospital. Eligible hospital employees had a 50.0% co-pay reduction and a 90-day fill option to utilise the hospital's outpatient pharmacy. The pharmacy also processed all specialty pharmacy prescriptions, eliminating leakage to external sources. The organisation saved 8.0-12.0% on ingredient costs, administrative costs and increased realised gross margin from 11.9% to 15.7% over three-years.

Conclusion: Hospitals should integrate pharmacy clinical and financial expertise into PBM contract negotiation to optimise the organisation's employee prescription benefit plan.

Paediatric major depression: An international comparison of the summary of product characteristics

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Background: There are few psychotropic medicines approved for the treatment of paediatric (<18 years) major depression (P-MD), and little research comparing their approval across countries.

Purpose: To compare the approval of psychotropic medicines for the treatment of P-MD across five developed countries.

Method: Using the regulatory-approved summary of product characteristics (or equivalent) documents (SmPCs), a cross-comparison document analysis of SmPCs from five countries was performed (Australia, New Zealand (NZ), the United Kingdom (UK), Canada and the United States of America (USA)). Psychotropic medicines were classified according to the Anatomical Therapeutic Chemical (ATC) classification system, comprising the groups 'Psycholeptics' (N05) or 'Psychoanaleptics' (N06). The approval data extracted included the medicine name and ATC code, age and dosage information (initial dose, dose titration, dose range or maintenance dose and maximum dose).

Results: A total of 13 medicines were approved in one or more of the studied countries, across 22 SmPCs. The US had the highest number of approvals (nine), followed by NZ, UK, Canada and Australia (five, four, three and one, respectively). Five of 13 medicines were approved in two or more countries (amitriptyline, doxepin, nortriptyline, fluoxetine conventional oral formulation (COF) and phenelzine), but only fluoxetine COF and phenelzine were consistent for the approved age group. Cross-country discrepancies in dosages were identified among the approved medicines.

Conclusion: There were significant variations in the approval information contained within SmPCs across countries, identifying a need for the harmonisation of regulatory documents. Future research into the reasons for variations may be needed.

Change of Lithuania pharmacy specialists job satisfaction and work-related stress from 2017 to 2020: COVID-19

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Background: During the COVID-19 pandemic, pharmacists were front line healthcare professionals, providing necessary care in a stressful situation. The main stress and job satisfaction driving factors are important, yet they may not have the influence they deserve in specific circumstances.

Purpose: To compare job satisfaction and work-related stress among pharmacy specialists between 2017 and 2020.

Method: Health Professions Stress Inventory (HPSI) questionnaire was translated and adapted to Lithuanian in 2017. In 2020 additional statements regarding COVID-19 were added. Pharmacy specialists completed the questionnaire online both in 2017 and 2020. Data were analysed with SPSS 23 software using independent sample T-criteria, Pearson correlation and Spearman's rank correlation coefficients. Mean comparative analysis and dispersive analysis ANOVA was performed.

Results: Three hundred and thirteen (313) pharmacy specialists completed questionnaire in 2017 and 152 in 2020. In 2017 55.9% of them were satisfied with their job, compared to 40,5% in 2020. The number of specialists feeling work related stress also increased from 25.6% to 46,1%. In 2020, 77.6% pharmacy specialists had been instructed on the use of personal protection at their workplaces within the last three months; 73.0% had attended distanced learning sessions, conferences or seminars on COVID-19. 82.9% of pharmacy specialists had enough personal protective equipment at work. In 2020, 53.3% of pharmacy specialists were worried about their job position in the future.

Conclusion: In 2017 no evidence that work-related stress had a direct impact on job satisfaction was found. Yet, during COVID-19 more pharmacy specialist felt work related stress and less of them were satisfied with their job.

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Pharmacoeconomic surveillance in pharmacovigilance at a tertiary care hospital: An intensive prospective study

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Background: Adverse Drug Reactions (ADRs) is the sixth leading cause of death in the United States of America and 106,000 people die annually because of ADRs. More than 10% of total hospitalisation is due to ADRs and many countries spend 15% to 20% of their hospital budgets specifically on the management of such Drug Related Problems (DRPs).

Purpose: To identify direct and indirect economic burdens associated with the management of ADR. Additionally, to establish the correlation of the cost with ADR assessment parameters.

Method: This was a prospective observational study conducted at a tertiary care hospital for a period of one year (August 2017 to July 2018). Strict definition of ADR by the World Health Organisation was adhered to enrol 201 causalities from medicine and surgery departments. Hospital-In-Patients Billing System (HIPBS) was communicated to receive a final bill and insurance details. Direct cost, indirect cost and average increase in length of prolongation of hospital stay were studied in association.

Results: The average prolongation of length of hospital stay was 3.84 days. The total daily cost for management of reaction was 3869.75 Euros (INR 319997.18). Average cost of each ADR that resulted in hospital admission was 187.60 Euros (INR 15512.95) and for unlisted ADRs the cost was 25.66 Euros (INR 2121.90). Only nine reactions were 'certain' and 27 reactions were 'possible'. Total cost for management of all 201 ADRs was 14775.86 Euros (INR 1228789.2) and the average cost for each ADR on outpatient was out to be 74.08 Euros (INR 6113.37).

Conclusion: The average cost for management of each ADR was found to be higher than suggested in previous studies.

Developing a questionnaire to analyse the use of medicinal cannabis for veterinary purposes

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Background: Medicinal cannabis is indicated in the management of loss of appetite, nausea and vomiting and pain. Cannabis is proposed as an alternative medical treatment for a number of conditions in humans such as multiple sclerosis. Research investigating the potential therapeutic value of cannabis in animals is still in its infancy with most studies focusing on pharmacokinetic data.

Purpose: The aim of this study is to design a questionnaire to analyse the use of medicinal cannabis for veterinary purposes.

Method: The method is divided in two phases. The first phase is a systematic literature review from 2010 to 2019 using open-access journal articles. The second phase included the development of a questionnaire validated by three pharmacists working in academia, a regulatory pharmacist and a veterinary surgeon.

Results: The first phase, the systematic literature review resulted in the finding of a total of 20 published studies regarding use of cannabis in animals. An example of a study showed an increased in comfort and activity in dogs suffering from osteoarthritis (Gamble *et al*., 2018). The systematic literature review led to the identification of the domains to be included in the questionnaire. The domains identified were: views about safety, potential indications, barriers and issues related to use of medicinal cannabis for veterinary purposes.

Conclusion: A questionnaire was developed and validated to investigate medicinal cannabis for veterinary use.

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Price and reimbursement policies

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Background: Generic medicines (generics) contribute to health systems' sustainability by its cost-efficiency. Public policies promoting the use of generics have led to significant healthcare-related savings in European countries, but estimated market penetration is not yet achieved.

Purpose: To describe generic medicine pricing and reimbursement (PR) policies of seven European countries which have reported high generics uptake and evaluate the policies which led to high rates of generics use.

Method: Pubmed and Google searches were performed using the following terms: generic medicines, reimbursement, pricing, policies.

Results: Reference pricing is the most common PR system in European countries except for Sweden and the United Kingdom (UK) which rely on value-based pricing and other reimbursement schemes. Germany and the UK reported the highest generics market shares in 2017 (over 80%) and maintained an increasing trend for more than ten years. Germany established generics reference pricing and imposes MAHs rebates for the third payer and substitution of every medicine but OTCs by generics. On the other hand, UK generic prices are determined by market competition forces, substitution is not allowed, and reimbursement is based on actual selling prices obtained by generic manufacturers. Both countries have recently implemented measures to regulate innovative medicines market entry and prices.

Conclusion: Medicines are more expensive in Germany but also more readily accessible, whilst in the UK the wait is longer, but prices are lower. To obtain the most from generics, implemented policies should be tailored to each country specific health care setting. It seems that there is no standard procedure or policy for combination for these measures.

Accessibility to generic medicines

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Background: As the price of innovative and complex therapies increases, availability and access to generic medicines is critical for the sustainability of healthcare systems.

Purpose: To identify generic medicines available on the Maltese market.

Method: Two drug classes were selected for the purpose of this study; drugs for oncology and drugs acting on the nervous system. Innovator drugs for oncology are expensive and nervous system drugs are widely prescribed in Malta and not broadly represented on the national health service scheme, requiring patient out-of-pocket payment. All authorised products as listed by the national competent authority were reviewed, and generic products available for each active ingredient and the corresponding dose and pharmaceutical forms were analysed.

Results: For oncology, 159 generics for 15 originators are available, namely; alkylating agents (n=16), antimetabolites (n=63), plant alkaloids (n=26), cytotoxic antibiotics (n=18), and other antineoplastic agents (n=36). For nervous system drugs, 467 generics for 114 originators are available, namely; antiepileptics (n=104), antipsychotics (n=146), hypnotics, sedatives and anxiolytics (n=65), antidepressants (n=128), central nervous system stimulants (n=8), and drugs used in addictive disorders (n=16). There were nine originators for oncology drugs and 60 for nervous system drugs which did not have generic counterparts.

Conclusion: Results show that for oncology drugs, antimetabolites have the most generics available, while alkylating agents have the least. Drugs for nervous system disorders are generally well-represented, with antipsychotics having the greatest number of generic products available.

Negative impacts of the Pharmaceutical Affairs Act - Patent Linkage System

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Background: Patents grant an inventor the right to exclude others from making, using, or selling their invention. In Taiwan (TW), the revision to the Pharmaceutical Affairs Act to accommodate Patent Linkage (PAA-PL) was passed in 2017, and implementation rules went into force on the 20th August 2019.

Purpose: To confirm whether industries benefit from PAA-PL implementation, this study compares the trends of Paragraph IV (P-IV) challenges before and after implementation.

Method: This study analyses P-IV litigation in South Korea (KR) compared to ones in TW. Data on the views of TW officials and industry were collected from the Internet, public opinion, and database searches to analyse obstacles in implementation.

Results: There were 1,957 cases in KR the first year after PAA-PL implementation. Only five P-IV challenges were brought by generic pharmaceutical manufacturers over the past six months in TW. A review of the history of official- industry interaction revealed that there were several obstacles to implementation. The most significant flaw was the lack of prosecution laws in the Patent Act.

Conclusion: Though it is important to respect intellectual property, P-IV challenges may increase generic entry, lower drug prices, and increase quantity. In fact, the success rate of generic drug litigation in TW was 86.0% before PAA-PL implementation. After implementation, less litigation was brought in TW than in KR which may increase the costs for generic pharmaceutical manufacturers to develop a generic product. The observed fewer P-IV challenges can hinder the new drug markets in TW, outweighing the benefits of joining TPP. The new Congress must reconsider the necessity of pursuing PAA-PL revisions.

The overview of orphan drug utilisation in Taiwan In 2018

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Background: The analysis of orphan drug usage is very important for clinicians and rare disease patients.

Purpose: This research analysed the usage of orphan drugs in Taiwan to provide the government with a reference for importing medications, physicians for prescribing medications and pharmacists for providing medications.

Method: In order to let all rare disease patients obtain medication smoothly, the government has created several regulations related to orphan drugs management such as the Ad Hoc Applications for Orphan Drugs Regulation to support the whole administration needs.

For those orphan drugs that already obtain license approval, the PSUR (Periodic Safety Update Reports) is needed to be provided to TFDA every year. For those orphan drugs that without license approval but with special import permit, the hospitals need to provide the utilisation evaluation report to MoHW.

Results: In 2018, the hospitals reported total 91 orphan drugs in utilisation. There are 14 orphan drugs with special import permit and used by 512 patients. In 2018, there are 390 utilisation evaluation reports collected and the recovery rate is 76.2%. Studying those reports, the adverse events happened in 43 patients (incident rate: 11.0%). Those events include flushing, diarrhoea, rash/urticarial, etc.

Conclusion: The efficacy and safety of orphan drugs has been closely monitored in Taiwan. The monitoring and management has started since granting Orphan-Drug Designation, pre-license management, post marketing risk management to efficacy and safety re-evaluation.

Understanding access to pharmacy services: A qualitative exploration of views from marginalised patient groups

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Background: Vulnerable patients from marginalized groups (e.g. people with disabilities, people from black and minority ethnic communities) experience higher rates of ill-health and inequitable access to healthcare. Improving fairness is a priority for many healthcare systems.

Purpose: Using an access conceptual framework (Levesque *et al.*, 2013), this study explored the views of patients from marginalized groups, how they accessed pharmacy and medication review services.

Methods: Semi-structured interviews were conducted to explore patient experiences and how access could be improved (n=10). Interviews of patients who had received a medication review from their pharmacist were also conducted (n=10). Interviews were transcribed and an interpretivist approach was used to analyse the data.

Results: Patient's ability to perceive support, their ability to seek this support, ability to reach, ability to pay and engage were explored. The findings exposed that most patients experienced significant medicine, health and social care challenges affecting their access to medication reviews. Where a medication review was received, these were broadly welcomed. However, the unfamiliarity with this one-to-one support constrained their ability to frame this service as one that could be useful to them.

Conclusion: Pharmacy teams need to be mindful of groups who are marginalised and most vulnerable. Further training is recommended for community pharmacy staff to ensure services are made accessible, inclusive and culturally sensitive. Policy makers should reconfigure services to ensure people from diverse backgrounds can access support from the pharmacy.

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CONFERENCE ABSTRACTS

FIP VIRTUAL 2020

New, Personalised and Precision Medicines, including Drug Delivery and Industrial Pharmacy and Scientists

Design of solid powder particles for a needle-free injection

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Background: In 2020, the COVID19 pandemic has shown the medical need for vaccinations. The conventional method of vaccine application is intravascular injection of a liquid solution. However, this method is associated with some disadvantages, such as a high risk of infection.

Purpose: The approach of a needle-free ballistic administration accelerates solid powder particles to a sufficient speed so that they are able to penetrate into the skin and address target Langerhans cells. For this purpose, the particles require certain characteristics (Weissmueller *et al.*, 2017). The main criteria for a successful application is the particle size as well as the density (Maa *et al*., 2004).

Method: One potential production process is freeze-drying out of a solution with a subsequent milling step (abbreviated to FD). Another modified approach is spray-freeze drying (abbreviated to SFD). Dried powders are treated afterwards by ultrasonic microsieving (6000 vibrations per seconds for ten minutes) in order to segregate a useable fraction (38 µm to 75 µm). Tap density was determined according to the protocol by Ph.eur. guidelines. Helium pycnometry determines the true density. The magnitude of density is described by the quotient of tap density ρ tap and pycometric density ρ He- pycnometer.

Results: Estimated density of examined samples containing trehalose and mannitol could not exceed 50%.

Conclusion: The described techniques reveal a quite porous structure of the product. This structure might not be sufficient for particles to successfully penetrate into the skin. These powder particles might burst upon the surface. However the dimension of the speed has to be considered as well as it plays a crucial role as well.

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Maghemite/PLGA (core/shell) nanocomposites for combination antitumor therapy

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Background: Combination therapy is a promising move against cancer. Superparamagnetic iron oxides can help in engineering nanoplatforms that can maximise the accumulation of chemotherapeutics into malignant cells (Jamieson & Lippard, 1999) simultaneously providing antitumor magnetic hyperthermia functionalities.

Purpose: Development of a reproducible procedure to obtain maghemite/PLGA nanocomposites (NCs). In vitro evaluation of: i) the loading of Cisplatin to the NCs and the drug release kinetics; and, ii) the magnetic hyperthermia effect.

Method: Incorporation of oleic acid onto the maghemite nuclei was confirmed by the analysis of the surface thermodynamics. The NCs were prepared by emulsion/solvent evaporation2 and size was analysed by PCS. Magnetic responsiveness and heating capacity were characterised. Drug loading was determined by UV-Vis absorbance measurements. The dialysis bag technique was used to characterise in vitro the drug release. The hyperthermia effect was evaluated against T84 human colon cancer cells.

Results: Complete coating of the nuclei with oleic acid improved the yield (%) in the production of NCs (≈ 270 nm). Maximum drug loading and entrapment efficiency values were 15% and 73%, respectively. Cisplatin release was a biphasic process involving an early rapid release phase followed by a longer second phase. Drug release was faster under hyperthermia conditions (45°C). The antitumor magnetic hyperthermia capacity of the NCs significantly decreased the viability of T-84 cells.

Conclusion: A reproducible methodology to obtain Cisplatin-loaded NCs was defined. The nanoplatform showed promising capabilities for combination therapy against cancer.

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A magnetopolymeric nanocomposite for synergistic anticancer treatments

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Background: Antitumor magnetic hyperthermia can defeat malignancies per se or, more interestingly, be combined with chemotherapy to optimise clinical outcomes (Dagogo-Jack & Shaw, 2018). Superparamagnetic iron oxides are ideal materials in this scenery. However, limited biomedical use is associated to pure nanoplatforms exclusively made of them

Purpose: Formulation of magnetite/poly(ε-caprolactone) nanoparticles (Fe3O4/PCL NPs) loaded with Gemcitabine (Gem). In vitro analysis of the potentialities in combination therapy (hyperthermia and chemotherapy) against cancer.

Method: NPs were obtained by interfacial polymer disposition, and characterised by dynamic light scattering, electrophoresis, X-ray diffractometry, and thermodynamic analysis. Gem loading and release was characterised by UV- Vis absorbance determinations. Drug release was analysed by the dialysis bag method (pH 7.4, at 37 and 45°C). Magnetic responsiveness and heat generation were evaluated in vitro. Antitumor hyperthermia-mediated by the Fe3O4/PCL NPs was investigated in HT-29 human colon adenocarcinoma, T-84 human colon carcinoma, and MCF-7 breast cancer cells.

Results: A reproducible procedure was developed to produce the NPs (125 nm in size) capable of significantly reducing cell viability in T-84, HT-29 and MCF-7 lines to: 34.0%, 32.0% and 28.0%, respectively. Maximum Gem loading and entrapment efficiency values were found to be 11.0% and 84.0%, respectively. Gem release was a biphasic process dramatically accelerated at the maximum temperature of hyperthermia (45°C).

Conclusion: Gem-loaded Fe3O4/PCL NPs have demonstrated in vitro promising possibilities for combination antitumor therapy. In vivo studies are in progress.

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Anti-thyroperoxidase and anti-thyroglobulin antibodies: a comparison of techniques

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Background: Hypothyroidism is a frequent disease of autoimmune origin and anti-thyroperoxidase (TPO) and anti-thyroglobulin (TG) antibodies are involved in the damage of the gland. Therefore, the measurement of these autoantibodies in serum samples is useful in the etiologic diagnosis of hypothyroidism

Purpose: To analyse the interchangeability of the results of anti-TPO and anti-TG measured by two analysers, Architect i2000 (Abbott) and Phadia 250 (Thermofisher).

Method: A total of 107 serum samples were measured by both techniques. Results were expressed in IU/mL. The comparison analyses were performed with Passing-Bablock non-parametric linear regression test, Bland-Altman concordance test and intraclass correlation coefficient (ICC). The analyses were conducted with MedCalc statistical assistant.

Results: Passing-Bablock regression analysis showed that Anti-TG's intercept was 3.338 [95% CI = 1.115-5.007] and anti-TPO's intercept was 0.918 [95% CI = 0.762-1.166]. Anti-TG' slope was 2.307 [95% CI = 1.884-2.712] and anti-TPO's slope was 0.442 [95% CI= 0.129-0.477].

Bland-Altman concordance study for anti-TG's showed a means difference of -69 [95% CI = from -591 to 452], and anti- TPO's means difference of 75 [95% CI = from -181 to 331]. ICC of anti-TG was 0.438 [95% CI = 0.166-0.622] and ICC of anti-TPO was 0.838 [95% CI = 0.649-0.922].

Conclusion: Passing-Bablock analysis revealed a systematic bias for both anti-TG and anti-TPO analysis, and also a proportional bias between the two techniques. Bland-Altman concordance study didn't show any bias. ICC yields low value for anti-TG and fairly good for anti-TPO. For this reason, it is concluded that these techniques are not interchangeable, and other reference values are needed.

Recommendations for pre-emptive genotyping in the Netherlands

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Background: The Dutch Pharmacogenetics Working Group (DPWG) of the KNMP has been developing pharmacogenetic guidelines since 2005. These guidelines, however, do not indicate wether patients are eligible for genotyping. Since 2017, the DPWG has started to develop recommendations for pre-emptive genotyping.

Purpose: The recommendations for pre-emptive genotyping will increase the clinical use of pharmacogenetics and aim to optimise therapy and prevent side-effects. It indicates the relevance of genotyping for a specific drug and it increases the availability of genotypes overall.

Method: The clinical implementation score is used to determine if pre-emptive genotyping is essential, beneficial or potentially beneficial. The criteria for this score include the clinical effect, level of evidence, number needed to genotype and pharmacogenetics information in the Summary of Product Characteristics.

Results: Pre-emptive genotyping is indicated to be essential for 13 drugs, beneficial for five drugs and potentially beneficial for 21 drugs to date.

Conclusion: The recommendations for pre-emptive genotyping are a next step into clinical implementation of pharmacogenetics. In the PREPARE study (www.upgx.eu) a complete panel of genotypes is determined when a patient is eligible for inclusion. Until a complete genotyping panel is standard of care, the recommendations for pre-emptive genotyping can help healthcare professionals to select the most relevant patients for genotyping to optimize therapy and prevent side-effects. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 668353.

Health technology assessment of precision and personalised medicine interventions: Methodological developments

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Background: Current approaches to assess the value of health technologies focus on estimating average effects on a cohort level and, in doing so, may not consider the heterogeneity among individuals and the impact of their characteristics on response to treatment.

Purpose: To facilitate the development of methodologies to deliver more customised information on the effectiveness and cost-effectiveness of personalised medicine interventions.

Method: Next Generation Health Technology Assessment project (HTx) is a five-year Horizon 2020-funded project. As part of HTx, potential therapeutic areas and interventions for developing methods for personalised cost effectiveness analysis and comparative effectiveness research have been identified.1 Patient-level prediction models are developed using conventional as well as artificial intelligence (AI) and Machine Learning (ML) techniques. These methods will be tested in a "policy sandbox" environment to assess their potential for implementation in real-world health technology assessment (HTA) decision making context.

Results: The following therapeutic areas have been identified for development of patient level prediction models: head and neck cancer, diabetes, multiple sclerosis and myelodysplastic syndrome. The interventions tested include sequences of treatment, digital technologies and telehealth. Planned outputs include prediction models that could be used to guide clinical decision making.

Conclusion: Recent advances in the area of precision medicine show promise in relation to using AI and ML methods to facilitate personalized assessment of treatment effect. HTA organisations should develop their methods to respond to this change.

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Suitability of the demand in request for thyroid hormones from Spain

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Background: The request for Thyroid Hormones (TH) in primary care (PC) medical is essential in the early diagnosis and monitoring of Thyroid Pathology.

Purpose: Study the demand and the adequacy in the request for laboratory tests in the request of TH parameters from PC in Spain and the differences between CCAA.

Method: Participating public laboratories were required to serve the needs of a Department of Health (DS), which will complete a form regarding the number of thyroid tests requested, from primary care for one year and the number of inhabitants of the DS. The request for each test was calculated for every 1,000 inhabitants and the ratio of request for free thyroxine (fT4) and triiodothyronine (fT3) for thyrotropin (TSH), (fT4 / TSH), (fT3 / TSH) and anti-thyroglobulin antibody (TgAb) with respect to anti-peroxidase (TPOAb) (TgAb / TPOAb) and the results between the different CCAA, with more than 4 participants.

Results: 110 laboratories that attended to 27,798,262 inhabitants participated. It was requested about six million TSH, which represented an expense of 10,643,840 Euros. The TSH demand data for every 1,000 inhabitants ranged from 198 to 289, and the request for fT4 doubled in the DS with the most demand. The TPOAb request per 1000 inhabitants varied from 0.2 to 11.2, and the application of TgAb and TPOAb was concomitant in five CCAA, as shown by TgAb / TPOAb results.

Conclusion: There is a high demand for laboratory tests of TH in PC. The request and expense in the TSH measure is very high. The variability observed between the CCAA and the inadequacy, especially in antithyroid antibodies, suggests that design strategies, on a national scale, are needed to improve your application.

Regional variability in recommendations for patient for laboratory testing in primary care

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Background: Preparation of the patient for laboratory tests is crucial for a subsequent accurate interpretation of many laboratory results.

Purpose: The aim was to investigate what the current practice and regional variability of recommendations regarding patient preparation for laboratory tests requested by Primary Care physicians is in Spain.

Method: A call for data was posted by email. Spanish laboratories were invited to fill out and submit a survey regarding current practice and agreement with a proposed harmonised recommendation.

Results: Sixty-eight (68) laboratories participated in the study. In 50 (73%) of those, fasting was always recommended regardless of the requested tests; in 16 (24%) it was just encouraged when tests requiring fasting were ordered; in 2 (3%) institutions fasting was always recommended except for CBC and/or coagulation tests. Only one third (24/68; 35%) of the laboratories systematically recommended a 12-hours fasting. In 48 (71%) water intake was allowed without restrictions during the fasting period and only in 9 (13%) to a maximum of 500 ml. In 45 (66%) a light meal was recommended before fasting. In 39 (57%) computerised order entry offered the possibility to print customised recommendations automatically in the primary care doctor's office according to the requested tests. Forty-nine (49) (72%) laboratories agreed with the proposed recommendation

Conclusion: There was a high variability in patient's preparation for laboratory testing. A significant proportion of centres did not follow international guidelines.

Effectiveness of evolocumab in the treatment of familial hypercholesterolemia and cardiovascular disease

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Background: Evolocumab is a monoclonal antibody that reduces LDL cholesterol (LDL-C) levels by binding to PCSK9.

Purpose: To evaluate the efficacy of evolocumab in the treatment of familial hypercholesterolemia (FH) and cardio-vascular disease (CVD).

Method: Observational and retrospective study of patients who started treatment with evolocumab between January 2016 and April 2020. Data were obtained from the outpatient dispensing module ATHOS-Prisma and from the Digital Unique History (Diraya). The variables collected were: age, sex, diagnostic, baseline LDL-C and LDL-C reached after the start of treatment and mean duration of treatment. To evaluate the efficacy, a reduction of at least 50% was considered with respect to the baseline value of LDL-C and / or target values of LDL-C <100 mg / dL in patients with high cardiovascular risk (CVR) and LDL-C <70 mg / dL in patients with very high CVR or CVD

Results: A total of 34 patients, 15 men and 19 women, with a mean age of 60.2 years, 20 of them with CVD and 14 with FH (five with high CVR and nine with very high CVR) were included. 12 patients were administered as monotherapy, and in 22 cases, in combination with statins and/or ezetimibe with an average duration of 20.2 months. The mean baseline LDL-C was 181.7 mg/dL (93-298) and LDL-C reached 102.7 mg/dL (6-262). 18 patients reached LDL-C target values, 11 with CVD, five with FH with very high CVR and two with FH with high CVR.

Conclusion: Evolocumab seems to be more effective in achieving LDL-C target values in patients with very high CVR or CVD, but it would be necessary to study if it is associated with a decreased cardiovascular events. The combination or not with statins and/ or ezetimibe does not seem to affect the efficacy.

Acquired Haemophilia can be caused by aortic stenosis? A clinical case report

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Background: Haemophilia is a rare disorder in which the person's blood cannot clot normally as it lacks sufficient clotting factors; specifically: F.VIII (Haemophilia A) or F.IX (Haemophilia B). According to literature, congenital haemophilia is caused by mutations in the genes that encode F.VIII or IX, whereas acquired haemophilia is produced by autoantibodies against these factors.

Purpose: In this study, a patient with aortic stenosis was analysed. They had aPTT (activated Partial Thromboplastin Time) elongated and 46% of F.VIII activity without the presence of F.VIII inhibitor. After replacing their aortic valve with a biological prothesis the patient presented a normal aPTT and F.VIII activity. The purpose of this abstract is to relate aortic stenosis to acquired haemophilia.

Method: In the laboratory coagulometric methods were used to measure the aPTT and F.VIII activity. Moreover, a literature search in Pubmed was conducted using the keywords 'aortic stenosis', 'Haemophilia' and 'Factor VIII'.

Results: A syndrome which can relate aortic stenosis to blood clotting deficiency is Heyde syndrome, which connects aortic stenosis with acquired VonWillebrand disease. VonWillebrand factor (FVW) is a multimeric protein which is fragmented when passing through the degenerative aortic valve. FVW concentration is normal but it does not work.

Conclusion: There are no reports about acquired haemophilia cases produced by non-immune causes. The only explanation that the authors have found is associated with Heyde syndrome, which connects aortic stenosis with acquired VonWillebrand disease. FVW is fragmented when passing through the degenerative aortic valve, its concentration is normal, but it does not work. Thus, FVW will not be able to protect F.VIII, developing haemophilia A.

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Standardised interpretation of CYP2D6 genotypes and phenotypes: From lab reports to clinical recommendations

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Background: Interpretation of CYP2D6 genotypes to assign phenotypes is critical since clinical recommendations are based on phenotypes. In 2019, the CYP2D6 Genotype to Phenotype Standardisation Project addressed concerns of discordant phenotype assignments.

Purpose: What are the practical implications of the consensus on standardised CYP2D6 genotype to phenotype translation?

Method: Buccal swabs were obtained from 42 consenting patients on amitriptyline therapy attending Mater Dei Hospital.

Lab analysis, using real-time PCR with SNP genotyping assays, reported CYP2D6 genotype (e.g. *1/*1), copy number variation (e.g. 2), and phenotype (e.g. normal metaboliser). CYP2D6 activity scores were calculated and the phenotypes inferred by lab reports reconsidered in line with the newly published standardisation - downgrading a CYP2D6 activity score of 1 from normal to intermediate and downgrading CYP2D6*10 activity score from 0.5 to 0.25.

Results: The lab reported three intermediate, 35 normal and four ultra-rapid CYP2D6 metabolisers. Aberrant metabolism was identified in 17% of patients. The reconsideration exercise assigned an intermediate metaboliser status to 14 patients previously categorised as normal, rendering 50% of patients to deviate from the normal phenotype. The impact of consensus changes was evident in the CYP2D6 intermediate metaboliser status for which tricyclic antidepressant clinical guidelines recommend a 25% reduction in dose.

Conclusion: Pragmatic construal of standardisation concerns may necessitate review of genotype-inferred phenotypes stored in patient health records. Further clinical research with harmonised phenotype assignments is anticipated.

Galenic preparations for the prevention of the spread of COVID-19

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Background: A.P.P.A. Project is the main activity of the non-profit organisation Aid Progress Pharmacist Agreement (A.P.P.A.) which is the result of the cooperation between the University of Turin and Italian Pharmacists and it operates in the field of International Health Cooperation. The objective of the Project is the realisation of Galenic laboratories within healthcare facilities located in Developing Countries. Seven Projects are currently on-going in Madagascar, Angola, Chad and Haiti.

Purpose: In view of the pandemic caused by COVID19, and to reduce its spread as much as possible in the hospitals where the Project is active, the goal was to implement specific procedures on site for the production of alcoholic solutions, liquid soaps and disinfectant gels in accordance with WHO guidelines.

Method: The A.P.P.A. labs have been promptly equipped with standard procedures for the preparation of disinfectant formulations. The procedures have been developed in a very simple way to allow their introduction on site even remotely and without a specific training path that requires to be carried out in person.

Results: Since the manual skills have been acquired during the preparation of Galenic formulations over time, local operators had no difficulty with the new formulations; if necessary specific indications are given by email or by phone calls. In the labs where these formulations had already been introduced in the past for the prevention of nosocomial infections, the setting up has been enhanced by the reorganisation of the production activities.

Conclusion: The Galenic preparation, also in these contexts, resulted a good strategy for healthcare personnel and for hospitalised patients.

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A.P.P.A. Project: Therapeutic food prepared in galenic laboratories

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Background: A.P.P.A. Project is the main activity of the non-profit organisation Aid Progress Pharmacist Agreement, which is the result of the cooperation between the University of Turin and Italian Pharmacists, and it operates in the field of International Health Cooperation. The aim of the Project is the realisation of galenic laboratories within healthcare facilities located in Developing Countries. Seven Projects are on-going in Madagascar, Angola, Chad and Haiti. Against child malnutrition, WHO and UNICEF have provided guidelines for the preparation of food products with high energy content and easy to administer, among these are the Ready to Use Therapeutic Food (RUTF), peanut-based paste in a plastic wrapper. The supply of RUTF is almost impossible in the realities in which A.P.P.A operates, because they are always very far from their respective capitals, the cost of transport can get to two euros per dose and the product is not always available.

Purpose: To allow local operators to produce a specific therapeutic food on site composed of local raw materials with the addition of mineral salts and vitamins.

Method: A feasibility study and cost analysis were conducted, then a standard operating procedure was established, whose application could be sustainable by the requesting health structures.

Results: In according with WHO guidelines, an operating procedure has been developed. One serving ranges from 0.30 and 0.40 Euros, definitely lower than the industrial one.

Conclusion: The operating procedure has already been introduced in two laboratories during the year 2019 and the technicians were trained for the preparation. In the coming months, a follow-up of the treatment of hospitalised patients is expected.

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Finding new analytical solutions for personalised breast cancer treatment

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Background: Breast cancer is the most common malignant tumour in women. Systematic medication therapies include chemotherapy, endocrine therapy, targeted therapy and immunotherapy.

Purpose: In clinical practice, the concept of therapeutic drug monitoring (TDM) is increasingly being used to achieve the best therapeutic effect of the drug with minimal risk of side or toxic effects. In oncology patients, this concept is still being adapted, with only a small number of drugs (such as methotrexate) in which TDM is part of the standard of care. For many anticancer drugs there is still not enough data on the effectiveness and importance of this approach.

Method: Patients not achieving desired treatment outcomes will be chosen for TDM. New analytical methods, employing both liquid chromatography (LC) and capillary electrophoresis (CE) coupled to a sensitive mass spectrometer (MS) and sample pre-treatment methods, will be developed to ensure accurate, fast and reliable drug determination.

Results: Through this is an ongoing project, new analytical LC-MS and CE methods will be developed for the analysis of novel drugs, cyclin-dependent kinases 4 and 6 (CDK4/6) inhibitors palbociclib and ribociclib, which are used in combination with endocrine therapy (anastrozole and letrozole) or antiestrogen fulvestrant.

Conclusion: Newly developed analytical methods can be used in routine clinical laboratories for TDM of patients on these cancer treatment protocols. Additional post-marketing surveillance, PK and metabolic studies of palbociclib and ribociclib will give more insight into their pharmacokinetics in real patients with co-morbidities and additional therapy.

UV/Vis spectroscopy in determining water content in solvents

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Background: The Karl Fisher titration is one of the main methods used to determine water content in solvents. Adopting the UV/Vis spectroscopy could be a simpler alternative to the Karl Fisher method.

Purpose: To develop an alternative method to the standard Karl Fisher for the determination of water content in tetrahydrofuran (THF) as an example of a solvent.

Method: A method to determine the water content in alcohol-based solvents using cobalt chloride (CoCl2) as an indicator and a UV/Vis spectrometer, was adapted for THF. Three solutions of CoCl2 in anhydrous THF at a concentration of 1.69x10-3 mol/L, 3.42x10-3 mol/L and 6.98 x10-3 mol/L, were prepared. For each concentration, eight dilutions which make up to a volume of 1 mL, were made in triplicates, by adding 0.1, 0.5, 1, 2, 5, 8, 10 and 15 µl respectively, of HPLC grade water. Analysis of the solutions was conducted using UV/Vis spectrometry (200nm to 800nm).

Results: THF has an absorbance between 200-320nm. CoCl2 has an absorbance between 480-720nm with a maximum absorbance at 672nm observed in the 1.69x10-3mol/L and 3.42 x10-3mol/L solutions and at 669nm in the highest THF/CoCl2 solution. The average absorbance for each dilution was calculated at 672nm and plotted. From their respective polynomial equations, an initial increase in absorbance followed by a decrease on further addition of water was observed. This variance in absorption could be due to the incomplete dissolution of CoCl2 in THF, forming a very fine suspension which escapes detection.

Conclusion: UV/Vis spectroscopy may present an alternative method for the determination of water in solvents. Yet, the Karl Fisher titration remains the method of choice.

Might selenium nanoparticles help as adjuvant antitumor therapy?

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Background: Selenium nanoparticles (SeNPs) exhibited multiple therapeutic roles in in vitro and in vivo studies, qualifying them as a potential remedy for metabolic, cancerous or infectious diseases.

Purpose: In this study, we aimed to evaluate the biological effects of chemogenically synthesised SeNPs on two cell lines – normal (MRC-5) and malignant (PANC-1).

Method: We synthesised SeNPs using sodium selenite and glutathione and stabilised them with bovine serum albumin. We tested the resulted SeNPs on PANC-1 cancer cells and MRC-5 normal cells, with a sodium selenite control. We evaluated citotoxicity using LDH test and MTT test, for 0.1-25 µg/mL SeNPs. We also measured the intracellular ROS formation induced by hyperglycemic culture media (25mM glucose), with the fluorescent probe 2',7'- dichlorodihydrofluorescein diacetate.

Results: PANC-1 cell membrane was insignificantly damaged compared to control, as a mild decrease of LDH concentration was observed after the SeNPs treatment. Yet, for these cells, the viability decreased up to 42% for the highest SeNPs applied dose, in a dose-dependent manner. A slight increase of LDH level and a decrease of 43% of cell viability were noticed at the highest SeNPs dose, 25 µg/mL, with no significant variations in the 0.1-5 µg/mL range. The ROS level in normal cells slightly varied for the applied doses, which could be interpreted as a self-limitation of SeNPs harmful effects that would the benefit/risk balance control.

Conclusion: We can conclude the SeNPs, as well as sodium selenite, exerted no significant effect on normal cells, but

decreased the cancer cells viability. These results support the hypothesis that SeNPs could represent a potential adjuvant antitumor treatment.

Development of chitosan nanoparticles surface functionalised with heparin to target Plasmodium ookinetes

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Background: Therapeutic approaches against malaria target different pathogen life stages. Ookinetes adhere to the midgut epithelium of adult female Anopheles to form an oocyst. This is considered to be a critical and possible target for future transmission-blocking strategies (Marques *et al*., 2017). Ookinetes interact with hosts binding glycosaminoglycans, e.g. Heparin (hep) (Dinglasan *et al*., 2007). The positive surface electrical charge of chitosan nanoparticles (CS NPs) favours electrostatic attractions toward negative biological surfaces (Unciti-Broceta *et al*., 2015).

Purpose: Development of a reproducible procedure to formulate CS NPs surface functionalised with hep.

Method: CS NPs were prepared by coacervation (Unciti-Broceta *et al*., 2015) and hep was covalently linked to CS NPs. Methylene blue spectroscopic competition technique was used to determine the hep:CS ratio. Size and electrokinetics were characterised by photon correlation spectroscopy and electrophoresis, respectively. The techniques helped in demonstrating the efficient incorporation of hep onto the NPs.

Results: CS NPs were characterised by a small size (≈115 nm). The electrophoretic properties were found to be controlled by the pH and ionic strength of the aqueous media. The adequate hep:CS ratio to obtain hep-CS NPs was 1:25. Efficient incorporation of hep moieties onto the particle surface was postulated given the slight increase in size (mean diameter ≈160 nm) and the change in the surface electrical charge.

Conclusion: It has been defined a reproducible methodology for the formulation of CS NPs adequately coated with hep. Electrophoresis was a sensitive technique to demonstrate the positive electrostatic interaction of hep with the NP surface.

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Improving the colloidal stability of a magnetic colloid by engineering a chitosan-based nanostructure

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Background: Nano-sized iron oxide particles are characterised by superparamagnetism, a useful property in Biomedicine. Tendency to aggregation frequently occurs, which could mean the loss of clinical use, along with a possible increase in toxicity (risk of embolisation). Generation of a physical barrier onto the iron oxide surface by using biodegradable polymers may facilitate the stabilisation of the nanoparticles (NPs). If chitosan is used, additional functionalities may be gained by the resulting magnetic NP, e.g. mucoadhesiveness, increased cell uptake, and pH- triggered drug release (Ali & Ahmed, 2018).

Purpose: Formulation of magnetite/poly(ε-caprolactone) (Fe3O4/PCL, core/shell) NPs, and (Fe3O4/PCL)/chitosan (core/shell)/shell NPs, and comparison of their colloidal stabilities.

Method: Core/shell NPs were prepared by interfacial polymer disposition, while (core/shell)/shell NPs were obtained by coating the surface of the core/shell particles with chitosan by coacervation. Size was determined by photon correlation

spectroscopy, and the surface electrical charge was estimated by electrophoresis. Samples were kept at 4.0±0.5 °C, and ultrasonicated before analysis.

Results: Initial mean size of the negatively charged core/shell NPs was 170 nm, while mean diameter of the positively charged (core/shell)/shell NPs was 300 nm. Irreversible aggregation was found for the Fe3O4/PCL particles at day 2. On the opposite, the (Fe3O4/PCL)/chitosan NPs were stable during the study (30 days).

Conclusion: Chitosan coating is needed for a long-term stabilization of Fe3O4/PCL NPs, thus postulating its potential use to control the stability of magnetic colloids being used in Biomedicine.

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Legibility analysis of the patient information sheets of pharmaceutical preparations

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Background: All drugs dispensed in the Pharmacy department (PD) must have a leaflet with information about that medication. In case of pharmaceutical preparations elaborated in the PD, a patient information sheet (PIS) must be written in order to be dispensed with the medication, and it must be understandable notwithstanding the patient's sociocultural level.

Purpose: To analyse the PIS legibility of the pharmaceutical preparations dispensed in the PD.

Method: PIS of the most dispensed pharmaceutical preparations were analysed with the Férnandez-Huerta rate (FHR) (206,84 – 60 x (syllables/words) + 1,02 x (words/sentences)) and with the Szigriszt-Pazos rate (SPR) (206,835 – 62,3x (syllables/words) - (words/sentences)). Normal score was established as the minimum level of an understandable PIS (>60 in FHR and >50 in SPR). Those PIS with <50 were rewritten to reach normal score.

Results: Seven PIS were analysed. Results obtained (FHR, SPR): cyclosporine eye drops (65.22, 60.11) (normal, normal), cidofovir cream (62.48, 57.54) (normal, normal), furosemide oral solution (41.33, 35.01) (hard, very hard), hydrochlorothiazide oral suspension (49.08, 43.13) (hard, quite hard), insulin eye drops (66.71, 61.86) (normal, normal), omeprazole oral suspension (52.48, 46.57) (quite hard, quite hard), sildenafil oral suspension (60.33, 55.15) (normal, normal). Results obtained after rewritten process (FHR, SPR): furosemide (60.81, 55,29), hydrochlorothiazide (60.86, 55.46), omeprazole (60.43, 55.21).

Conclusion: The PIS were modified to improve their comprehension and to guarantee a correct treatment. The rest of the PIS less dispensed of the pharmaceutical preparations will be analysed too and rewritten if necessary.

Post-sexual assault kits dispensed in a hospital pharmacy department

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Background: The high risk of suffering a sexually transmitted disease (STD) after a sexual assault demands a quick and effective treatment to prevent it.

Purpose: To analyse the use of post-sexual assault kits since their implementation in 2011.

Method: An observational and retrospective study was performed. A protocol was jointly elaborated by the Emergency, Gynaecology and Pharmacy departments. Three different kits were prepared for prophylaxis of gonorrhoea, syphilis and chlamydia:

- ADULT KIT (K1): ceftriaxone 250 mg intramuscular (IM), azithromycin 1g oral, penicillin G benzathine 2,4M UI IM.
- CHILD KIT (K2): ceftriaxone 125 mg IM, erythromycin 250 mg/6h for seven days.
- BETA-LACTAM ALLERGY KIT (K3): erythromycin 500 mg/6h for 15 days.

Additionally, one or many of the following drugs can be added if considered necessary by the physician:

- Anal fissure (A): clindamycin 600 mg IM.
- HVB prophylaxis (B): specific globulin and first vaccine dose.
- Tetanus prophylaxis (C): specific globulin and first vaccine dose (not in the first trimester of pregnancy). - Pregnancy prophylaxis (D): levonorgestrel 1500 mcg.
- HIV prophylaxis (E): the one prioritised at the moment of dispensation.

The following data were registered in an Excel database during 2011 to 2019: dispensation date, sex, age and dispensed kit.

Results: Ninety-seven kits were dispensed (87 K1, 9 K2, 1 K3). Mean age: 26 years (6-53), 97.9% women. In some cases other prophylaxis drugs were prescribed with adult kits (2.06% A, 16.5% B, 8.2% C, 49.5% D, 7.2% E) and child kits (2.1% B, 1% C, 4.1% D).

Conclusion: These kits are a quick and effective way to dispense the adequate treatment to prevent a STD in assaulted patients.

Evaluation of the effects of a deodorant produced from the extracts of flower buds of clove

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Background: Deodorant products prevent the growth and activity of bacteria found in the armpit of humans. Aluminium salts, however, are suspected to increase the risk of certain diseases necessitating the use of alternative natural product extracts.

Purpose: This study aimed at evaluating the in vitro antimicrobial effect of crude extracts of clove against bacteria extracted from the armpit of humans and to compare the effectiveness of the crude extracts against an established aluminium-containing deodorant.

Method: Different acetone extracts (2.5% to 25.0%) of clove were evaluated via antimicrobial susceptibility testing to the bacteria isolated from the armpits of four female volunteers. The minimum inhibitory concentration of the extract was determined to be 5.0%. Deodorant sticks were prepared with 10.0% and 25.0% clove extracts as the active component. A placebo was also prepared. Using the Agar diffusion method, antimicrobial susceptibility testing was carried out using the deodorants formulated with the clove extract and the placebo product. A commercial deodorant containing Aluminium Zirconium Tetrachlorohydrex Gly was also tested.

Results: Antimicrobial activities determined by the inhibitory effects of test formulations towards the bacteria indicated that the deodorant formulations containing 10.0% and 25.0% clove extracts, were more effective in inhibiting the growth of the bacteria while both the placebo and the formulation containing Auminum Zirconium Tetrachlorohydrex Gly were ineffective.

Conclusion: This work demonstrates that clove extract can be used as a safe and effective active component in them formulation of deodorant. An enlarged version of this study is expected and possible patenting of the work.

Perception of delivery systems used for medicinal cannabis

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Background: Cannabis for medicinal use is available in various dosage forms. The opinion of patients about medicinal cannabis dosage forms has not previously been evaluated.

Purpose: To evaluate the preferred delivery methods for medicinal cannabis through a patient-focused analysis.

Method: Two self-administered questionnaires were developed to evaluate opinions of users and potential users of medicinal cannabis with regards cannabis dosage forms. The questionnaires were validated using the Delphi method and disseminated at two clinics in Malta following ethics approval. Participants were asked to rate methods of administration using a 5-point Likert scale (where 1 is least preferred and 5 is most preferred).

Results: The 87 (61 male) users and 101 (55 male) non-users of medicinal cannabis completed the questionnaires. Medicinal cannabis users rated edibles (n=66), tea (n=65), drinking oil (n=72) dosage forms and non-users rated liquid (n=79), vegetarian capsule (n=79) and capsule (n=79) as the most preferred methods of cannabis administration orally. Users prefer cannabis in the form of cigarettes (n=71) and tinctures (n=67) while non-users prefer spray (n=80), patch (n=78), and nebulisers (n=76).

Conclusion: Both users and non-users of cannabis for medicinal purposes, indicated different preferences for medicinal cannabis dosage forms. Availability of patient-preferred dosage forms is desirable to meets patients' needs. The great variety of dosage forms requested by potential patients is a challenge to the evolving manufacturing industry for medicinal cannabis.

The assessment of pharmacy students involvement in scientific research projects

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Background: There is global variation in the pharmacy and pharmaceutical sciences experiential education. This may affect the competences of students, the future pharmaceutical workforce, in their scientific careers.

Purpose: The research aimed to assess the extent, motivation, and barriers for the involvement of pharmacy students in scientific research projects, with respect to different parts of the world they are coming from.

Method: A quantitative descriptive study was conducted. A well-structured questionnaire was distributed across the IPSF network. 657 responses from 63 countries of all five IPSF regions were received and analysed by Microsoft Excel. The extent of involvement indicators (duration of involvement, number of

hours per week, number of posters made, etc.), barriers, and facilitators were evaluated.

Results: Twenty-eight percent (28%) of all the respondents have been involved in scientific projects, with extent (in percentages) varying from 8% (African) to 30% (European), depending on the region. The main facilitator of being involved was an investment in a future career of which 51% of the involved students were in the best ten percent of their academic class based on grades. Half of the involved students have presented at least one research poster. The main barrier of involvement for all the regions was the inadequate project budget and the lack of opportunities.

Conclusion: Differences in the level of involvement between the world regions exist, however, the challenges are similar. Opening more opportunities and lowering curriculum workload, could cause a higher involvement of students in science. As the future pharmaceutical workforce, they should be given adequate opportunities to gain experience in practices of scientific research.

Evaluation of phenylpropanoic acid derivatives to target markers of inflammasome pathway

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Background: Pyroptosis is an important component of immune system and is regulated by NOD-like Receptors (NLRs). Among the NLR family, role of NOD-like receptor Pyrin containing domain 3 (NLRP3) is now well established in a number of inflammatory conditions. NLRP3 is present in the cytoplasm of the cells of the immune system, specifically, macrophages and microglia. NLRP3 gets activated when the membrane bound Toll-like Receptors such as TLR4 (Groslambert & Py, 2018) recognise a specific danger signal (Yang *et al*., 2019). Phenylpropanoic acid derivatives have not been evaluated for specific pathways of inflammation at a molecular level. In this study, we have screened these compounds against various proteins of NLRP3 inflammasome pathway.

Purpose: To evaluate the selected derivatives of naturally occuring phenylpropanoic acid derivatives against important molecular markers of NLRP3-inflammasome pathway.

Method: *In-silico* evaluation was done using AutoDock v4.2. Based on free energy of binding and bonding profile, selected candidates were screened in-vitro for the activity. Human glioblastoma cell line was used to assess the inhibition of NLRP3-inflammasome pathway. RT-qPCR and ELISA were used as quantitative tests to measure the activity of the compounds.

Results: Out of eight selected compounds, four were short-listed for in-vitro screening based on in-silico results. All four of the selected molecules showed promising results in-vitro, when compared against standard inhibitors.

Conclusion: Phenylpropanoic acid derivatives, with their potent anti-inflammatory activity can be developed as NLRP3-inflammasome inhibitors and hence, can be useful in prevention as well as treatment of various inflammatory and auto-inflammatory disorders.

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Pigmented villonodular synovitis successfully managed with imatinib

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Background: Anti-colony-stimulating-factor-1 recently emerged as potential therapeutic target vs PVNS (Brahmi, Vinceneux, & Cassier, 2016). Limited experience with imatinib only in retrospective cohorts (Cassier *et al*., 2012; Tap *et al*., 2019).

Purpose: Assessing efficacy/safety of imatinib in a patient with long-standing PVNS.

Method: A 37-year-old male with PVNS (tendon sheath right knee, multiple decreasingly-effective operations between 2013 to 2019) was analysed. He was found to have Obesity (BMI 45), T2DM, hypercholesterolemia, and suspected Gilberts' syndrome. Empaglifozin, metformin, sitagliptin, atorvastatin, naproxen paracetamol, dihydrocodeine, and oxycodone were prescribed. NKDA; no tobacco/alcohol. A Management plan was put in place of neoadjuvant imatinib for six to 12 months (consent obtained, off-label use granted), then total knee replacement and RT. Baseline imaging, blood tests, and cardiac function performed.

Efficacy: radiographic response/clinical findings (pain reduction, flexibility).

Safety: toxicities requiring reduction/discontinuation.

Results: Imatinib 400mg/day (started in August 2019), immediate response confirmed by CT. Pain reduction (VAS eight to three), knee flexibility (100o to ~130o), reduced oedema. Neutropenia (0.37x109/L) post-initiation (imatinib withheld, restarted at 100mg/day and up-titrated). Nausea (g2) (domperidone prescribed), fatigue and appetite loss (g1). Nonsignificant raised bilirubin (normal total/conjugated, reticulocytes, LDH and haptoglobin).

Conclusion: Significant and sustained clinical/radiographic response shortly after initiation. Despite an isolated neutropenia episode requiring temporary discontinuation, its safety profile was manageable (only mild nausea & fatigue). This report offers insightful information in the management of long-standing PVNS in a patient with multiple co-morbidities.

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Comparative study of chemical composition of Xanthoceras sorbifolia growing in Inner Mongolia

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Background: *Xanthoceras sorbifolia* Bunge has the strength to reduce fever, reduce edema, and relieve pain. This plant is widely used in Mongolian medicine for the treatment of inflammatory diseases and is included in many traditional medicines such as Senden 4, Senden 7, Senden 9, Senden 25, Agar 19. Distributed in Inner Mongolia, Northeast, Northwest and Northern parts of China.

Purpose: To reveal chemical composition of *Xanthoceras sorbifolia* and compare the contents of samples collected from different places in different years.

Method: The 27 samples collected in different years from 12 places in Inner Mongolia were used for this study and the chemical compositions of them and the contents of epicatechin, dihydroquercetin and myricetin were defined by High Performance Liquid Chromotography in all samples.

Results: Epicatechin, dihydromyricetin, dihydroquercetin, myricetin, quercetin and naringin were revealed in *Xanthoceras sorbifolia* Bunge and the contents of epicatechin, dihydroquercetin and myricetin were defined in all samples. The chemical compositions of these samples were similar, but the content of some substances were different in studied 27 samples collected in different years from 12 places in Inner Mongolia.

Conclusion: The chemical compositions in samples collected from different places were similar, but the content of some substances were different.

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Standardisation study of the Natural Musk

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Background: The musk, a biological secretion with unique odour, is produced by the Siberian musk deer (*Moschus Moschiferus* Linnaeus). For thousands of years, the musk has mainly been used to treat white channel disorders. In Asian countries it was prescribed for the treatment of neurological, cardiovascular, respiratory and sexual dysfunctions. Although in Traditional Mongolian Medicine, the musk was used to treat bacterial infectious diseases, it has not been the subject of standardised research until now, which defines the background of this research study.

Purpose: To conduct a standardisation study and determine the quality and safety parameters of Natural Musk.

Method: Quality parameters (moisture, total ash) and safety parameters were determined by Mongolian National First Pharmacopoeia methods. The content of main biologically active compounds in the natural musk was determined by HPLC methods.

Results: Suitable condition of HPLC to reveal muscone in Natural Musk were defined and the content of muscone in Natural Musk was determined as 0.235±0.12%. Some quality and safety parameters of Natural Musk determined as: moisture 6.35±0.72%, total ash 2.62 ± 0.32%, Cd was not detected.

Conclusion: The standardisation indicators of Natural Musk were defined and Mongolian national pharmacopoeia monograph's draft for Natural Musk was developed.

Standardisation study of cultivated Sophorae alopecuroides L

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Background: *Sophorae alopecuroides* L has the ability to suppress nausea, replenish energy, suppress shortness of breath, soothe constipation, remove phlegm, heal wounds. It grows in Dundgobi, Dornogobi, Gobi-Altai, Bayankhongor, Umnugobi provinces of Mongolia and this plant is cultivated in Dashinchilen soum of Bulgan province of Mongolia.

Purpose: To conduct the standardisation study of the root of *Sophorae alopecuroides* L cultivated in Mongolia.

Method: The root of cultivated *Sophorae alopecuroides* L was collected in September and used for this study. The plant anatomy was detected by light microscopy and standardisation indicators were defined according to Mongolian National Pharmacopeia. Oxymatrine and matrine were revealed by Thin Layer Chromotagraphy (TLC) and content of oxymatrine was determined by spectrophotometric assay.

Results: Special features of root of *Sophorae alopecuroides* L were defined. Oxymatrine and matrine in the root were revealed by TLC using solution of chloroform-methanol-concentrated ammonia with proportion of (10:1.2:0.6). The content of total alkaloids calculated as oxymatrine in the root was determined as 0.45±0.1%, humidity as 6.9±0.25%, ash as 4.65±0.32%, acid insoluble ash as 2.1±0.2% and water-soluble extractive as 18.56±2.45%.

Conclusion: The standardisation indicators of root of cultivated Sophorae alopecuroides L were defined and pharmacopeia monograph of the root was developed.

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CONFERENCE ABSTRACTS

FIP VIRTUAL 2020

Pharmacy Practice Research

Economic evaluations of antivirals for pandemic influenza viruses

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Background: The coronavirus, COVID-19, has caused a global pandemic of an unprecedented scale. The efficacy of antivirals and other drugs, considered for repurposing, is assessed in clinical trials. It is not clear, however, whether these treatments, when available, will be cost effective.

Purpose: To systematically review published economic evaluations of antivirals for the management of pandemic influenza.

Method: The following databases were searched from inception to 26 March 2020: Medline (EBSCO HOST), EMBASE (OVID), EconLit (OVID), NHS EED (OVID) and HTA (OVID). Citation tracking and reference checking were also used. Only full economic evaluations published in the last ten years were included. Studies were quality assessed using NICE economic evaluation checklist. Data were extracted into standard data extraction tables and narratively summarised.

Results: Of 709 records identified, 14 studies were included. These were mostly conducted in high income countries. They were seven (50.0%) cost-utility analyses, four (28.6%) cost-effectiveness analyses, two (14.3%) cost-consequences analyses, and one (7.1%) cost-benefit analysis. Antiviral treatment-containing strategies were found to be either cost saving or cost effective. Empirical treatment was more cost effective than test-guided treatment for young adults but less for older adults. Infection rate, prevalence, antiviral efficacy and costs were the key drivers of cost effectiveness

Conclusion: Antiviral treatment for managing pandemic influenza viruses that have high case fatality rate, similar to the COVID-19 pandemic, has shown to be cost effective, either as standalone intervention or part of a multifaceted strategy

Effect and associated factors of a clinical pharmacy model in the incidence of medication errors

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Background: Medication errors are considered by the WHO to be a subject that requires attention at all levels of care, to reduce serious and preventable damage related to medication. Clinical pharmacy practice standards have been proposed around the world where the pharmacist, as part of a multidisciplinary health team, can help improve patient safety; however, further evidence derived from adequate studies is needed to demonstrate this.

Purpose: The aim of this study was to assess the effect of a clinical pharmacy practice model (CPPM) in preventing medication errors (MEs) associated with the medication use process.

Method: A prospective, stepped-wedge cluster randomised controlled trial with a duration of 14 months was performed to compare the effect of a CPPM along with the usual care process of patients in a Pablo Tobón Uribe Hospital. The study was designed as a cluster-randomised controlled trial, involving five units and 720 patients. Unit care was allocated to interventions using a Stepped Wedge Design.

Results: The incidence of ME was 13.3% for Intervention group and 22.8 for control group. In the Poisson model estimated a RR 0.52 (IC 95% 0.34 to 0.79), determining that the probability of presenting a medication error was 48% lower when the patient is followed up by CCPM.

Conclusion: This trial assessed the effect of a clinical pharmacy model as demonstrated an effect in reducing medication errors in hospitalised patients (RR=0.52). To the authors knowledge, this study is the first stepped-wedge controlled trial designed to assess the effect of the clinical pharmacy practice model on the incidence of medication error in hospitalised patients, generating strong evidence.

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Roles for pharmacists to address medicine safety in Australia

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Background: With Medicine Safety declared a National Health Priority in Australia in 2019, the pharmacy profession needs a strategy to tackle medicine-related harm.

Purpose: To identify priority areas in medicine safety relevant to pharmacists and determine a key intervention by pharmacists in each priority area.

Method: An expert advisory group identified 20 domains in which pharmacists could potentially improve medicine safety. A workshop of pharmacists evaluated each domain using prevalence, risk and the level of pharmacist engagement. Sub-groups within the workshop scoped potential interventions relevant to the five priority domains. Based on the effort required to implement each intervention and the likely impact, each group selected a preferred intervention within pharmacists' scope of practice. The preferred interventions were described using a common nine-point instrument.

Results: In descending order of priority, the selected domains are poly-pharmacy, health literacy, geriatrics, high risk medicines and potentially inappropriate medicine use. The preferred interventions in the respective domains are; primary care embedded pharmacists, improved counselling, medication review with follow-up, pharmacist workforce capacity building to increase confidence, and pharmacists' engagement in on-going medication management. Factors common to the implementation of these interventions include workforce capability and capacity, regulatory changes, enhanced communication, access to patient records, and remuneration.

Conclusion: All five interventions are enhancements of current practise and the implementation factors align with prior work that identified macro-environmental changes required to adopt enhanced roles (Jackson, Hussainy, & Kirkpatrcik, 2016).

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The attitude of Dutch community pharmacists towards vaccination qualification and the willingness to vaccinate

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Background: In the Netherlands, pharmacists are not qualified to vaccinate. KNMP would like to advocate for this qualification.

In order to do so, it is important to know the attitude of Dutch community pharmacists towards vaccination qualifications, the willingness to be trained to vaccinate and towards a possible different scenario: pharmacy-based vaccination by a nurse.

Purpose: To assess the attitude of Dutch community pharmacists towards vaccination qualification of pharmacists, the willingness to be trained to vaccinate and the attitude towards pharmacy-based vaccination by a nurse.

Method: We developed a questionnaire and spread it by email to all KNMP members.

Results: Sisty-six percent (66%) of the responders were positive about vaccination qualification of pharmacists (17% neutral and 17% negative), and even 78% were willing to be trained to vaccinate (ten percent neutral and 12% negative).

On the other hand, only 34% was positive about pharmacy-based vaccination by a nurse (27% neutral and 39% negative). 95% of the responders were community pharmacists, of which 12% were hospital-based community pharmacists, five percent were hospital pharmacists and five percent were other pharmacists. The total number of respondents was 60, that is a response rate of two percent.

Conclusion: We have a positive impression of the attitude of Dutch community pharmacists towards vaccination qualification of pharmacists and the willingness to be trained to vaccinate.
This is a much more popular scenario than vaccination by a nurse who could vaccinate in the pharmacy.

Because the total response to the questionnaire was low, we cannot be sure whether this is representative of Dutch community pharmacists or not. We considered sending the questionnaire again after the COVID-19 crisis, to gain higher response.

A 2019 survey of YPG Members in FIP's Pharmacy Practice Research Special Interest Group (PPR SIG)

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Background: The Pharmacy Practice Research (PPR) Special Interest Group (SIG) of FIP disseminates PPR information internationally and serves as a platform for networking and collaboration. Members of the Young Pharmacists Group (YPG) of FIP desire to be actively involved in the SIG.

Purpose: This survey was aimed at understanding the needs of YPG members of the PPR SIG.

Method: From July to August 2019, a survey was sent to 343 YPG members of the SIG. The survey had 12 questions on demographic data, practice areas, reasons for joining the SIG, how to increase involvement, and ideas for PPR projects, amongst others.

Results: Twenty-four (24) responses were recorded. Most respondents were in academia (n=9) and had three to five years of experience (n=10). Reasons for joining the SIG included mentorship; networking; participation in collaborative projects; expanding knowledge/skills in PPR; accessing high-quality research evidence; and awareness of PPR globally. Respondents suggested that involvement in the SIG could be improved by: 'Meet and greets' at FIP conferences; webinars; joint projects; promotion of research activities from different countries; creation of working groups. Most respondents preferred to receive information from the SIG via Newsletters (n=11). Respondents shared 14 research project/additional ideas.

Conclusion: The PPR SIG is a good platform for YPG members to get involved more actively in FIP. Although few responses were received, they highlighted a need to increase the engagement of YPG members in the SIG. The survey findings have been shared with the PPR SIG leadership and are being used to devise plans to increase YPG engagement. This survey has served as a tool in building a fruitful relationship between the PPR SIG and YPG.

Quantifying the value and preferences for sustainable professional pharmacy services: A literature review

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Background: Designing professional pharmacy services (PPS) should include considering the preferences of the stakeholders (in particular consumers and professionals) and match their views and needs for optimal resource allocation and effective implementation. Stated preferences methods are robust to quantify preferences and to identify which characteristics (named 'attributes') of a good or service respondents like, the trade-off between these different attributes, and their relative value.

Purpose: The aims of this review were to identify discrete choice experiment (DCE) and best-worst scaling (BWS) studies designed to elicit preferences for PPS in the community setting, assess their methodological quality, and synthesize the main findings.

Method: This review used a search strategy updating two previous systematic reviews. Study focus, characteristics and main findings were collected to map the use of these methods.

Results: Twenty-two (22) DCE and three BWS were identified, including ten surveys conducted in the United Kingdom. 20 studies elicited consumer preferences in different contexts: e.g. management of minor symptoms (n=4), choice of a pharmacy (n=3), prescribing role of the pharmacist (n=2). Monetary attributes were often integrated to estimate willingness to pay and cost appeared as an important attribute. Nevertheless, consumers valued PPS and some trade-offs were possible. Pharmacists valued the provision of PPS, as well as income level or organisational aspects when they had to choose their preferred job (n=3).

Conclusion: The use of these methods, respecting a high methodological quality, provides robust and powerful information for establishing smarter and sustainable PPS for health systems.

Redefining the community pharmacy workflow: An approach based on the patient journey

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Background: Pharmacists are well positioned to facilitate and simplify life for people living with a chronic illness by making use of knowledge and technology.

Purpose: To develop a conceptual model for professional interventions in community pharmacy, based on the journey of people living with chronic conditions.

Methods: An integrative literature review was carried out to identify, in several clinical areas, journeys of people living with chronic conditions, in order to inform a standard patient journey from prevention to palliative care or cure. For each stage, the research team also identified relevant and feasible health interventions in the context of community pharmacy. A literature search was conducted in PubMed/Medline, Scopus and Web of Science, as well as sources for grey literature. The key words used were: 'patient journey', 'patient pathway', 'care pathway' and 'continuum of care'.

Results: Through the analysis of the literature, it was possible to identify several common stages in the patient journey of people living with different clinical situations, namely: (a) Prevention; (b) Pre-diagnosis; (c) Diagnosis; (d) Treatment; e) 'Maintenance'; f.i) Palliative care; f.ii) Cure. Health interventions identified included, among others: health promotion campaigns; new medicine service; medication management and counselling, including medication adherence and Patient-Reported Outcomes; support services for informal caregivers; integrated care with other healthcare professionals and structures such as patient organisations.

Conclusion: A standard patient journey was created that will inform the design and implementation of several health interventions to be developed in community pharmacy.

Design and implementation of a computer application to support pharmaceutical interventions

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Background: Pharmacists are well positioned to facilitate and simplify life for people living with a chronic illness by making use of knowledge and technology.

Purpose: To describe the 1) design; and 2) implementation of a patient management software for professional interventions in community pharmacy, namely, a service that improves medication adherence for people with long-term conditions and who have been prescribed a new medicine, similar to the 'New Medicine Service' implemented in the United Kingdom.

Methods: Firstly, a literature review was carried out to define the service process. Next, the computer application, developed from the Salesforce Health Cloud software, was customised to support the intervention. Then logins were assigned to 80 pharmacies and training was provided to pharmacy teams. The data collected (after obtaining informed consent) was anonymised and handled by the application, using pre-defined algorithms.

Results: It was defined that the service consists of two pre-scheduled tasks that correspond to two contacts (undertaken over the phone or in person), that will take place seven and 14 days after dispensing the medication to the patient for the first time. Patient registration in the programme, automatic task scheduling and registration forms were defined and made available through the computer application. Then preliminary data from the first phase of implementation indicated that more than 100 people were included in the first three months of implementation. Data are currently being analysed.

Conclusion: The application facilitates the implementation of pharmaceutical services and the collection of data, it systematises information, and it supports the development of scientific studies

A new work-based learning model: phArmaCy sTudent patIent counselling serVicE (ACTIVE) placements

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Background: Delivery of clinical pharmacy services globally is limited by access to appropriately skilled workforce (Bates *et al.,* 2018). Pharmacy students may have knowledge and communication skills to be able to contribute to service delivery. Current evidence, however, indicates student experiences on placement are frustrating and lack hands-on practice of service delivery (Bullen, Davison, & Hardisty, 2019).

Purpose: To explore a phArmaCy student paTIent cOunselling serVicE (ACTIVE) model for work-based learning on placement.

Methods: Small groups of students were asked to complete as many medication histories as possible over ten three-hour placements in a hospital. Students used the medication history to identify if treatment counselling was required and provided counselling using an approved clinical protocol. Students recorded patient interactions using a proforma (SOAP note) which was reviewed and verified by a clinical pharmacist. Student feedback was then collected using an evaluation form; and the data were analysed using descriptive statistics and thematic analysis.

Results: Sixty-eight (68) third year Master of Pharmacy students completed 311 medication histories and provided counselling to 308 patients. Counselling included analgesia (40%), inhaler (41%), NOACs (9%) or a combination of two (8%). 16% of patients were referred to clinical pharmacists for follow-up.

After repeated visits students were confident to provide advice about medications and felt part of the team. However, as the students were visiting the same ward, at the same time, each week, their learning plateaued after six placements.

Students reported feeling well-prepared for practical assessments (e.g. OSCEs) and pre-registration training.

Conclusion: Findings indicate students can be an active part of the pharmacy workforce whilst learning during placements.

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Whistle-blower protections for community pharmacists and technicians during COVID-19

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Background: International human rights law, in particular Article 7 of the International Covenant on Economic, Social, Cultural Rights, calls for 'just and favourable' work conditions including the 'right to safe working conditions'. COVID-19 has exposed many frontline health workers to unsafe working conditions especially in regard to lack of Personal Protective Equipment (PPE) or protocols to minimise exposure. This further jeopardises not only the health of community pharmacists and technicians but also patients.

Purpose: Whistle-blower protections ensure that individuals can freely report on substandard and unsafe work conditions without fear of retaliation. However, in many cases, unclear or lack of reporting guidelines for employees, or weaknesses in law and resource limitation of regulatory agencies can prevent or deter reporting.

Methods: This paper will explore the state of whistle-blower protections policies in the United States, in order to analyse the effectiveness of these protections and their uptake in community pharmacy settings. Furthermore, the paper will explore the resources available to pharmacists and technicians who wish to become whistle-blowers or have experienced retaliation as a result of whistleblowing.

Results: There is a disconnect between protections available, employee understanding and use of these various instruments, enforcement mechanisms, and protection through alternative policies and laws.

Conclusion: The findings in this paper will be useful for pharmacists and technicians who would like to avail whistle-blower protections and for future research which looks at more effective alternatives to the current whistleblowing protection infrastructure.

Implementation of the appointment-based model in Canadian community pharmacies

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Background: Community pharmacy practice is traditionally reactive in nature, waiting for patients to request medication refills. The appointment-based model (ABM) is a proactive model that synchronises refills and schedules appointments for the patient and pharmacist to review medication regimens.

Purpose: To be the first in Canada to evaluate the ABM within independent community pharmacies.

Methods: In 2017, the ABM was implemented across five independent community pharmacies in Ontario, Canada. In 2018, a convenience sample of three pharmacies was selected; demographic and quantitative data were extracted from the pharmacy management software. Descriptive statistics and frequencies were analysed.

Results: Analysis of the 131 patients (52.5% female; mean age (±SD) 71.3±8.8) revealed medically complex patients prescribed 7.15±3.29 medications. Polypharmacy was experienced by 102 (77.9%) patients. Patients had a statistically significant reduction in mean number of refills dates (6.78±3.78 six months pre-implementation of the ABM vs. 4.91±3.08 six months post-implementation, p <0.0001) yet a statistically significant increase in the mean number of refills (11.86±6.58 six months pre-implementation vs. 13.29±7.38 six months post-implementation, *p*=0.02). Similar results were seen at 12 months pre- and post-implementation. This reduced filling complexity may reflect higher levels of adherence. Evaluation of clinical services is ongoing and will be presented.

Conclusion: Findings support broader adoption of the ABM as a proactive model of pharmacy care that has potential to increase medication adherence for complex patients

Predicting pharmacist intention to contributing to COVID-19 management: A cross-sectional survey study

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Background: Pharmacists have a key role to play in responding to public health emergencies such as the COVID-19 pandemic. However, few studies have sought to evaluate their intention to contributing to the outbreak management.

Purpose: This study used the theory of planned behaviour (TPB) to investigate pharmacists' intention to practice the FIP COVID-19 recommendations and to explore possible enablers that support such practice.

Methods: A cross-sectional, self-administered survey was distributed to pharmacists in Macau in May 2020. Cronbach's alpha was used to test the reliability for the four TPB constructs (attitude, subjective norm (SN), perceived behavioral control (PBC), and intention). Multiple linear regressions were conducted to predict intention using the other three TPB constructs

Results: Pharmacists (n=110) had a positive intention to contributing to COVID-19 management (mean=4.21±0.60). Attitude (β=0.547, *p*=0.000), SN (β=0.177, *p*=0.050) and PBC (β=0.158, *p*=0.027) were significant predictors of intention, accounting for 60.2% of the variance in their intention to practice. Scale reliability ranged from 0.838 to 0.948 for the four constructs. The difference between past behaviours and intentions was statistically significant (*p*=0.000). Important enablers to support the practice included training (mean= 4.26±0.57), better communication with stakeholders (mean=4.17±0.61) and improved pharmacy management (mean=4.18±0.60).

Conclusion: Pharmacists showed favourable attitude, SN, PBC and intention to contributing to COVID19 management. Actions to enhance training, stakeholder communication and pharmacy management are important to increasing their willingness to take part in public health emergency alike in the future.

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Adverse drug reactions among breast cancer patients at a teaching hospital in North-Central Nigeria

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Keywords: Breast Cancer, ADRs, Pharmaceutical Care

Background: Adverse drug reactions (ADRs) are a global public health problem. Patients on chemotherapy are vulnerable to ADRs. information dearth about ADRs among breast cancer (Bca) patients in North-Central Nigeria is of concern.

Purpose: To assess the pattern of adverse drug reactions among BCa patients at a teaching hospital in North-Central Nigeria.

Methods: A structured questionnaire was interviewer-administered to 60 eligible BCa patients. Also, designed data extraction forms (coded) were used to obtain relevant information from patients' medical folders. Data entry and statistical analyses were done using Statistical Package for Social Sciences version 20.00. An Institutional Ethical Review Committee granted ethical approval for this study.

Results: Most of the study participants were married (93.3%), 50.0% had primary education, the modal age class was 31- 40 years and 63.3% were on cancer chemotherapy. The medications of the patients included tamoxifen; Anthracycline (Doxorubicin or Epirubicin)+Alkylating agent (Cyclophosphamide) +Taxane (Docetaxel or Paclitaxel); and Anthracycline (Doxorubicin or Epirubicin)+Alkylating agent (Cyclophosphamide). Others were analgesics, corticosteroids, antiemetics, ascorbic acid and vitamin B complex. More than half (53.3%) of the study participants experienced one or more of these ADRs such as headache (36.7%), fatigue (33.3%), dizziness (13.6%), nausea (31.7%), vomiting (15%) alopecia (3.3%) and mouth sore (1.7%).

Conclusion: More than half of the study participants experienced ADRs. These ADRs were mostly Central Nervous system associated. This calls for effective and efficient Pharmaceutical care intervention for Bca patients.

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Pharmacy staffs' response to antibiotics request for an upper respiratory tract infection in Vietnam

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Background: Inappropriate sale of antibiotics for upper respiratory tract infections (URTIs) is one of the important drivers of inappropriate antibiotic use.

Purpose: To determine the proportion of antibiotics sold without a prescription to URTI patients and to explore the appropriateness of pharmacy staffs' assessment and patient counselling in Vietnam.

Methods: A standardised patient (SP) study was conducted in the four provinces in Vietnam. A total of 633 visits to 318 selected pharmacies. Each pharmacy was visited twice by a trained actor reporting either a relative with clinical symptoms of a common cold (SBR) or requesting amoxicillin/clavulanic acid 500mg/125mg. Data were analysed using descriptive inferential statistics.

Results: In 88.2% (558/633) of the visits, antibiotics were sold inappropriately. Of these, 92.1% (291/316) were to patients making an SBR and 84.2% (267/317) for PBR. Over half of the pharmacy staff did not ask SPs any clinical assessment questions, 40% asked one or two questions, and only 3% asked three questions during SBR visits. Only 2% of the staff asked assessment questions in PBR visits. The counselling was more frequent in SBR than PBR. Though pharmacies in Northern Vietnam were more likely than Southern to sell antibiotics without a prescription for SBR (A.OR=6.12, 95% CI: 1.32-16.12), it was vice versa in PBR visits (A.OR=0.31, 95% CI: 0.14-0.72). Gender of the actor, population density and interaction time were also associated with antibiotics sales during PBR.

Conclusion: Inappropriate sales of antibiotics remains an important problem in Vietnam. Assessment and counselling qualities are suboptimal. Socio-demographic characteristics seem to influence the staff's decision making during a PBR.

New oral versus common anticoagulants: The future of the pharmacist in medication therapy in Albania

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Background: Anticoagulants known as 'blood thinners' are medications used to prevent blood clots, thrombosis, and ischemic diseases. Their oral form has been the most widely used therapy in medical and outpatient practice for more than 60 years. The limitations associated with this type of therapy are represented by interactions with other drugs and foods, narrow therapeutic intervals and the need for careful monitoring. For these reasons, new oral anticoagulants (NOAC New oral anticoagulants) have been introduced to minimise these concerns for the patient. Many pharmaceutical companies around the world are involved in the development of NOAC. In Europe and throughout the Balkans, including Albania, although some of these drugs have been authorised to be marketed, despite how very little is studied into these.

Purpose: The study aims to understand the role of the pharmacist in medication therapy and the impact of long-term monitoring of patients treated with NOAC medication.

Methods: The study was conducted with 35 doctors of different specialties and 55 pharmacists in three public and one non-public hospital, a health centre in two different regions of Albania through a randomised survey.

Results: The results include different approaches of physicians and pharmacists according to these drugs; there is minimal involvement of the pharmacist in the actual contest, but high expectation for this figure to be a contact point for the monitoring programme of the patient.

Conclusion: The pharmacist can play a crucial role in the good management of the patient on an anticoagulant medication, being a constant and frequent contact in these therapies through consultations and mediator with the doctor.

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Potentially inappropriate prescription of antibiotics in paediatric age in Albania region

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Background: Inappropriate prescriptions are one of the leading causes of errors and the occurrence of side effects in the paediatric population.

Purpose: The purpose of this study is to develop a database to identify inappropriate prescriptions in paediatric patients based on international guidelines and indicators used in European countries to assess these inadequacies in prescribing.

Methods: The current study focuses on the evaluation of antibiotic use in the paediatric population (0-14 years old) using data from a regional hospital at Tirana University Hospital Centre 'Mother Teresa' at the Paediatric Intensive Care and at three health centres in the city of Tirana as well as frequency estimates of PPP (Potentially Inappropriate prescriptions) prescriptions according to international criteria. The study is a retrospective type study where data were collected during the period of time 2018 to 2019.

Results: The data obtained from the files and prescriptions are reflected in a database that summarise the data, classifies them and makes it possible to identify PPPs according to selected POPI criteria. In the health files there was a marked lack of examinations that the doctor did before prescribing an antibiotic as well as precise specification of diagnosis, age or patient age.

Conclusion: This is a shortcoming of the health services in Albania, as there is a lack of electronic patient records where to obtain information on all of its clinical data and history. This study goes a step further than other studies as it takes into account recently developed criteria by applying the POPI and PIPc criteria for paediatric aged individuals, a population that is very poorly studied in this way in the Albania region.

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Community pharmacists' knowledge of and perception towards their role in the management of COPD in China

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Background: Community pharmacists are trusted to play an integral role in the management of chronic obstructive pulmonary disease (COPD). However, little is known about their knowledge of COPD and the perceptions towards their role in COPD management

Purpose: To evaluate community pharmacists' attitudes towards their role related to COPD, assess their COPD-related knowledge, and analyse factors affecting their knowledge.

Methods: A cross-sectional survey study was conducted in three cities (Nanjing, Zhuhai and Qingyang) in China in 2019. *T*-test and one-way ANOVA were used for data analysis.

Results: The survey was completed by 177/796 community pharmacists (response rate 22.2%). The majority (91.0%) of participants were positive about their role in COPD management despite only 73 (41.2%) and 81 (45.8%) reported previous COPD training prior to and during practice respectively. To a list of 12 questions, no one answered all of them correctly, only 34 (19.2%) had correct answers for at least half of the questions, and the number of correct responses varied in different COPD aspects: risk factors (4.0%), disease characteristics (33.3%), symptoms (96.6%), diagnosis (13.0%), awareness of guideline (27.1%), pharmacotherapy (51.9%), non-pharmacotherapy (6.8%) and rehabilitation (87.6%). Higher knowledge score was significantly associated with higher academic education, on-the-job training, and pharmacies selling COPD medications (all $p<0.05$).

Conclusion: Our findings prompt the need to enhance COPD content in the university curriculum and continuing education in COPD management for community pharmacists.

Examination of pharmacist outpatient services in a travel clinic in Japan

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Background: Pharmacists in the field of travel medicine in Western countries contribute to the health care of travellers. However, pharmacists in Japan rarely work in this field at present.

Purpose: To examine the role of pharmacists at a travel clinic in Japan.

Methods: The authors targeted outpatients who booked appointments at Kameda Kyobashi Clinic and consulted before travelling abroad. The study period was from December 2016 to August 2017. The following items were investigated using an electronic health record and interview sheet: age, sex, purpose of travel, region of travel, time until travel from first doctor's consultation, source of travel information, and whether they were taking any drugs. In addition, we evaluated the vaccine matching rate between the plan recommended by the resident pharmacist, based on appointment data (region and date of travel), and the finalised plan after consultation with the doctor.

Results: Sixty patients participated in the study. The median age was 36.0 years, and 41 patients (68.3%) were men. The median time until travel was 4.0 weeks, and 13 patients (21.7%) reported taking a drug regularly. We recommended 26 vaccination plans, and the matching rate was 26.9%. Mismatches were mainly attributed to patients' vaccination history, and their personal preferences.

Conclusion: This study revealed limited sources of information for recommending a vaccination plan prior to a doctor's consultation. Further, Japanese pharmacists must collect data in a manner similar to pharmacists from Western countries, and it is necessary to develop a system that contributes to travel medicines by performing pre-travel consultations

Home medication readiness: Potential threats to community health in China

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Background: Scores of people are prone to store medications for long periods at home. Data regarding home medications are scarce in China. The extent of the knowledge and awareness of medication among Chinese community residents is unknown.

Purpose: To survey the prevalence and the contents of home medications and the knowledge and awareness for medication among Chinese community residents.

Methods: The present study was a cross-sectional study in a suburban community in Beijing during the period of July 2015 to July 2016. Information about home medications was gathered and a survey about the knowledge and awareness of medication was carried. Data were collected by means of a questionnaire.

Results: One hundred and fifty-four (154) subjects completed the survey instrument for a valid response rate of 93.33%; 140

(90.91%) residents had home medications with only 65 (42.21%) of them had disease diagnoses. The main medication classes were medication for cardiovascular diseases (147, 33.79%), for influenza (109, 25.06%), antibiotics (47, 10.80%), and anti-diabetic medications (25, 5.75%). 123 (79.87%) of subjects had basic medication knowledge. But only 23 (14.93%) of subjects had awareness about professional knowledge. 62 (40.26%) of subjects had awareness about medication safety. 41 (26.62%) of subjects knew the correct way to dispose of the expired medications.

Conclusion: Medications were widely used at home among Chinese community residents. A larger number of medications were stored for disease prevention and self-medication. Community residents lack appropriate knowledge and awareness of medications which may expose them to health threats. Sustained efforts are warranted for the future.

Tools to assess the FIP's academic goals of Pharmaceutical Workforce Development Goals: A systematic review

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Background: Pharmaceutical Workforce Development Goals (PWDG) have become an important component of pharmaceutical workforce, practice, and education in the last few years. PWDG comprise three main clusters: academic, professional development, and systems.

Purpose: This review aimed to identify existing tools within pharmacy or other healthcare professions to assess the three academic cluster's goals of PWDG, namely: academic capacity, foundation-training-and-early-career-development, and quality-assurance.

Methods: The following databases were searched from their inception until April 2020: ERIC, PubMed, EMBASE, Scopus, ProQuest, and Google-Scholar. The Crowe Critical Appraisal Tool (CCAT) was used for quality assessment of the included studies. Two reviewers independently assessed eligibility of the studies, and disagreements were resolved by consensus or third reviewer adjudication.

Results: Academic capacity, foundation training and early career development, and quality assurance possess five, three, and four indicators, respectively. Overall, three academic capacity tools (focusing on indicators two and three), followed by four foundation training and early career development (indicators one and three), and three quality assurance (indicators one and four) were identified which were assessing part of the indicators related to each goal. All of the included studies are of a high-quality (scored from 83-98% >75%).

Conclusion: This study is the first study to identify tools available to assess the PWDG's academic goals. The identified tools were focusing mainly on few indicators rather than all indicators in the goal. Therefore, there is a need for the development of objective tools that could assess all of the academic goals of PWDG and their indicators.

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Tele-pharmacy innovations to improve pharmaceutical services

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Background: Iraqi remote and rural sites suffer from a lack of healthcare services, that causes trouble for the elderly, disabled and poor patients at remote sites who need to travel and spend money to get access to healthcare.

Purpose: Pharmacists in Iraq are able to use tele-pharmacy and other useful technologies to provide patient care in remote areas by active communication with patients; besides, technology also facilitates sharing patient health records.

Methods: Employing the specialised pharmacy to connect with three pharmacies in remote areas to perform specialised pharmaceutical services to any pharmacy on the network. This network is done using both software and hardware, including: headsets, webcams, screens, and the specialised pharmacy photobox.

Through a questionnaire, which was done for patients in underserved areas, the author found that many patients suffered from a lack of healthcare services. Another questionnaire in which pharmacists expressed their suggestions also found that that applying tele-pharmacy was recommended by this group to help serve remote areas.

Results: Pharmacists are able to perform traditional pharmacy practice services by tele-pharmacy, such as prescription

verification and patient education in remote or rural sites. This developed the ability of pharmacists to communicate with specific patients by telephone such as geriatrics and patients with chronic diseases that always need pharmaceutical services.

Conclusion: Tele-pharmacy will facilitate interactions between pharmacists and patients in remote areas. Allows them to give drug information to patients and will also facilitate patients access to pharmacists specialising in high blood pressure, diabetes and heart disease. This will also improve the opening of tele-pharmacy services at all time including holidays in remote sites (allowing drug deliveries and audio video chats with pharmacists).

Student advocacy has ripple effects into the future

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Background: Pharmacy professionals and students have the ability to influence change in policies through advocacy. The ability to understand and engage in the policy process is paramount to our ability to successfully advocate for positive changes in the healthcare system.

Purpose: To share the process students used to successfully lead the passage of a bill at the Washington State Legislature to expand interprofessional service and educational opportunities. The law allows any licensed nurse, physician, or pharmacist to supervise students in programmes of nursing, medicine, and pharmacy respectively, while providing healthcare services, so long the services are within the shared scope of practice and some other caveats.

Methods: The authors identified a need for change that had a legislative policy solution. They then built relationships with stakeholders who would be affected by this policy change and sought to understand their perspectives and objections. This was followed by negotiations with stakeholders during the legislative interim to achieve a proposal acceptable to stakeholders. The developed relationships for legislative sponsorship identified key steps in the legislative process for advocacy efforts. The authors then organised student advocacy days and testimony for public hearings on the bill with appropriate and concise messaging.

Results: The opportunity to advocate for change to a policy with meaningful applications for students provided direct exposure to the policy process that can be applied to other issues in the future.

Conclusion: Encouraging engagement at the student level and providing opportunities for students to engage in advocacy can have ripple effects into the future to improve healthcare with the collective voices of those from within the professions.

Impact of teaching policy and advocacy on student understanding and confidence

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Background: For pharmacy professionals, learning to advocate for better healthcare policies is a crucial aspect of professional service and responsibilities. At the Washington State University College of Pharmacy and Pharmaceutical Sciences an elective course focused on politics and advocacy has been in place for seven years. The focus of the course is to teach the legislative and regulatory process and how stakeholders can influence policy.

Purpose: To assess the impact a politics elective course has on students' understanding of the legislative process and their confidence level advocating as stakeholders.

Methods: Students attending a state legislative event were given a survey pre/post the event. The survey assessed whether students were currently or had previously taken the course or if they had never taken the course. Survey questions focused on preparedness to discuss topics with legislators, understanding of the legislative process, belief their opinion is valued, and if the politics elective course influenced their confidence advocating.

Results: Ninety-one percent (91%) of survey respondents either were currently enrolled or had previously taken the elective course. A statistically significant increase was seen pre to post survey in students who agreed or strongly agreed that they were prepared, understood the legislative process, their opinions were valued, and that the course had significantly influenced their confidence in advocating.

Conclusion: The elective course positively influences student growth and understanding of advocacy. Material presented results in students who are confident and believe their opinion is valued. They understand how to navigate the advocacy process and hopefully will remain active members of the pharmacy profession.

What influences change in community pharmacy? A realist review

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Background: Internationally, policymakers recognise community pharmacists' potential to support the health needs of the

population and reduce workload on the health system through better use of their skills.

Purpose: To explain how new community pharmacy services could be successfully implemented through addressing the research question 'what works for whom in what circumstances?'.

Methods: Conducted according to RAMESES standards. Systematic searching of four databases: Medline, EMBASE, Cochrane Library, and Scopus. Snowballing was used to gather more papers using Google searches, reference lists, and similar citations search.

Results: Fifty-two (52) papers were included for the final descriptive synthesis. Most of the studies explored stakeholder perceptions of community pharmacy services (CPSs). Accessibility and convenience were the main reasons behind using CPSs. Meanwhile time pressure and funding were real challenges for the pharmacists. No studies had developed or tested theoretical models to explore how organisational context could affect the implementation of new CPSs. A provisional realist analysis was possible consisting of six mechanisms: Pharmacist Willingness, General Public Trust, Pharmacy Layout, Nature of the Services, Other Healthcare Perceptions, and Funding of the Service. This review offers hypotheses about how these mechanisms might play out differently in different contexts to account for the success or failure of delivering new services in CP.

Conclusion: Further research is required into the organisational and contextual factors that could affect the delivery of CPSs, then to develop and test the theory

Exploring public attitude towards community pharmacy services in Cardiff: A pilot study

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Background: Although there are studies on enhanced roles of community pharmacists in the United Kingdom, little is published about the public's perceptions of current or proposed roles in Wales.

Purpose: To investigate public perspectives on the feasibility of delivering various services through community pharmacy in the future in Wales.

Methods: A cross-sectional questionnaire using interviewer assisted or self-completion online.

Results: Sixty-nine (69) responses were analysed (37 interviewer-assisted, 32 online). Two-thirds of the participants were female (65.2%, n=45), with approximately 67% (n=46) below 35 years old. Most participants 78 % (n=54) had visited community pharmacy at least once within the last six months. However, awareness about current services delivered in community pharmacy varied. Most participants felt that the pharmacist and their team could help with medication-related tasks, such as giving advice or repeat prescriptions. Furthermore, 79.7% (n=55) agreed that health campaigns on social media would help to increase awareness of relevant health issues. People were highly willing to use the proposed pharmacy services, including screening services (81%, n=56), digital health (71% n=49), and services provided by pharmacist independent prescribers (71%, n=49).

Conclusion: From the public perspective, it is most feasible to deliver more screening and independent prescribing services in community pharmacies. There is scope to use digital health to deliver future services and social media to promote healthy living.

Quality improvement framework for cardiovascular disease prevention services by Saudi community pharmacists

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Background: Cardiovascular disease (CVD) is a high burden disease in Saudi Arabia, however, primary care CVD risk prevention services are limited. Globally, there is evidence that community pharmacists can play a key role in CVD prevention. However, the perspectives of decision makers is critical to successful translation of evidence into local practice.

Purpose: To engage decision makers in discussions about implementing high quality CVD risk prevention services in community pharmacies.

Methods: Qualitative semi-structured interviews were conducted, audio-recorded and transcribed verbatim. All transcripts were thematically analysed.

Results: A total of 23 participants (87% male) from government and private sectors were interviewed. Alongside acknowledging the limited provision of CVD risks preventative services in primary care, most participants favoured the concept of utilising community pharmacist's capacity to assist in such services, with the data yielding three broad themes around the notion of

pharmacy service provision, which included: 1) Structure, 2) Processes and 3) Outcomes. Sub-themes included curriculum reform, health system reforms, health workforce development, professional services reconfiguration, professional socialisation and need for demonstrable clinical and cost effectiveness. Professional readiness, economic viability and stakeholder acceptance were considered essential to the successful services implementation.

Conclusion: Most participants favoured pharmacy-based CVD risk prevention services. However, prior to developing such services, support structures at the health system and health professional level are needed as well as building public support and acceptability for pharmacy services.

Primary care pharmacists and the management of chronic illness in young people: A qualitative study

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Background: Recent evidence has shown that the incidence of long-term illnesses in young people is increasing (Shah, Hagell, & Cheung, 2019). Pharmacists, as medicine experts, are in a unique position to promote young people's health.

Purpose: The aim of this study was to explore the role of primary care pharmacists in the management of chronic illnesses in young people aged 18-24 years.

Methods: A qualitative study was undertaken. 21 primary care pharmacists in the United Kingdom were recruited through purposeful sampling. Semi-structured interviews were conducted, and audio recorded, transcribed verbatim and analysed using thematic analysis. The main focus was on primary care pharmacists' roles in caring for young people with chronic illnesses. Pharmacists' perceptions about young people's medication-related experiences, and views on pharmaceutical care services provided to young people and suggestions for improvement were also explored.

Results: Participants identified several roles for primary care pharmacists in caring for young people with chronic illnesses. These roles included following the safe guiding protocols, encouraging young people to visit the pharmacy to collect their medicines and ensuring that they have enough medicines supply, counselling and educating young people about their medicines and answering their queries, building trusted relationships directly with them, provision of specialist services, following up with young people and checking on medication compliance, and signposting them for further support.

Conclusion: Primary care pharmacists feel that they have an important role in supporting young people with chronic illness. This study identified many ways in which pharmacists provide services and support to young people.

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Risk of re-feeding syndrome in malnourished patients that initiate total parenteral nutrition

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Background: Re-feeding syndrome (RFS) is a metabolic condition that occur after the reintroduction of complete nutritional therapy, in an excessive and improper amount, in malnourished patients.

Purpose: To evaluate the malnourished patients at risk of developing RFS and with how many energy requirements they had initiated.

Methods: An observational, retrospective study was carried out in a third level hospital from September 2018 to September 2019. Demographic variables: age and sex. The analytical variables of malnutrition at the beginning of total parenteral nutrition (TPN) and subsequent RFS were, respectively: prealbumin (<10mg/dL) and phosphorus (<2.3mg/dL on day 7 after the beginning). Theoretical nutritional requirements were calculated using the Mifflin formula and compared with the initial kilocalories (Kcal) received. Data were collected from the electronic health records and the electronic prescription records.

Results: One hundred (100) patients were included, 66 were men. The median age was 69 years (range 21-93). 36 patients presented malnutrition at the beginning of TPN (defined as prealbumin < 10mg/dL) of which 4 had low phosphorus levels on day 7 (11%). Median starting Kcal of undernourished patients was 1565 Kcal (97.71% of the theoretical nutritional requirements, 1598 Kcal).

Conclusion: The prevalence of malnutrition at the beginning of TPN was 36% of patients of whom 11% were at risk of developing RFS because of starting TPN with practically all requirements. To prevent RFS is critical to identify malnourished patients and gradually increase TPN intake.

Pharmacogenetics in pharmacy practice: Collaboration between community and hospital pharmacists

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Background: Clopidogrel is a CYP2C19-activated pro-drug, used to prevent cardiovascular events. Up to 27% of Caucasians has at least one CYP2C19*2 allele (impaired enzymatic activity), whereas 38% have at least one CYP2C19*17 allele (higher enzymatic activity). However, CYP2C19 pharmacogenetic analysis before prescribing clopidogrel is not widely implemented in clinical practice.

Purpose: To evaluate feasibility and operability of a collaborative pilot circuit to determine pharmacogenetic markers to optimise clopidogrel prescription.

Methods: The authors expect 150 patients with a clopidogrel prescription by a cardiologist of Hospital de Sant Pau to enrol. They can enrol when filling their prescriptions in one of the 24 collaborating community pharmacies in the Hospital's area. Community pharmacists collect from each participant's pharmacotherapeutic profile and a saliva sample to be sent to the hospital for CYP2C19 genotyping. Hospital pharmacists collate all obtained data with their clinical records. Data are analysed jointly with a cardiologist to assess clopidogrel prescription adequacy. Barcelona Pharmacists' Association (COFB) coordinates the whole project and provides IT and logistic support.

Results: This project started in January 2020 and it was temporarily suspended due to the COVID19 pandemic. On 13th March 2020, 114 patients with clopidogrel prescriptions were registered, 21 met the inclusion criteria and 15 were enrolled. Five out of the eight already genotyped patients were intermediate or poor metabolisers.

Conclusion: This circuit seems to be feasible, but further research is needed once the study is resumed. Pharmacogenetics increasing clinical relevance needs more clinical implication of pharmacists.

Medicines as a hidden source of free sugars

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Background: An unhealthy diet is a risk factor for non-communicable diseases (NCDs). Since high intake of free sugars from foods/drinks is related to low nutritional value, it is important to assess if medicines could be also a potential source, considering the recommendation of reducing the intake of free sugars to <10% of total energy intake and ideally <5% for additional health benefits.

Purpose: To estimate the maximum energy contribution from free sugars of orally administered medicines in Spain, according to their daily doses.

Methods: We conducted a search about all medicines authorised in Spain that declared a presence of glucose, fructose or sucrose. The amount of sugar and maximum daily dose were obtained from the summary of product characteristics (AEMPS-CIMA) or by contacting the manufacturer.

Results: A total of 2,086 medicines were analysed, of which 1,945 had information on free sugar content. On average, the potential daily contribution of free sugars as glucose, fructose or sucrose per medication is 19.4 kcal, equivalent to 1% of the total energy intake for a healthy person who consumes about 2,000 kcal/day.

However, 68 medications exceed the recommended 5% of energy intake from free sugars, reaching a potential of 2,400 kcal/day in the case of a sucrose-containing medicine (120% of total energy). 37% of that medicines are used for respiratory system pathologies and 72% of them could be dispensed without prescription.

Conclusion: Patients and healthcare professionals must be aware that some oral medicines may be an important source of free sugars. Care must be taken especially in people with NCDs associated with a positive energy balance and diabetes.

Gluten-containing excipients in prescribed drugs: are celiac patients at risk?

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Background: Celiac patients must maintain a strict gluten-free diet to reduce symptoms and improve their quality of life. However, not only self-medication but also medications prescribed to treat acute, chronic conditions or even those derived from their underlying pathology could be a source of unintentional gluten intake, due to possible presence of wheat starch (containing gluten) used as an excipient.

Purpose: To estimate the prevalence of medication prescribed to celiac patients in Spain that may contain gluten in their excipients and to be aware of this potential source exposure.

Methods: Medications prescribed to celiac patients between January 2013 to December 2018 were collected from a national prescription database. The gluten content was analysed with the Nomenclator for prescription of the Medicine Online Information Centre of Spanish Agency of Medicines and Medical Devices (CIMA-AEMPS).

Results: On average, 19,458 (10.2%) out of 190,983 medicines prescribed to celiac patients had excipients that may contain gluten, during the course of the five year study. The highest rates were observed in 2016 and 2017, both with 14%. Fifty percent (50%) of prescriptions were issued for patients under 40. Fifteen oral medicines with excipients that may contain gluten were identified, of which 13,241 medication belong to the ATC code A: alimentary tract and metabolism (68.0%), being sodium carboxymethyl starch the most frequently declared excipient (75.7%).

Conclusion: The percentage of potential gluten-containing medicines prescribed to celiac patients in Spain is not negligible. Given that this disease is commonly underreported these results could show just the tip of the iceberg.

Analysis of the care consumption of Belgian children taking asthma medications

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Background: Asthma is a multifactorial disease often associated with higher health care utilisation such as higher drug consumption or more frequent hospitalisations.

Purpose: The purpose was to analyse the consumption of asthma medications in children (2-18 years) in order to investigate the association with healthcare consumption.

Methods: A retrospective study using anonymised administrative data for 2013 to 2018 from the third Belgian health insurer, Mutualités Libres, was conducted. The authors identified two groups of suspected asthma cases based on asthma drugs deliveries: 1) at least one asthmatic drug dispensation; and 2) at least 2 asthmatic drugs dispensations with at least 30 days between two purchases (more severe clinical picture). Health care consumption was analysed by the use of allergy medication or antibiotics, emergency rooms visits and overnight hospitalisations.

Results: 67.5%(1) to 75.6%(2) of preschool-children who received asthma medications also received allergy medications against 34.8% for children without asthma medications. The same trend was observed for antibiotics: children with asthma medications were about twice as likely to receive antibiotics. Regarding hospital visits, children who have received asthma medications were more likely to end up in the emergency room (34.8%(1) to 38.8%(2)) than those who have not (23.0%), and this is especially true in preschool-children. Furthermore, children who have been prescribed at least one asthma medication were twice as likely to be hospitalised.

Conclusion: Further studies are needed to understand the reasons for this increased use of healthcare, which could be related, for example, to medication adherence problems

Real-world effectiveness and safety of ixekizumab in patients with psoriasis

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Background: Ixekizumab is a recently approved interleukin 17A inhibitor indicated for the treatment of patients with plaque psoriasis and psoriatic arthritis.

Purpose: To assess effectiveness and safety of ixekizumab in patients with psoriasis.

Methods: Retrospective, observational study performed in a third-level hospital. Patients with psoriasis starting treatment with ixekizumab between July 2017 to December 2019 were included. Demographic, clinical and treatment variables were collected at baseline. Efficacy and safety were assessed based on the Psoriasis Area and Severity Index (PASI), Body Surface Area (BSA), and pre and post treatment analytics. Data were obtained from medical records (Diraya) and electronic prescription (Prisma) applications.

Results: Seventeen (17) patients included, mean age 42±11 years, of whom 76% were men. All patients had moderate to severe psoriasis. 88% had received prior non-biological systemic treatment and 71% had failed to prior biologics

Patients were assessed according to PASI or to BSA, baseline average was 7.2 and 15.3 respectively. Treatment's average duration was 56 weeks. eight patients achieved a PASI75 and six of them reached PASI90. Two patients reached BSA0 and one attained BSA1. 35% of patients achieved completely clear skin and 59% attained almost clear skin. Five patients had no response data available during the study period. Regarding safety, three patients experienced injection site reaction and one suffered a UTI.

Conclusion: Ixekizumab shows high efficacy, achieving almost clear skin in more than 50% of patients, both in naive patients and in those who failed prior biologics. Ixekizumab is well tolerated, with a good safety profile and without discontinuations due to adverse effects

Effectiveness and safety of nab-paclitaxel in metastatic breast cancer

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Background: Trial results might have limited external validity in daily practice so real-life studies are commonly performed to confirm the results.

Purpose: To analyse nab-paclitaxel effectiveness and safety.

Methods: A retrospective observational study from 2014-2019. Data collected: age, number of cycles, duration of treatment, progression-free survival (PFS), number and type of previous chemotherapy regimens, adverse events (AE), dose reductions and delays between cycles. Data obtained from the health records and chemotherapý s software.

Results: Thirty-five (35) patients were included, median age of 57 years. The median duration of the treatment was 2.9 months (five cycles). Patients had a median of one previous chemotherapy line in metastatic stage (range 0-4). Ninety-four percent (94%) of the patients received nab-paclitaxel as metastatic therapy in the second line or later. Most common regimens used before nab-paclitaxel were: paclitaxel+ bevacizumab 31%, non-pegylated liposomal doxorubicin 25.7%, epirubicin+docetaxel 20%, vinorelbine 14%, paclitaxel 11%, docetaxel 11%, eribulin 11%, pegylated liposomal doxorubicin 8.6%, and cisplatin+gemcitabine 5.7%. Median PFS was 3.4 months; 62.8% of the patients had any AE during treatment. Most frequents were: neuropathy 59%, asthenia 54.5%, sickness 36.0%, alopecia 27%, mucositis 18%, constipation 18%, diarrhoea 9.0% and anorexia 9%. One patient interrupted the treatment due to AE. There were two delays and six dose reductions due to toxicity.

Conclusion: Nab-paclitaxel median PFS was lower than the PFS obtained in phase III trial. It could be explained because the patients received previous regimens of chemotherapy with taxanes for metastatic disease and our sample size was smaller. Nab-paclitaxel was well tolerated

Secukinumab for the treatment of plaque psoriasis and psoriatic arthritis

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Background: Secukinumab is authorised for the treatment of moderate-to-severe plaque psoriasis (PP) and psoriatic arthritis (PA).

Purpose: To assess the effectiveness and safety of secukinumab in adults with moderate-to-severe PP or PA.

Methods: An observational transversal study was carried out in 2019, which included patients treated with secukinumab for moderate-to-severe PP or PA. Data collected: sex, age, indication, treatment regimen, previous treatment and reason for discontinuation, Psoriasis Area and Severity Index (PASI) and adverse events (AE). Effectiveness endpoint was PASI75 at 12 weeks.

Results: Forty (40) patients (62.5% men), median age of 46 years; 57.5% were treated for PA and 42.5% for PP. The treatment regimen consisted of secukinumab 300 mg for PA 78% and PP 100%, or secukinumab 150 mg for PA 21.7%. The frequency of administration was monthly 95% for maintenance therapy except in two cases of dose optimization in PA. Secukinumab was first 20%, second 35%, or subsequent biologic treatment line 45%. Previous treatments were adalimumab 52%, etanercept 45%, ustekinumab 22.5%, infliximab 17.5%, golimumab 10% and certolizumab 5%. Discontinuations of previous treatments were due to lack of efficacy 95% or AE 5%. PASI could be evaluated in 14 patients. At week 12, the median PASI value was six for PA and five for PP. Seven patients achieved PASI75, two with PA and five with PP. No AE were reported.

Conclusion: According to PASI75 at 12 weeks, secukinumab was an effective treatment in approximately half of the patients evaluated. Our data showed a PASI improvement worse than clinical trials that could be due to most patients presented prior biologic treatment failure. Secukinumab was well-tolerated.

Six Sigma as a modern medical method of managing healthcare systems

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Background: Throughout history, healthcare systems have always had difficulties in achieving optimal and cost management.

Purpose: The goal is to give patients the best possible evidence based medical treatment which in modern medicine includes individualised modalities of treatment.

Methods: In recent centuries, as medicine has reached new horizons, big improvements have been made in management theory and application. Management thought has transformed organisational structures of many different organisations.

Results: The initial approach from Webber's administrative management in which there are rigid organisations with vertical information flow was altered to mixed decentralised organisation with small but efficient processes. Rigid organisational structures have failed to follow medical improvement in individual drug patient treatment and implementation of newest medical technology with cost efficiency. Six Sigma is based on business process analysis and removing or remodelling individual processes defect. A defect is defined as a factor that leads to patient dissatisfaction. The goal of Six Sigma is three to four defects per million. An example of Six Sigma implementation would be implementation of efficient enterprise resource management programmes in hospital pharmacies; This is a computerised system that promotes faster communication with suppliers and tracks drug supplies in pharmacy. This way there is improvement in business process by removing defect of running out of drugs or oversupply.

Conclusion: Modern management methods are becoming more utilised in medical institutions. Utilisation of these theories which gave positive results in other industries provides more value to patient health as well as employee satisfaction.

Effect of pharmacists' medication reconciliation and counselling in ambulatory dialysis patients

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Background: Management of patients with kidney diseases poses many challenges to health practitioners because they often have existing co-morbidities and are taking multiple medications which predisposes them to a higher risk of adverse events (Patricia, & Foote, 2016). Pharmacists, through medication reconciliation and patient counselling, are in the best position to improve the level of care and health related quality of life of kidney disease patients (Thomas *et al*., 2009).

Purpose: It is the interest of this study to explore pharmacists' potential interventions in the management of out-patient dialysis patients through medication reconciliation and counselling.

Methods: This study is a randomised quasi-experimental non-equivalent (pre-test and post-test) control group design exploring the effects of patient counselling and medication reconciliation among CKD patients undergoing dialysis.

Results: Results showed that there were 108 identified errors identified through medication reconciliation. Majority of these Level 0/No Harm errors were due to unspecified dosage form. There appears to be a significant change in the dialysis patients' quality of life after pharmacist's patient counselling. This indicates that patient counselling may help improve kidney patients' quality of life. There appears to be a significant change in the dialysis patients' quality of life after pharmacist's patient counselling and medication reconciliation as shown by higher scores in the post test.

Conclusion: The results of the study showed that patient counselling and pharmacists' interventions through medication counselling offered benefits to kidney patients undergoing dialysis in terms of improvement of their health-related quality of life.

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Developing pharmacy assistants' role in medication checking

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Background: Medication safety is a patient care priority worldwide. In Australian hospitals, patients' medications are predominantly checked by pharmacists, a labour and time intensive process. Expanding the scope of pharmacy assistants' roles to include medication checking may address this challenge. While this approach has shown benefits, implementation in Australia is limited and no formalised training is available to Australian-qualified assistants.

Purpose: This study aimed to explore barriers and facilitators to developing pharmacy assistants' capabilities to accuracy-check inpatient medications at an Australian tertiary hospital.

Methods: This qualitative descriptive study involved semi-structured interviews with pharmacists and pharmacy assistants using purposive sampling. Interview guides based on the Theoretical Domains Framework (TDF) were used to collect data. The interviews were audio recorded, transcribed verbatim, and framework analysis conducted.

Results: A total of 22 interviews were conducted with pharmacy assistants (n=10) and pharmacists (n=12). Several key themes and sub-themes relating to barriers and facilitators to developing pharmacy assistants' capabilities for medication accuracy checking emerged. Barriers included negative peer influence and limited personnel resources, whilst enablers included career goals/motivation and improved workflow.

Conclusion: This study identified perceived barriers and facilitators to developing pharmacy assistants' capabilities in conducting medication accuracy checking in an Australian hospital context. To bring about a successful change in practice, barriers must be addressed, and facilitators should be promoted, so the assistant workforce is able to upskill.

The role of pharmacist in therapy optimisation among patients after myocardial infarction–a preliminary study

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Background: Myocardial infarction (MI) is one of the leading causes of mortality in Europe. To reduce the risk of cardiovascular complications, the guidelines on management in acute coronary syndrome recommend poly-pharmacotherapy. Patients with MI often suffer from concomitant diseases that also require treatment. The use of multiple drugs increases the risk of drug-related problems (DRPs).

Purpose: This project aimed to identify and resolve DRPs in MI patients, as well as to support their therapy by informing patients about medications taken, correct principles of pressure measurement and, in case of smokers, smoking cessation.

Methods: The research was performed among Polish patients included in Managed Care after Myocardial Infarction programme. For DRPs identification, pharmacist-led medication use reviews were conducted five weeks after MI. Number and type of DRPs were assessed according to PCNE classification, version 8.03. Every patient was given written recommendations concerning adherence and health-related issues.

Results: The study recruited 20 MI patients. The most common comorbidities were hypertension (60%), hyperlipidemia (50%), heart failure (40%) and diabetes (20%); 30% of patients were addicted to nicotine. Each individual was taking on average eight medications (range of 5-10). A total of 18 DRPs were identified in 13 (65%) patients. The most common DRPs (67%) were related to treatment safety: the use of an inappropriate drug or inappropriate combination of drugs.

Conclusion: Comprehensive therapy needs cooperation among healthcare professionals. Pharmacists, with their knowledge and skills, can provide significant support for therapy optimisation in MI patients.

Characterisation of professional pharmacy association resources and recommendations on COVID-19 pandemic

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Background: As one of the most accessible healthcare workers, pharmacists are at the frontlines during emergencies such as the COVID-19 pandemic. Professional pharmacy associations provide resources and recommendations for pharmacists on COVID-19. Yet, the extent and repository of resources are currently not categorised.

Purpose: To identify COVID-19 resources for pharmacists provided by associations in the United States of America and the International Pharmaceutical Federation (FIP) and characterise these resources to better serve pharmacists' needs to combat the pandemic.

Methods: A review of 17 pharmacy association websites was conducted to identify available resources. Search terms included 'resource, policy and recommendation'. Specific criteria were applied to categorise results in six areas. Descriptive statistics were used for data analysis.

Results: Of the 16 US pharmacy associations and the FIP websites, 94% provided COVID-19 resources, 53% developed policies, and 94% had specific recommendations. Those were characterised into 6 types of recommendations, including 94% on general recommendations, 65% on education/training, 53% on supply chain management/drug shortages, 47% on guidelines/protocols, 71% on scope of practice, and 24% on the emergence of tele-health.

Conclusion: Whilst the majority of associations provide COVID-19 related resources on general recommendations, scope of practice, and education/training, there are opportunities for more specific areas on guidelines/protocols and telehealth. With the dynamic nature of COVID-19, it is important for pharmacists to stay updated to provide optimal care for diverse patients and populations while combating the current pandemic and beyond.

Attitudes of Estonian pharmacists towards pharmacy-based vaccination

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Background: Estonia is experiencing a decline in overall vaccination rates and Estonia has one of the lowest vaccination rates in Europe for seasonal influenza. In 2018, a pilot project for pharmacy-based flu vaccination took place and the public received it very well. Many of the patients indicated they would accept pharmacists as vaccinators, in addition to nurses or other health-care professionals.

Purpose: To find out the attitudes of Estonian pharmacists towards pharmacy-based vaccination and themselves as vaccinators and pharmacies as place to administer vaccines.

Methods: An online survey was carried out amongst currently working community pharmacists after the vaccination pilot project. The questionnaire consisted of 25 questions and was anonymous. Altogether 313 pharmacists from four pharmacy chains took part of the survey. For data analysis descriptive statistics with Microsoft Excel was performed.

Results: Although pharmacists find pharmacy a suitable place to vaccinate, most of them are not willing to vaccinate by themselves. After proper training, 30% of participants are already willing to vaccinate people. The biggest concerns were lack of private counselling rooms, lack of counselling knowledge about vaccines, unwillingness to touch patients and fear of administering vaccines due to syringes and possibility of anaphylactic shock.

Conclusion: Pharmacies are most accessible primary health-care institutions and therefore hold a significant role in informing public about the importance of vaccination. Training programmes should be implemented during studies and as further training for working professionals to use pharmacists as

Systemic solutions for addressing non-communicable diseases (NCDs) in low and middle-income countries (LMICs)

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Background: NCDs have been on the rise in LMICs representing a significant healthcare concern. The need for inter-sectoral partnerships between all sectors is key element in addressing the rising burden of NCDs in these countries.

Purpose: To address challenges in emerging nations, actors from across the health sector in LMICs formed a think-tank to examine issues and offer potential opportunities that may address the rising burden of NCDs in these countries.

Methods: An Expert Forum on NCDs in LMICs was convened in Dubai September 2019: From the 15 experts, one Community Pharmacist and member of FIP NCDs working group was representing the community pharmacists as front line primary health care providers. Each delegate presented the patient journey in the context of his/her respective region and put his expertise to analyse current situation and find solutions.

Results: The experts identified five challenges and seven solutions for NCD burdens.

The main challenges were limited implementation of Universal Health Coverage, need for inter-sectoral partnership, gaps in the implementation of regulations, in systemic data collection and longitudinal surveillance data. The main solutions were: screening and risk assessment, optimised education for all sectors; access to treatment, better use of human resources; and greater utilisation of technology. Community pharmacists already embrace several of these solutions but remain under-utilised as health care professionals with broad capability

Conclusion: A multi-sectoral approach with novel accountable alliances involving both public and private sectors, including community pharmacists, is needed to ensure that the essential resources for NCD care are evenly distributed and accessible to all.

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Acceptance of CMM intervention in a nursing home

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Background: Comprehensive Medication Management Services (CMM) are clinical services based on pharmaceutical care. It is a patient-centred approach in which pharmacists take responsibility for the patient's needs.

Purpose: To determine the prevalence of drug therapy problems and identify their type. Secondary aim: To describe the interventions proposed to a general practitioner and identify the proportion of accepted interventions.

Methods: An interventional study was conducted during a 17-month period in a nursing home. DTPs were classified according

to an evaluation of the indication, effectiveness, safety, and convenience of each medication the patient was taking.

Results: Sixty (60) residents were included in the study. Median age was 79.9 (56.1 – 96.7) years. On average, residents used seven (2-16) medications and had five (1-10) comorbidities. The total number of 146 DTPs were identified (4.3 ± 1.9 per resident). The most prevalent DTP was ''Needs additional drug therapy'' (N=74; 23.9%), falling into effectiveness category. Pharmacists involved in the study suggested a total of 133 modifications to the mentioned DTPs. Pharmacist suggested six intervention. Physicians accepted a total number of 112 interventions.

Conclusion: The high prevalence of DTPs identified among elderly institutionalised patients strongly suggests the need to incorporate CMM services within the already existing institutional care facilities to improve the care provided to nursing home residents. High acceptance of such suggestions by the physicians proves that pharmacists are an essential part of the health system

Exploring ethical pharmacy practice in Jordan

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Background: Contemporary pharmacy practice is patient-centred practice, which implies a closer participation in patient's needs and wellbeing. As a result, pharmacists have more diverse decisions to make on handling different situations, ranging from simple matters to major ethical dilemmas. There is a paucity of research conducted in the area of pharmacy ethics in Jordan.

Purpose: This study aimed to explore the manner in which ethical dilemmas can be handled by Jordanian pharmacists, the resources used and their attitudes towards them.

Methods: Semi-structured interviews were carried out, using four pre-set scenarios, each based on ethical principles of pharmacy practice. The transcribed interviews were thematically analysed for emerging themes.

Results: Interviews were conducted with 30 registered pharmacists in Jordan. Four major themes were identified: Legal Practice; Familiarity with the Code of Ethics; Personal and Religious Values; and Professionalism. Findings showed that ethical decision-making in pharmacy practice in Jordan was decisively influenced by pharmacists' personal moral values and legal requirements; and managed by exercising common sense and experience. This pointed to large gaps in Jordanian pharmacists' understanding and application of basic principles of pharmacy ethics.

Conclusion: This study highlighted that paternalism, personal values and legal obligations are the major drivers influencing decision making processes of Jordanian pharmacists and a concerning trend of lack of respect for patient autonomy, which is a major gap in the ethical reasoning of Jordanian pharmacists. This illuminated the need for increased literacy in professional ethics of Jordanian pharmacists'. anaphylactic shock.

EXXITO - Children, youth and community pharmacy

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Background: The General Pharmaceutical Council of Spain, with the collaboration of Cinfa Laboratories, has been promoting annual training and practical actions for the development of Professional Pharmacy Services (SPFA) since 2014.

Purpose: This action aimed to update the knowledge of community pharmacists in addressing health problems whose prevalence is increasing among the child and youth population: Attention-Deficit/Hyperactivity Disorder (ADHD), addiction to new technologies, food intolerances and allergies, and eating disorders.

Methods: The action was developed between January and June 2019 using the CGCOF training platform with four theoretical modules, four interactive clinical cases, materials for parents and other complementary materials (audio book, website of interest, etc.). On a voluntary basis, the community pharmacists could register six real cases of the Medicines Dispensing Service indicated for the treatment of ADHD, thus leaving a record of their professional performance.

Results: Two thousand, eight hundred and nineteen (2,819) registered CPs from all over Spain; 1,061 CPs completed the action; 354 actual cases registered (65.5% women, 34.5% men)

-Main health problems: ADHD (50.3%), insomnia (5.0%), attention deficit (4.4%)

-Active treatments: methylphenidate (24.6%), atomoxetine (9.8%) and lisdexamfetamine (2.5%)

-Medicines to be dispensed: methylphenidate (36.0%), atomoxetine (9.6%)

-Professional performance: dispensing with health education (52.0%), dispensing with personalized information on the medicine (32.0%).

Conclusion: The CP provides different SPFA, such as medicines and health products dispensing, protocolised by AF-FC Forum[1], to respond to new needs in the child and youth population in

regard not only to medicines but also to other health-related aspects.

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Applying the WHO SAGE Working Group Survey to Pneumococcal Vaccination Hesitancy in High-Risk Adults

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Background: Significant attention has been paid to vaccine hesitancy in paediatric and adolescent populations, with several frameworks developed to interpret vaccine-seeking behaviours. However, frameworks established in younger populations may be applicable to adult vaccine hesitancy but have yet to be fully tested.

Purpose: To test the model fit of the WHO SAGE Working Group Survey on constructs associated with vaccine hesitancy in adults.

Methods: This was a cross-sectional survey of adults (18-64 years old) residing in select Tennessee cities and diagnosed with a condition placing them at high-risk for an invasive pneumococcal disease according to the US Centre for Disease Control and Prevention. The survey instrument used items suggested by the WHO SAGE Working Group on Vaccine Hesitancy, adapted for use in adults. Inferential statistics compared responses by hesitancy status, and exploratory factor analysis fit scaled responses to the Three C model of vaccine hesitancy.

Results: Vaccine hesitancy was identified in 31.9% of respondents (total N=1002), 27.2% of which were specifically resistant to the pneumococcal vaccine. Factor analysis resulted in a ten-item structure with most items mapping to 'complacency' and those remaining mapping to 'confidence'. Comparisons between hesitancy status indicated that 'convenience' factors, including clinic hours, wait times, and vaccine costs, were more likely to be barriers to vaccination among those indicating historical hesitancy (all $p<0.01$).

Conclusion: The WHO SAGE Working Group Survey may be an effective tool for predicting vaccine hesitancy in adults, but further application in other vaccinations recommended in adults is needed.

Association of gestational diabetes with age and its risk factors: A cross-sectional study in Pakistan

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Background: Gestational diabetes is one of the most prevalent pregnancy complications among women in Pakistan, linked with numerous destructive health effects for both mother and progeny.

Purpose: This study was conducted to systematically review the evidences gathered on gestational diabetes linked with several factors like co-morbid diseases, family history, etc. The authors also observed whether the recommended treatment protocol was in accordance to the guideline suggested by American Diabetes association and whether there were any pharmacists specialised in diabetes who dealt with them and counselled them.

Methods: The authors analysed data from 1000 pregnant Pakistani women who were aged between 16-45 years old, GDM outcomes were compared by age and different other factors of pregnant women by applying cross – sectional study using SPSS. This survey was conducted in different maternity hospitals in Karachi, Pakistan.

Results: According to this survey gestational diabetes mellitus risk is higher in women who were greater than 30 years old because of it they were more prone towards maternal obesity as compare to those aged between 16 to 30 years old, and the p-value was found to be 0.0001 in diabetes mellitus associated with all risk factors and we also observed that lack of pharmacist in maternity hospitals only approximately 10% of mothers interacted with pharmacists regarding their counselling.

Conclusion: The antenatal survey results showed that Gestational diabetes mellitus rate was higher in older pregnant women due to issues with being overweight and they are more insulin resistant as compared to younger women and they should maintain their health and also attended regular paternal check-ups and maintain their diet because due to GDM women face complication during delivery.

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Chinese expert consensus of the prescription audit for anti-tumor drugs - lung cancer

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Background: Primary lung cancer is the most malignant tumour with the highest incidence and highest mortality in China. MDT (Multidisciplinary Team), as well as individualised treatments, are normally used for most cases. However, with whichever treatment is adopted the use of drug is indispensable

Purpose: To standardise the drug therapy for tumours, to further improve the prognosis of lung cancer patients, with the purpose of providing a reference to review the prescriptions of lung cancer patients for oncology pharmacists

Methods: The 'Six steps method' was raised for the first time by consensus in the process of reviewing the prescription of anti-tumour drugs, that is, legitimacy review, patient assessment review, scheme review, organ function and laboratory index review, pre-treatment review and non-prescription audit. This consensus refers to the guidelines home and abroad and the drug instructions, focusing on the detailed description of the audit points of patient basic information evaluation audit, scheme audit organ function and laboratory index audit, pre-treatment audit of the drug therapy scheme of lung cancer.

Results: There are totally five frequently-used chemotherapy schemes, ten targeted drugs, two immunotherapy schemes of NSCLC (non-small cell lung cancer) and two chemotherapy schemes of SCLC (small cell lung cancer) involved in the consensus.

Conclusion: To the oncology pharmacists, the consensus plays a positive role in guiding the prescription audit work in China.

A user-driven teaching programme delivered by community pharmacy for relatives to achieve medication safety

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Background: Older people with chronic conditions often depend on support from relatives to manage their daily medication. It is perceived as an enormous responsibility for relatives to carry out alone.

Purpose: To develop and evaluate a user-driven teaching programme delivered by community pharmacy to groups of relatives who manage the daily medication for persons ±65 years using ±5 drugs.

Methods: Six relatives and four community pharmacists in Denmark participated in developing the teaching programme to groups of relatives (n=10-12) comprising four sessions lasting two hours each. Topics: 1) Introduction; 2) Use of medication; 3) Same medicine – different names; 4) Local support.

The programme was tested at five community pharmacies in Denmark. Relatives and community pharmacy staff evaluated the programme quantitatively and qualitatively through surveys and focus group interviews.

Results: One pharmacist and one pharmacy technician from five community pharmacies delivered the teaching programme for three months to a total of 29 relatives. The relatives were very satisfied with the user-driven teaching style and programme and grateful for the opportunity to talk to other relatives being in the same situation. The relatives gained new knowledge about how the community pharmacy could be a support in the future. Teaching materials supported the pharmacy staff in delivering the user-driven programme.

Conclusion: Pharmacy staff can develop and deliver a user-driven teaching programme for relatives which reflect their challenges and needs to achieve medication safety. The pharmacy staff obtained new insight into relatives' specific needs for knowledge and advice which can be used for other relatives at the pharmacy.

Improving prescriber adherence to commissioning criteria when prescribing high-cost SACT in lung cancer

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Background: In the United Kingdom, funding of high-cost systemic anti-cancer treatments (SACT) falling outside the standard payment-by-results reimbursement system is managed and approved using a web-based system (Blueteq). Absence of relevant funding prior to SACT administration may have considerable cost implications and/or result in treatment delays.

Purpose: To analyse the percentage of patients lacking relevant funding prior to SACT administration and the impact of pharmacy-led changes in the rate of funding requests and prescribers with active Blueteq access in a tertiary care teaching institution.

Methods: Two PDSA cycles were conducted.

PDSA 1: pharmacist-led lung MDT education session;

PDSA 2: weekly highlighting of outstanding funding requests prior to clinic by the responsible pharmacist. Efficacy measures: (a) percentage of non-approved funding requests pre-SACT, and (b) percentage of prescribers with Blueteq active accounts.

Results: (a) baseline = 29.75%, post-PDSA 1 = 15.75%, post-PDSA 2 = 5.42%; (b) baseline = 40% (2/5), post-PDSA 2 = 71% (5/7).

Conclusion: Results post-PDSA cycles showed a continued downward shift below baseline median in the percentage of patients lacking funding pre-SACT until the end of the observations. This runs parallel to an increase in the number of prescribers with active Blueteq accounts. This project led to an improvement in the adherence to high-cost drugs prescribing criteria and highlights the key role of the clinic pharmacist in successfully influencing prescribing habits, preventing treatment delays, and ultimately affecting the efficacy of SACT.

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Use of total parenteral nutrition in a university hospital

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Background: Parenteral nutrition is a high-alert medication available for patient care within a complex clinical process. An appropriate use of this complex therapy maximises clinical benefit while minimising the potential risk of adverse events, therefore it must be supervised by a nutrition support team.

Purpose: To describe the use of total parenteral nutrition (TPN) in a university hospital.

Methods: An observational and retrospective study including patients who received TPN in a year period (2019) was performed. Intensive care unit (ICU) patients were excluded. Data were collected from the medical history records including: Age, sex, fasting times before TPN, TPN prescribing service, supervision by the nutritional support team, pharmaceutical intervention, indication and duration of TPN. Guidelines from American Society for Parenteral and Enteral Nutrition (ASPEN) were consulted.

Results: A total of 171 patients received TPN; 106 (60%) male. Mean age was 64±15 years. Mean fasting times before TPN was 2.5 days (0-8). The TPN regimen was prescribed by the nutrition team in 52% of patients, followed by the surgery department with 30%. Nutrition team monitored 87% of TPN. Hospital pharmacists carried out 88 interventions based on notifications to the nutrition team for monitorisation. The median duration of TPN was 10.8±45 days, being less than five days in 36%. According to ASPEN, 61% of TPN prescribed was well-indicated.

Conclusion: A high proportion of TPN was prescribed by non-nutritionists. Indication and duration of the TPN did not agree with ASPEN guidelines, being necessary a protocol review.

Real-world clinical practice of isavuconazole

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Background: The aim of the pharmacy and therapeutics (PyT) committee is to promote the rational use of drugs through medication-use policies to improve effectiveness and safety.

Purpose: Analyse the degree of protocol compliance established by the PyT committee on the use of isavuconazole.

Methods: A retrospective observational study was carried out in all patients treated with isavuconazole from January 2019 to January 2020. Data sources: electronic prescription program and electronic medical records. Collected data: demographics, indication (invasive aspergillosis or mucormycosis), dosage, duration, adverse drug reactions, previous treatments, kidney failure (glomerular filtration<50 ml/min), ineffectiveness or toxicity with voriconazole or amphotericin B liposomal.

Results: Ten patients were included. Mean age: 58±10 years; 50% male. Therapeutic indications were: 90% invasive aspergillosis,10% Candida endocarditis. Two patients presented kidney failure (45 and 14 ml/min glomerular filtration). About lines treatment: 20% first-line,30% second-line and 50% third-line. Previous treatments: 86% amphotericin B liposomal(20% toxicity and 60% ineffective), 86% voriconazole(70% toxicity and 10% ineffective), 43% caspofungin, 14% daptomycin, 14% dalbavancin and 14% posaconazole. All patients received loading dose (200 mg/8 hours, two days) and subsequently maintenance (200 mg/24 hours). The median duration was 5.5 days (range: one-69). No adverse effects to the drug were reported.

Conclusion: The degree of protocol compliance was high. The role of the pharmacist in an interdisciplinary team, assuming an active role can contribute to achieving the therapeutic objectives of the patient.

Utilisation of immunotherapy for cancer treatment in a university hospital

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Background: Immunotherapy is a rapidly growing field for cancer treatment. Immunotherapeutic strategies focus on reactivating the immune system to display an antitumor response. Since the approval of immunotherapy an increasing proportion of patients are achieving long-term survival.

Purpose: To analyse the utilisation of immunotherapy in a university hospital.

Methods: A retrospective and observational study was performed in a university hospital. Between June 2016 to December 2019, patients who had active treatment with immunotherapy were selected. Patients with hematologic malignancies were excluded. Data were collected from the medical history records including: sex, age, expression of programmed cell death ligand 1(PD-L1), diagnosis, drugs, duration of treatment and cycles received.

Results: A number of 111 patients were selected; 87 (78.4%) men. Mean age was 61±8.7 years. Expression of PD-L1 was: 56 (50.5%) unknown and 55 (49.5%) positive (27% with PD-L1>50%). Main diagnoses were: Lung adenocarcinoma 51 (49.9%), squamous cell lung cancer 21 (18.9%), melanoma 14 (12.6%), renal cell carcinoma 8 (7.2%), bladder cancer 8 (7.2%) and others (oropharyngeal cancer, laryngeal cancer, large cell neuroendocrine and colon cancer). Drugs used: Pembrolizumab 47 (42.3%), nivolumab 37 (33.3%) and atezolizumab 27 (24.3%). Mean duration of treatment was 6.2±8 months and 10.5±12.9 cycles. A total of 18(12.6%) patients responded to treatment for more than 12 months. 36(32.4%) patients received less than three cycles.

Conclusion: Immunotherapy was mainly used in lung cancer, with pembrolizumab being the drug most widely used. More than a half of patients received immunotherapy with unknown PD-L1.

Off-label use of drugs in a university hospital

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Background: Off-label use is the prescription of pharmaceutical drugs for an unapproved indication or in an unapproved age group, dosage, or route of administration. This type of prescribing practice is increasing; however, the suitability of medications for off-label use remains an issue of controversy, due to uncertainty around the clinical benefits.

Purpose: To analyse the prevalence and the cost of off-label drugs prescribed in a university hospital.

Methods: A retrospective observational study of patients who received off-label drugs from January 2019 to January 2020 was performed. Data collected from electronic medical records: sex, age, drugs, prescribing service and costs.

Results: Sixty-thre (63) patients were included. Mean age: 52.5±15 years; 60.0% male. The main drugs prescribed were: Rituximab (45.5%; n=15), infliximab (18.2%; n=6), dalbavancine (6.1%; n=2), lenalidomide (6.1%; n=2), nintedanib (6.1%; n=2) and others (mepacrine, nivolumab, pembrolizumab, sarilumab, sorafenib and tocilizumab). Off-label drugs were prescribed by internal medicine (27.3%; n=9), followed by neurology (24.2%; n=8). Oncology, haematology, and pneumology prescribed three drugs (9.1%). Rheumatology, dermatology and infectious diseases prescribed two drugs (6.1%) and nephrology one drug (3%). The least expensive drug was mepacrine (0.042 euros/mg); pembrolizumab was the most expensive purchase (1352.15 euros). The department with the highest spent was Oncology (22609.17 euros) and Nephrology cost the least (209.9 euros). The total spent of the Hospital on off-label drugs was 87405.234 euros.

Conclusion: Internal medicine had the most prescriptions, but oncology costed a quarter of the whole expense. Monoclonal antibodies were the drugs with the highest cost.

Development of a performance-based pharmacy payment framework for Australia

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Background: Community pharmacists in Australia are funded for dispensing on a fee-for-service basis and outcomes of their dispensing have not to date, been assessed in determining their level of remuneration.

Purpose: To develop and evaluate a framework that links community pharmacists' remunerations to a performance-related measure.

Methods: Semi-structured interviews with 23 including consumers, pharmacist, pharmacy regulators and funders determined attitudes towards current and alternate funding models, measures of pharmacists' performance and factors relevant to the introduction of a performance-linked payment model. A funding framework based on the data were evaluated by focus groups of pharmacists.

Results: The current funding model is not transparent and promotes dispensing speed and volume over quality. It provides a single level of remuneration for the professional aspect of dispensing and does not consider patient or drug complexities or the need to adapt the interaction between the patient and the pharmacist based on these complexities. There is no recognition of patient outcomes in the current model. The proposed funding framework separates payment for dispensing into a commercial payment to the pharmacy and a professional component to the dispensing pharmacist. The level of the professional component would be adjusted based upon drug and patient risk factors, quality-related inputs applied at the time of dispensing or

outcome measures such as adherence, bio-markers or satisfaction.

Conclusion: Performance-based payment for dispensing in Australia is technically feasible however significant political and cultural barriers would need to be addressed.

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Exploration and practice of hospital pharmacy continuous training based on CMEI affiliated to CPA

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Background: In 2009, the drug price addition was cancelled in state owned hospital during the health system reformation in China. The pharmaceutical training has sprung up as a response to the requirements from the pharmacists

Purpose: To promote the healthy development of China's hospital pharmacy, improve the overall quality of pharmacists, and to promote the development of pharmacist teams

Methods: Chinese medicine and economic information network (CMEI) is a non-profit organisation affiliated to the Chinese Pharmaceutical Association, which is run by the science and technology development centre of the China Pharmaceutical Association. Relying on the advantages of CMEI membership hospital, and combined with the new policy, new trends and new problems of hospital pharmacies, the themes for the trainings were designed and a new mode of training was explored from 2008 to 2019

Results: From 2008 to 2019, trainings have been carried out in 61 cities in China. In total, 441 trainings have been organised from 2008 to 2019, with 1298 experts and 43,910 participants. Training frequency had been increased year by year, reaching a peak in 2016. The number of organisational sessions reached 73 at most, with 252 experts and 8,380 participants. Since 2016, the average number of holding training remained 50 every year. In recent years, pharmaceutical service has changed from fully artificial to information intelligent, so from 2016, medical information technology training gradually has been increased to 30.3% by 2018.

Conclusion: The number of participants and the themes of trainings have greatly met the needs of pharmaceutical personnel. In future, various forms of online and correspondence courses will be designed and more tutor modes will be offered

Study on the change of Fisher drug price index in China base on the data from CMEI affilated to CPA

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Background: The drug price supervision and administration is one of the key policies in the Chinese health reformation system, which could ensure drug affordability for the patient. Since 2015, the regulation of retail drug price capping was cancelled by the government, since then drug prices have been formed by the market mechanisms.

Purpose: To study on the change in drug price since 2015 and evaluate the effectiveness of drug price regulations

Methods: The method of Fisher price index was used to establish the drug price index in China, which included the fixed based index and linked index, according to the procurement price of drug in sample hospitals from Chinese medicines and economic information networks run by Science & Technology Development Centre of CPA.

Results: From 2015 to 2019, the fixed based Fisher price index of total drug costs, declined gradually as the government had organised the centralised bidding and procurement of drugs multiple times during this period. The fixed based Fisher price index of the National Essential Drug and the drugs in the National Essential Medicare Formulary all fell significantly. But the fixed based Fisher price index of emergency used drugs was significantly raised. The change of linked Fisher price index was regular during these years, which showed seasonal variation and the overall decline trend. The DDDc was stable during these years between 12yuan to 14yuan.

Conclusion: The Fisher price index could be a good method of supervision of the changes to drug prices, which could reflect the effective of drug price regulation in some respect. Drug prices in China have slowed down these years due to the work of centralised bidding and procurement and optimised administration of the government.

outcome measures such as adherence, bio-markers or satisfaction.

Knowledge of hypertension and diabetes comorbid patients about their medication in a Hospital in Ghana

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Background: Patients with hypertension and diabetes co-morbidity may have medication knowledge and therapy challenges that could impact on patient outcomes.

Purpose: To assess patients' knowledge about medication and therapy for hypertension and diabetes mellitus.

Methods: This was a prospective study involving 338 patients with co-morbid diabetes and hypertension, enrolled from the out-patient pharmacy at Tema Municipal hospital in Ghana. The patients were interviewed with a semi-structured questionnaire about the number of medications taken, knowledge of name, duration of therapy, side effects, administration and purpose of the medication therapy. Bloom's cut off was used to assess the overall knowledge, and chi-square analysis was used to test significance of association between knowledge and other variables

Results: The highest number of medications taken per patient was five (n=98, 29%) and the least was nine (n=3, 0.9%). Patients' had knowledge of the name (n=158, 46.8%), side effects (n=50, 14.8%), duration of therapy (n=322, 95.3%), administration (n=324, 95.9%), purpose of anti-hypertensive (n=254, 75.1%) and anti-diabetic therapy (n=251, 74.9%). More than half had inadequate knowledge overall (n=187,55.3%). There was significant relationship between the level of knowledge about medications and family history of hypertension (p=0.001)/diabetes (p<0.026); and duration of hypertension (p=0.026)/diabetes (p<0.0001).

Conclusion: The diabetic and hypertensive patients' knowledge about their medications and therapy was inadequate. Effective pharmaceutical care interventions should be instituted to improve patient outcomes.

Drug-drug interactions in cancer patients and impact on the survival rate

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Background: Cancer patients undergo heavy treatment and are consequently at a high risk of poly-pharmacy. Drug-drug interactions (DDI) remain a constant concern, although their clinical effects can be hard to evaluate since they might be masked by disease progression or symptoms. Besides chemotherapy interactions, other interactions can also be linked to patient weakening during cancer treatment.

Purpose: The aim of this study was to detect the DDI in the cancer population with different tools, which were compared to highlight the prevalent interactions and assess the impact on the survival rate.

Methods: This study followed a six-month observational retrospective study in two major care facilities in Brussels. Patients readmitted within 30 days after their last hospital care for a potential drug-related problem (DRP) were included. Interactions were analysed using Lexicomp and Epocrates databases. Kaplan-Meier and Cox analysis were performed to evaluate the link between the interaction and death onset.

Results: The final population included 299 patients. Around 80.0% of patients had at least one interaction. Opioids (29.9%) followed by anxiolytics (15.8%) were drugs most often involved. The most predominant harmful effects were central nervous system (CNS) and respiratory depressions. Kaplan-Meier analyses highlighted a difference between patients with and without interactions regarding death. Nevertheless, death seems not to be linked directly to the presence of an interaction.

Conclusion: Interactions are predominant in cancer patients and lead to adverse effects but do not seem to be directly linked to the onset of death.

Regulating patient's use of medicinal herbs during cancer chemotherapy: VigiBase, WHO global database survey

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Background: Up to 70% of cancer patients use Herbal Medicines (HMs)1 despite the risk of interactions with Anti-Cancer Drugs (ACDs).

Purpose: The aim of this study was to analyse the adverse effects suspected to be associated with the concomitant use of a plant and a drug using Individual Case Safety Reports (ICSRs) from the World Health Organization (WHO) database, VigiBase.

Methods: ICSRs up to January 2020 containing at least one ACD and one of ten representative plants (pineapple, green tea, marijuana, black cohosh, turmeric, echinacea, St John's wort, milk thistle and ginger) were extracted. ICSRs containing at least one ACD and sufficient enough (including at least 'suspected' or 'interacting' drugs/plants and symptoms) were selected. Descriptive analyses were performed to confront them with literature data.

Results: One hundred and eighty-nine (189) ICSRs concerning co-suspected HMs and ACDs were retrieved, 47 (25%) were selected. No causality assessment had been reported for 20 cases (43%) while an analysis of the interactions would have been possible for 44 (94%). Literature seems to confirm the causality assessment in 17 ICSRs (36%) but 9 (19%) didn't contain any causality assessment while literature suggests there could be a causality link. In one case (2%), no literature was found to corroborate the causality assessment.

Conclusion: An in-depth review of literature could result in a better understanding and management of the HMs-ACDs interactions.

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Aknowledgment: The Global ICSR database VigiBase was used as a data source for this article. The information in VigiBase comes from a variety of sources, and the probability that the suspected adverse effect is drug-related is not the same in all cases. The information in this article does not represent the opinion of the UMC or the World Health Organisation.

Rogue online pharmacies in the time of pandemic: Capitalising on misinformation and fear

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Background: Rogue internet pharmacy networks are run by criminal opportunists - and the COVID-19 pandemic has provided the perfect opportunity for illegal online drug sellers to prey on fearful consumers. These criminals are not new to the game: they are simply targeting a novel disease.

Purpose: This study establishes the prevalence and practices of websites being used for the illegal sale of prescription-only medicine marketed as a therapy for COVID-19, and calls on internet intermediaries to take action against these websites.

Methods: NABP identified hundreds of domain names (web addresses) that include key words related to COVID-19. Among them were dozens of illegal online pharmacies that were actively peddling prescription-only drugs marketed as COVID-19 treatments. Staff evaluated these sites and looked for commonalities.

Results: In our review, we found the following: 1) most active websites have clear ties to known criminal networks; 2) some newly-created COVID-specific websites redirect users to established rogue network sites; 3) many domain names are clustered on "safe haven" registrars; and 4) the domain name registration information for almost all identified websites is anonymised, making it difficult for enforcement agencies to investigate these criminals.

Conclusion: Numerous websites are indeed being registered and used illegally to sell prescription-only medicine marketed as a therapy for COVID-19. Internet intermediaries must implement long-term policies that will not only put a stop to COVID-19 related cybercrime but will also shut down rogue internet pharmacy networks for good.

Impacts of science popularisation on knowledge attitude and practice of medication use of rural women

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Background: The project 'Wise Mom Programme: Rural women cared by pharmacists in China' is aimed at rural women and performs popular science activities, to improve women's scientific literacy of medication, establish healthy living habits, promote family happiness and social harmony. Improving the scientific literacy of drug use of the public has become an issue of concern to the whole society.

Purpose: The purpose of this study is to understand the current situation of medication attitude and behaviours of rural women in China, and to evaluate the changes in knowledge, attitude and practices (KAP) after medication education.

Methods: This study is a multi-centred cross-sectional study. A structured questionnaire was applied to evaluate the KAP of rural women. The Kruskal-Wallis test was conducted to analyse the relation between KAP scores and demographic characteristics. And the Wilcoxon-Rank test was used to analyse the impact of popularisation and education on KAP level.

Results: A total of 9093 surveys were collected in this study. The average score of medication knowledge questionnaire is 27.94±6.23 points. Women of different income levels, medical insurance and working conditions have no significant difference in KAP scores, while various education levels and residences have significant statistic differences. After two years of popular science education and publicity, the average and median value of KAP score have been increased. The influence of popular science education and publicity is statistically significant.

Conclusion: Popular science education and publicity have a positive impact on rural women's KAP. The 'Wise Mom Programme' has effectively improved the scientific literacy of rural women.

Value of price discount, pharmacy channel and medicine information for the online pharmacy OTC customers

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Background: Relatively little is known about the customer preferences for over-the-counter (OTC) purchases, in particular in digital pharmacy channels. The preferences are relevant from a viewpoint of rational pharmacotherapy.

Purpose: To assess heterogenic preferences for an OTC pain medicine to measure the concomitant value of price, pharmacy channel and availability of medicine information in online pharmacy. Customer groups and the price elasticity of demand were assessed.

Methods: The preference groups were identified on the basis of additive utility functions employing choice-based conjoint analysis among the customers of the online University Pharmacy. The purchase attributes comprised: price (discount 0-20%), channel (brick & mortar, online University Pharmacy, other legal online pharmacy), medicine information (not available, pharmacist chat immediately, chat after a 10 minute waiting period).

Results: Five preference groups (7–32% of the respondents, N=3118). Pharmacy channel was a dominating attribute for three segments (50% of the respondents; of which 63% preferred for a B&M pharmacy) and price for two segments (50%). Overall, pharmacy channel, price and medicine information were valued (of weight over 20%) by 72%, 68% and 30% of the customers, respectively. Preference group profiles were illustrated. The price elasticity of demand for online University Pharmacy varied much across the preference groups.

Conclusion: Most online pharmacy customers still prefer brick and mortar pharmacy for a non-acute OTC purchase. Potentially strong price elasticity, value of University Pharmacy brand and varying preference for medicine information have to be considered in the development of online pharmacy services.

Effect of PDCA cycle method on reducing positive rate of tetanus skin test

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Background: A great number of patients with tetanus antitoxin (TAT) skin test present false positives. The authors consider it of interest to reduce the false positive rate through pharmaceutical management.

Purpose: The study aims to evaluate the effect of PDCA cycle method on reducing the false positive rate of TAT skin tests.

Methods: The authors investigated patients received TAT skin test of Beijing Tsinghua Changgung Hospital from January 2019 to January 2020. An analysis was performed on the proportion of different factors of TAT skin test through the PDCA cycle method. Among these influencing factors, order of drug preparation, injection dose, the observation time, the standard of the injection method accounted for 35%, 31%, 12%, 9% respectively, and other factors accounted for 13%.

Results: One thousand six hundred and sixty-six (1,666) patients were enrolled on the study. The influencing factors included adjusting the order of saline and drug preparation, reducing the injection dose from 0.1ml to 0.05ml, extending the observation time from 20minutes to 30minutes, making the injection

method more standardised. The positive rate of TAT skin test were decreased from 76.4% to 57.9% (p<0.01) after the application of PDCA method.

Conclusion: The application of PDCA method would promote the standardisation of the TAT skin test and ensure the continuous improvement of hospital pharmaceutical management.

Investigation report on China's health emergency popularisation of science about the COVID-19 pandemic

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Background: The COVID-19 pandemic is a huge challenge to world health systems. The harm of public panic is more serious than that of the virus infection. Public panic will create a lot of rumours; Rumours will not only hinder the government's handling of public health emergencies, but also disrupt the public's awareness and behaviour of preventing viruses and cause social unrest.

Purpose: In order to investigate the demand of the ordinary personnel and health professionals for emergency popularisation of science, discover the current problems in popular science work during public health emergencies, and provided suggestions for future health popular science work.

Methods: This study designed two versions of the health emergency science questionnaire, which are divided into ordinary personnel version and health professional version. From 21st February to 10th March 2020, the authors received questionnaires from 25,935 ordinary personnel and 30,143 professionals from all provinces of China.

Results: The public has a high demand for health emergency popularisation of science about COVID-19, and the professional demand is higher than the ordinary personnel. Ordinary personnel's evaluation of the role of health emergency popular science in COVID-19 pandemic is 8.58±1.80 points (out of ten points), and the professional's evaluation is 8.93±1.44 points.

Conclusion: Ordinary personnel and professionals have highly evaluated the role of health emergency popular science during the COVID-19 pandemic. Mobile Internet is currently the main channel for the public to obtain emergency popular science information, but due to rumours, the public's trust in mobile Internet is low.

Assessing patient medicine adherence: Imaging a method for pre-filled syringes

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Background: It is widely recognised that medicine adherence is sub-optimal with potential negative outcomes and an increased burden to health services. On an elective orthopaedic setting a fairly common prescribed medicine for DVT prophylaxis is enoxaparin.

Purpose: On initial attempts to assess the adherence to enoxaparin treatments (normally presented in self-administrating pre-filled syringes) the traditional methods, apart from self-report, were deemed unfeasible. Consequently, we have devised a method to achieve such goal.

Methods: The authors propose X-raying the sharps bins provided to patients and perform a physical counting of the used syringes collected. The imaging specifications are fairly standard and achievable with basic equipment.

Results: Initial observations show clear and distinctive images that allow easy identification of the used syringes.

Conclusion: Even taking to account some limitations we have made a proof of concept that can be easily replicated and set up. Further developments will include an image processing algorithm for fully automatic counting of units.

Use of indirect methods in clinical decision-making: Two different scenarios from published trial data

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Background: Network meta-analyses (NMA) allow indirect comparisons between 3+ alternatives, thus facilitating therapeutic positioning.

Purpose: Apply NMAs to create efficacy-based algorithms for two different oncological conditions.

Methods: Separate comparisons were performed for: (1) CDK4-6 inhibitors in ER+, HER2-, locally-advanced/metastatic breast cancer in post-menopausal women, using PFS data from PALOMA-2, MONALEESA-2, and MONARCH-3 trials; and (2) drugs used in moderate/severe ulcerative colitis, using clinical response at week six to week eight (CR6-8) obtained from ACT 1&2 (infliximab), ULTRA 1&2 (adalimumab), and GEMINI-1

(vedolizumab). Within each analysis, trials had similar design, population, and common comparator (placebo). Fixed-and-random-effect model analyses were conducted on NetMetaXL.

Results: (1) No PFS difference found; (2) CR6-8 higher (yet not statistically significant) for infliximab, followed by vedolizumab, and adalimumab.

Conclusion: (1) In the absence of PFS differences, clinical decisions should consider the drugs individual toxicities and comparative costs. Conversely, (2) showed differences in favour of infliximab, thus supporting its first-line use, reserving vedolizumab for refractory cases. Results are consistent with the perceived clinical efficacy, as well as with vedolizumab's different mechanism of action. Caveats lie with the imperfect nature of the comparison and the presence of confounders. Nonetheless, NMAs provide insightful information on the relative efficacy of pharmacological alternatives, and illustrates how indirect methods can play a role in addition to direct methods, or when limited head-to-head comparisons are available.

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Creating a new course to train student pharmacists to provide clinical community pharmacy services

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Background: The role of the pharmacist in the community setting is transforming to include direct patient care responsibilities. Teaching future pharmacists the skills needed to excel in pharmacy practice involves providing education on innovative new clinical community services.

Purpose: WSU faculty created a new two-credit course, Point-of-Care and Clinical Services. The goals of this course are to provide an educational experience focused on specific clinical services that can be provided in a community setting, to develop the knowledge, skills, and abilities needed to provide those patient care services, to instil independent clinical decision making skills, and to utilise collaborative drug therapy agreements for prescriptive authority when appropriate.

Methods: Topics covered during this course includes performing point-of-care screening for influenza, group-A streptococcus, and human immunodeficiency virus, adult and paediatric immunisation needs assessment and administration techniques, providing travel medicine consultations, and identifying and treating minor ailments and conditions.

Results: This course uses a non-traditional delivery model involving teaching and facilitating the entire course during the first week of the semester. Logistically, this is very challenging as it requires all other second-year courses to postpone instruction until the second week of the semester.

Conclusion: A new course targeted to train students to perform clinical community pharmacy services can benefit students and their future patients.

Pharmacist-led HIV And HCV screening and education for adults experiencing homelessness

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Background: Over half a million people experience homelessness on a given night in the United States of America. As a result of increased exposure to disease, violence, malnutrition and substance abuse, homeless persons experience medical problems and treatment complications at higher rates than the general population. Chronic disease states that require uninterrupted treatment and high rates of adherence, such as HIV/AIDS, are more difficult to control in those with unstable housing. Individuals living with HIV or HCV who are unaware of their infection are more likely to transmit their disease to others.

Purpose: This project looks to describe the implementation of HIV and HCV screening conducted by a community pharmacist.

Methods: Project participants are walk-in patients of First Avenue Pharmacy who are adults that are experiencing homelessness. HIV and HCV screening tests are administered along with a risk determination questionnaire and comprehensive HIV/HCV education. Next, the investigator discusses personalised risk mitigation strategies and makes referrals to community partners based on the patient's risk and test results for follow-up testing, treatment and partner notification.

Results: The community pharmacy setting seems to be an ideal location to screen patients who are experiencing homelessness and connecting them to local services. The study population is very receptive to HIV and HCV screening.

Conclusion: Pharmacist-led screening, education, and connection to care may have a significant impact on the course of illness in high-risk populations. Pharmacists are the most accessible healthcare providers and are poised to play a significant role in the HIV and HCV epidemic.

Pharmacists leading use of quality control circle to reduce drug consumption

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Background: In order to reduce medical expenses and patients' burden, the government requires hospitals to make a policy of drugs with limited functions but high prices.

Purpose: The purpose of our research is to explore whether a pharmacist-led quality control circle (QCC) activities could reduce drug consumption and promote the rational use.

Methods: This is a prospective study carried out in a tertiary teaching hospital. The first phase was carried out from March to September 2018. According to the amount of drug consumption, the authors then identified the drugs they needed to focus on. Then, they used quality control circle methods such as Gantt chart, Fishbone chart, inspection table and Plato chart. Three measures were then taken to reduce the drug use for each expensive drug, including prescription comment, training of doctors, implementing clinical pathway management. In the second stage, the restriction of human albumin order was added, which was only allowed when the serum albumin was lower than 25g/L in 2019.

Results: Through this QCC activity, The hospital has established a special prescription review system, and strictly limited the medical order conditions of butylphthalideand and human albumin. Our hospital saved 2.62 million RMB in 2018 and 0.88 million RMB in 2019 . Through this activity ,the monitoring drug use rate decreased from 22.21% to 17.45% (p<0.001), and continued decreased to 16.76% in the first quarter in 2019 ;the rational rate of drug use increased from 85.17% to 94.1% (p<0.001).

Conclusion: Pharmacist-led drug management can reduce drug consumption and improve their rational use. Pharmacists can do excellent work in improving medical quality. In the future, the QCC activities should be more applied to drug management.

Assessment of drug therapy problems among patients in an intensive care unit of a tertiary hospital

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Background: Intensive care units (ICUs) are a potential area for drug therapy problems (DTPs) to develop; patients treated there are complex patients. Studies have shown that the involvement of a critical care pharmacist in ICUs decreases drug-related costs, prevents adverse drug events (ADEs), and reduces morbidity.

Purpose: To assess the drug therapy problems among patients in the intensive care units in a Nigerian Tertiary Hospital.

Methods: This prospective study was conducted in General and Cardiothoracic ICUs of University of Nigeria Teaching Hospital Enugu for 12 months. Identification of DTPs was assessed by reviewing and analysing all medication orders, administration sheets, laboratory test results and pathophysiological status. Data were collated and analysed using IBM SPSS Version 25. *P*-values at <0.05 were taken to be significant.

Results: A total of 162 patients were used in this study. Out of the 729 DTPs identified, drug interactions accounted for 33.9% of cases, inappropriate drug selection 25.9%, while inappropriate dosage selection accounted for 11.4%. Clinical Interventions at drug level (790) were undertaken in 44.7% of cases; prescriber's level 19.0% and patient level 8.9%. Interventions accepted were 94.2% and 92.3% of DTPs identified were successfully resolved. Increasing number of drugs prescribed per patient/day increasing number of co-morbidity per patient and increasing duration of ICU stay were shown to be independent predicators of DTP.

Conclusion: DTPs among patients admitted at the ICUs of UNTH were high. Drug interaction and inappropriate drug selection were the commonest drug therapy problems. Clinical pharmacists performed a high number of interventions and the level of acceptance of the interventions by the prescribers was high.

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Evaluating the impact of telehealth technology in the delivery of COPD comprehensive medication therapy management

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Background: Telehealth technology (TH) can provide remote patient monitoring and alleviate the strain on healthcare resources. Chronic Obstructive Pulmonary Disease (COPD) contributes to significant hospitalisations and cost. Given that Comprehensive Medication Therapy Management (CMTM) initiatives have demonstrated that pharmacists could be part of the solution to this problem, the COPD TH programme was developed.

Purpose: To assess the clinical and economic impact of TH in reducing hospitalisations and ER visits with primary COPD diagnosis, and patient satisfaction with the TH service.

Methods: A cohort of 73 COPD patients in the University of Maryland Health System were enrolled and followed for one year. Eligible patients were those 18 years old and older, ambulatory, had a COPD diagnosis, and had a primary care provider within the network or region. Pharmacists utilised HIPAA compliant video technology to complete CMTM. For analysis, visit and charge data were used to assess clinical service utilisation and cost. Surveys were used to assess satisfaction with services.

Results: A total of 126 TH CMTM visits were conducted through the duration of the programme. A decrease in COPD related ER and inpatient visits was observed among study participants post-TH CMTM intervention (mean visits 3.25 vs .75). Utilisation costs were also lower post-TH CMTM intervention (mean $9,778 vs $760). Overall, the programme received an 84% satisfaction score.

Conclusion: The study demonstrated the impact telehealth CMTM can have on reducing the number COPD patient utilisations and cost. While patient satisfaction was prominently positive, continuous quality assurance for these services should be conducted in order to tailor to patient and provider needs.

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Retrospective study of the MCA in Bizkaia subsidised by the Basque government between 2009 and 2018

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Background: Medication non-adherence is a persistent and widely recognised health problem in poly-medicated elderly patients1. In Bizkaia, the multi-compartment compliance aids (MCA) is the tool that is subsidised to improve medication adherence in the population.

Purpose: To describe the use of the MCA in Bizkaia between 2009 and 2018.

Methods: A retrospective descriptive study of the use of MCA. Data were analysed with Microsoft Excel and SPSS.

Results: Of the 1453 patients assigned to the MCA during the study period, 77.8% of the total population were women and 22.2% were men. 49.8% were over 65 years. 69.9% of patients started using the MCA due to therapeutic non-compliance, 2.9% due to personal characteristics and 1.5% due to erroneous administration. The number of new patients enrolled in the system increased exponentially (15.6% in total) until 2018. Incidents occurred in 4.1% of prepared MCAs, with the main causes being therapeutic non-compliance (2.9%), hospital admission (0.6%) and change of treatment (0.3%). The return on blisters was 7.5%, corresponding to 30,666 tablets.

Conclusion: Every year new patients are assigned to the MCA service, with women being the ones who demand this service the most. Non-compliance is the main reason for requesting the MCA service and continues to be the main cause of incidents in the service. Contextualising the use of this tool allows us to visualise the situation to develop a prospective study to analyse its effectiveness.

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Satisfaction survey on sanitary personnel after the installation of automatic dispensing cabinets

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Background: Automatic dispensing cabinets (ADCs) allows improving medication management, traceability and safety.

Purpose: To analyse the satisfaction level of ADCs in hospitalisation wards in a third level hospital.

Methods: A survey of 'perception received' was designed through LimeSurvey. The target populations were 230 nurses. The survey assessed three aspects: quality at work, safety in the use of medications and technical service. To analyse the quality, questions were grouped into: cabinet locations, time management and facilitation. Positive questions with >50% positive answers (agree; strongly agree) constituted an improvement, ≥60% advantage and ≥70% progress. In negative questions >50% inconvenient, ≥60% disadvantage and ≥70% recoil. In safety, they were grouped into: drug selection and administration. The same analysis methodology was performed as in quality. Technical service was analysed according to: incident management, frequency of incidents and training received.

Results: One hundred and twenty (120) users conducted the survey. Response rate was 52.2%. The most participative units were: intensive care (30%), maxillofacial surgery (15%),plastic surgery (9.17%) and neurology (9.17%).

Quality of work: location of ADC and facilitation were perceived as an advantage. However, nurses perceived the increased time to take medications as an inconvenience.

Medicines safety: ADC represented a progress in both the selection and administration of drugs. Technical service management: incidents management was perceived as positive(good), however, they consider the training received as poor and that incidents related to ADC frequently occur.

Conclusion: ADC installation has meant a great improvement in the level of patient safety and facilitates nursing care activity.

Study on the use of ceftaroline in an intensive care unit

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Background: Antimicrobial resistance represents a major public health problem. Ceftaroline increases the number of options available for treatment of complicated skin and soft tissue infections (SSTIs) and community-acquired pneumonia (CAP) associated with high mortality rates.

Purpose: The aim of the study was to evaluate the effectiveness and appropriate use of ceftaroline, according to the indications approved by the Spanish Agency for Medicines and Medical Devices (AEMPS).

Methods: Retrospective observational study conducted of an Intensive Care Unit (ICU) from December 2018 to December 2019.

Results: The number of patients treated with ceftaroline was 14 (ten men and four women), mean age: 58 years. The diagnosis were CAP (n=9) and endocarditis (n=3) and, it was used empirically in two cases. Nine patients met the utilisation criteria approved by the AEMPS. The average duration of treatment was 7.9 days. In seven patients, the microorganism was identified: Methicillin-resistant Staphylococcus aureus (MRSA) (n=5) and Klebsiella pneumoniae (n=2). The clinical cure rate was 78.6% (n=11), however in 21.4% of the cases it was not effective. This unfavourable situation seemed to be associated with the terminal condition of the patients.

Conclusion: Ceftaroline could be considered an option for patients with CAP or SSTIs, with confirmation or suspicion of MRSA, in those cases in which recommended first-line drugs cannot be addressed. Compliance with the AEMPS criteria has been deficient. The use in patients who meet the established indications and the performance of microbiological tests of identification and sensitivity can lead to a more efficient pharmacotherapy guaranteeing the adequate and rational use of broad spectrum antibiotics.

Medicines' sales and shortages during the COVID-19 outbreak: A nationwide retrospective analysis

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Background: The COVID-19 is a worldwide public health emergency. A possible direct result of this international outbreak is the disruption of medicine supply chains, which may also have consequences in the increase of drug shortages. Community pharmacies can contribute to early identification and report of medicines' supply and demand problems.

Purpose: The aim of this study is to characterise the impact of COVID-19 on the outpatient medicines' sales and shortages during the initial outbreak

Methods: A retrospective, time-trend analysis of medicine sales and shortages was performed from the 1st February to 30th April 2020 and its homologous period. Portuguese daily new laboratory confirmed COVID-19 cases and major national emergency measures were recorded. All data were subjected to rescaling using the min-max normalisation method to become comparable. Data analysis was performed using Microsoft Excel.

Results: The COVID-19 outbreak resulted in an increased demand for medicines, with a peak reached just after the World Health Organization declaration of the state of pandemic. By the end of March, sales had already dropped to proportions similar to those of 2019. The maximum proportion of drug shortages was reached about one week after the sales peak and by the end of the study period its values were below those recorded in the pre-COVID-19 period.

Conclusion: Data suggest medicines' sales and shortages were initially impacted by the COVID-19 outbreak in Portugal, although by the end of the study period, medicine markets had normalised. The long-term impacts of this pandemic on medicines' sales and shortages are unknown and should continue to be closely monitored.

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Screening services in community pharmacies: Needs and conditions for an optimal implementation.

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Background: The health care system is currently facing several challenges due to increased prevalence of chronic diseases. Pharmacists could take up a more active role in identifying, counselling, and referring patients with previously undiagnosed conditions and provide guidance to help mitigate further disease progression.

Purpose: To identify the factors influencing the feasibility of offering diabetes and cardiovascular diseases screening and participative patient education services in community pharmacy.

Methods: Three focus-groups with pharmacists (n=17) were conducted in February and March 2020. Qualitative data were analysed inductively using thematic analysis.

Results: Participants shared that the most important success factors would be the pharmacists' motivation, campaigns to promote the awareness of the service and electronic tools to facilitate the organisation within the pharmacy.

Trainings on screening and motivational techniques could be beneficial to perform the service and provide patient education. Many ideas on materials for patients with low health-literacy were also provided to ensure efficiency of counselling. However, time constraint remains a strong barrier, and strategies such as service-by-appointment and follow-up services need to be considered to guarantee optimal implementation of a prevention programme.

Conclusion: This research outlines factors that could influence engagement and participation in a screening service in community pharmacy. Based on the preliminary results, a patient questionnaire was developed and interviews with patients and general practitioners are still ongoing to gather the input of all the parties involved. Their insights should bring valuable additional recommendations.

Addressing the myth that polio vaccination leads to infertility through scientific evidence

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Background: Pakistan is one of the three countries where Polio is still reported. As of March 2020, 25 cases have been reported.

Purpose: This study was carried out to evaluate whether the uneducated population in Pakistan are aware of polio vaccination and if they get their child vaccinated. Based on the answer an experimental study was designed to evaluate the effect of oral polio on fertility.

Methods: A survey-based methodology was adopted, and based on the answers to the survey an experimental study was designed on adult swiss albino mice (22-25gm). They were divided into two groups (n = 6 pairs) in each. Group I was taken as Control (one drop distilled water), Group II was taken as

Treated (one drop of Polio vaccine). The pups delivered from these groups (F0 generation) were given distilled water and polio as per the schedule. After attaining adulthood six pairs each were made from these mice and mated (F1 generation).

Results: SPSS 19 was used for analysis. According to our survey n=46 out of 50 had awareness about the polio vaccine. N=41 did not get their children vaccinated (due to fears that it could cause infertility). Our experimental results showed insignificant effect i.e. nearly equal number of pups were born in both groups. The second group in which the polio vaccine was given at birth to the pups showed a significant result compared to the control group.

Conclusion: The study showed that there are still people who are not vaccinating their children based on the fear that the vaccine could cause infertility in their child. Our experimental study showed that polio vaccine had no negative impact on fertility. Widespread sharing of this knowledge can play a positive role in eradicating polio from Pakistan.

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Leadership and clinical pharmacy practice advancement training among intern pharmacists in Nigeria

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Background: The Nigerian Pharmacy training involves didactic and experiential learning for five years, leading to a Bachelor of Pharmacy degree, with a mandatory year-long internship training. However, training in leadership is lacking during internship.

Purpose: To develop and implement a leadership training programme for intern pharmacists in Nigeria.

Methods: The curriculum included online training in leadership, process improvement and project management that culminated in a capstone project to advance the practice of clinical pharmacy. The training was delivered through a modified project based, blended learning approach, utilising the Assessment, Design, Development, Implementation and Evaluation (ADDIE) principles of Instructional Design. Participants were selected from three Pharmacy schools and practicing at four hospitals in Nigeria. They were required to have a minimum cumulative Grade Point Average of 2.5, determined to have high educational and professional self-efficacy, with current placement for internship training. A learner analysis was performed to assess preparedness for the training.

Results: The nine-month long training programme commenced in November 2019 with 12 participants. Preliminary findings showed that 33.3% of the participants previously received training in leadership, 16.7% in project management and process improvement. Majority (91.6%) believed that pharmacy interns could be leaders in advancing clinical pharmacy practice.

Conclusion: Participants had limited prior exposure to leadership training but high level of preparedness for the training. It is expected that participants will acquire competencies in leadership and pharmacy practice upon completion.

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Understanding mental health challenges of community pharmacists and technicians during COVID-19

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Background: Deterioration in the mental health of healthcare workers during and after pandemics have been established. Ongoing health worker shortages and burnout previous to COVID19 and the aggressive transmission of the virus has intensified these mental health issues. Community pharmacists and technicians, who serve on the frontline and who are heavily relied upon during pandemics, are no exception.

Purpose: The purpose of this study is primarily to understand the immensity of the mental health problems faced in community pharmacy settings and highlight the legal and policy structures that may be easing or exacerbating these incidences in the United States of America.

Methods: Exploratory research that includes a rapid review of existing literature, current news articles and professional organisation publications is used to map out the problem.

Results: Little research has been conducted on the unique role that pharmacists and technicians occupy during a pandemic, and how, if at all, they may experience different types, or severities, of mental health problems. However, technological advancements have allowed for various interventions and resources.

Conclusion: This research will help to better understand mental health problems faced in community pharmacy settings, highlight available resources, and discern existing legal and policy structures. Moreover, it could be used to guide future studies on how to address and mitigate specific factors that exacerbate the mental health problems and the need for policy changes to accommodate these incidences.

Drug interactions and duplications in community pharmacies

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Background: Potential drug-drug interactions (pDDIs) and drug-duplications (DDs) are a significant risk in pharmaceutical care. The pharmacist has an irreplaceable role in their prevention and reduction.

Purpose: This study aimed to estimate the prevalence of pDDIs and DDs according to severity and analysed which drugs most frequently have pDDIs and DDs.

Methods: Demographic details including gender and age and other characteristics including brand name of medicinal products and dosage were admitted by the electronic application within the Slovak Chamber of Pharmacists´ awareness campaign. Data for analysis were collected in an anonymised form. The prevalence of pDDIs and DDs categories was examined using the DrugAgency(R) database from November 2017 to July 2019.

Results: A total of 29,704 valid inputs were revealed for this study. A valid input was recorded if there was at least one pDDI and/or at least one DD at the level of two medicinal products. A total of 27,632 (93%) pDDIs and 2,072 (7%) DDs were found with 4,388 a clinically relevant pDDIs (15.9%) (categories 4 - 6). pDDIs were more common in men than in women. Drug pairs that entered the most serious pDDIs (category 6, n=406) were escitalopram with amiodarone (11.8%), fixed-combination trandolapril and verapamil with ivabradine (8.6%), and citalopram with hydroxyzine (7.6%). Cardiovascular drugs were the most common in pDDIs and musculoskeletal drugs were the most common in DDs.

Conclusion: The prevalence of pDDIs and DDs was substantial in the pharmaceutical care setting. High prevalence some of pDDIs and DDs enforces the need for further risk-prevention actions regarding, especially for cardiovascular and psychiatric drugs

Patients' perception towards medicines-use review service in community pharmacy

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Background: It was reported that 43.4% of Malaysians do not know how to use their medicines properly, while 35.8% are unaware about their side effects. Medicines use review (MUR) service has been shown to reduce medication adverse events. It was unknown whether patients perceived this service to be beneficial.

Purpose: To evaluate patients' perceived benefits of MUR service in community pharmacy and their intent to participate in this service.

Methods: This was a cross-sectional survey conducted from September to October 2019 via self-administered questionnaires. Three hundred and eight-five (385) patients who took at least three types of chronic medications were recruited around Klang Valley.

Results: At least half of the patients perceived MUR service to be beneficial, which included helping them to take medicines on time (56.8%), be in control of their medicines (51.5%), better understand the use of their medicines (54.2%), sort out medicine-related problems (55.8%), build relationships with pharmacists (52.7%) and understand the reasons behind taking their medicines (57.1%). Perceived benefits of MUR service were found to be associated with the participants education level (p=0.001), monthly income (p=0.030), frequency of pharmacy visit (p<0.001) and frequency of getting advice from pharmacist (p<0.001). 62.6% of the patient's intended to participate in MUR service. Patients who thought MUR services would help them to be in control of their medicines were 1.87 times more willing to participate, and patients who thought MUR service would help them understand their medicine better were 1.15 times more likely to participate in this service.

Conclusion: Most of the patients expressed their intention to participate in MUR service in community pharmacy, and perceived this service to be beneficial.

Factors associated with self-control of body weight and blood glucose in type 2 diabetes patients

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Background: Better medication adherence among diabetic patients is positively associated with improved glycemic control. However, this is not always achieved in patients who strictly adhere to their given regime, probably owing to the challenges involving diet and/or exercise. From a patient-centred perspective, pharmacists should pay more attention to self-care management besides drug safety and medication adherence.

Purpose: To examine knowledge of diet therapy and analyse various factors related to the control of body weight and blood glucose level in diabetic patients.

Methods: A survey was conducted among type 2 diabetic patients using a well-structured questionnaire, which was concerned with respondents' knowledge levels regarding diet therapy, experience of nutritional counselling, and educational hospitalisation, and included select clinical and socio-demographic items.

Results: There were 553 survey respondents. The average number of correct answers for the 20 questions regarding diet therapy was 72.5%; however, only 20.6% of them responded correctly to the question on the required quantity of vegetables. In the logistic regression analysis, control status of body weight and blood glucose was used as a dependent variable, while nutritional counselling experience was not observed as a significantly independent variable. Conversely, age, educational hospitalisation, night work, and understanding the difference between calories and carbohydrates, were found to be associated with the participants' risk of poor body weight and poor blood glucose control.

Conclusion: Identification of key factors related to poor control of body weight and blood glucose will equip pharmacists on how to better contribute to patients' self-care management.

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Prescription review of immediate-release pharmaceutical forms of fentanyl

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Background: The immediate-release pharmaceutical forms of fentanyl (IRPFF) are oral or nasal administration systems that allow the immediate action of the active ingredient. The Spanish Agency of Medicines has detected an increase in their consumption since 2010. Due to its potency and risk of addiction and overdose, it is recommended to monitor patients.

Purpose: To review all new prescriptions for IRPFF and check that they comply with the authorised indication: treatment of breakthrough pain in cancer patients treated with a base opioid analgesic. Also, to contact the prescribing doctor in case of finding cases that do not comply with the established normative.

Methods: A list of patients on active treatments with IRPFF was obtained. Data were collected from their medical history including prescription records. We checked that the patient had been previously treated with at least 60 mg of oral morphine per day, 25 micrograms of transdermal fentanyl per hour, 30 mg of oxycodone per day or with an equianalgesic dose of another opioid for a week or more.

Results: One hundred and twenty-six (126) patients were analysed. Criteria were not met in 11 of them, since the start of fentanyl was not in accordance with the approved indication. Three of these patients were not even cancer patients. Intranasal fentanyl was prescribed at the same time as the transdermal form in nine patients. In two cases, the patient started sublingual fentanyl treatment without any other base opioid. The responsible doctor in each case was contacted and informed of the situation.

Conclusion: The work of the hospital pharmacist is essential to carry out an adequate pharmacotherapy follow-up on these patients, in order to avoid misuse of IRPFF and the risk of addiction.

Comparison of prices of medicines

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Background: International drug price comparisons can be used to evaluate affordability and accessibility of medicines in specific countries.

Purpose: To compare prices of generic medicines used in cardiovascular and respiratory diseases available for retail in

community pharmacies in Malta with other European countries that have comparable pharmaceutical policies and accessible retail prices of medicines.

Methods: Price data were collected from five countries: Malta, Greece, Macedonia, Slovenia and the United Kingdom for 27 generic medicines (cardiovascular diseases 19, and respiratory diseases nine). Medicine prices were converted to Euro and analysed per unit dosage form. Descriptive statistical analyses were performed.

Results: Prices of the medicines ranged from 0.17€ to 1.27€ per dosage unit for cardiovascular disease and 0.01€ to 0.92€ per dosage unit for respiratory disease. Malta had highest retail price per dosage unit for 72% of the medicines indicated for cardiovascular disease and for 89% of the medicines indicated for respiratory disease. The retail prices in Malta for amiodarone 200 mg tablet, perindopril 4mg tablets and rivaroxaban 10 mg tablet varied with standard deviation of 0.10-0.47 from the average price. The retail price for montelukast 10 mg tablet, fluticasone/salmeterol 100 µg/50 µg powder for inhalation and fluticasone furoate/vilanterol 92 µcg/22 µcg powder for inhalation varied with standard deviation of 0.09-0.34 from the average retail price respectively.

Conclusion: The size of the market is an important factor for cross country differences in prices of medicines. Differences in market size might explain higher medicine retail prices in smaller countries like Malta.

Evaluation of antibacterial drug use in an intensive care unit

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Background: Rationale use of antibacterial agents in hospitals reduces risk of antimicrobial resistance and ensures adequate anti-infective choices for patients which is particularly relevant for the intensive care unit (ICU).

Purpose: To evaluate retrospective and prospective anti-bacterial drug use in the Intensive Care Unit (ICU).

Methods: This study was carried out at the ICU at an acute care hospital. Past data from the hospital from 2009 to 2017 was retrieved. Present data were collected through patient records from the ICU using a devised 'Antibacterial Collection Sheet' over a period of four months, from February until May 2019. The Anatomical Therapeutic Classification/ Defined Daily Doses methodology was applied. Data were analysed using Microsoft Excel.

Results: From the retrospective study, meropenem and piperacillin, with a beta-lactamase inhibitor were the most commonly administered antibacterial drugs, with an average yearly DDD value of 3,577 and 1,362 respectively. From the prospective arm, piperacillin and tazobactam were the most used (28 patients) followed by carbapenems (20 patients).

Conclusion: The drug use trends indicate a rise in carbapenem use of 10.86% between the years 2009 and 2011, with a peak in 2014, and the use remained fairly stable through to 2017. This finding was identified in the ECDC 2018 report for Malta (ECDC, 2018), and the study indicates that the trend has been confirmed for the prospective arm. Reflection on clinical reasoning behind the use of carbapenems and review of the protocols is suggested.

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Physical activity promotion in Portuguese pharmacies: Pharmacists' knowledge, attitudes and behaviours

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Background: Despite abundant evidence on the benefits of physical activity to fostering health and its treatment role in many chronic diseases, high levels of physical inactivity persist. Healthcare professionals, such as pharmacists, can play a key role in the promotion and maintenance of behaviours contributing to higher levels of physical activity.

Purpose: The present study aimed to characterise pharmacists' physical activity promotions and its barriers and facilitators taking place in the Portuguese community pharmacies.

Methods: An observational study including a questionnaire was developed based on the COM-B model. Respondents rated different barriers on a scale ranging from 1 (not likely to be a barrier) to 5 (frequently a barrier). The questionnaire was distributed among 95% of the Portuguese pharmacies by the National Pharmacies Association (ANF).

Results: In total, 396 complete questionnaires were obtained, representing about 5% of Portuguese community pharmacists (≈8700). The main identified barriers were related to opportunities for promotion, such as lack of time (3.06) and lack

of coordination with other healthcare professionals (3.35). Regarding motivation, two important barriers referred were being afraid of the health risks (2.77) and lack of incentives (2.68). Pharmacists lacked capacity, especially in relation to technical knowledge in the area (2.84) and knowledge regarding opportunities for referral in the community (2.98).

Conclusion: Pharmacists seem to be motivated to engage in different physical activity promotion actions, acknowledging their importance. However, there is a need to increase their training and opportunities to stimulate physical activity promotion.

Risk of anticholinergic effects estimated in nursing home residents

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Background: Medications with anticholinergic and sedative effects carry significant risks for older people. Impaired physical function and cognitive decline has been attributed to the use of these medications.

Purpose: The aim was to estimate the Risk of Anticholinergic Effects (RAE) in nursing home residents based on their pharmacotherapy.

Methods: Cross-sectional study of RAE in a cohort of patients resided in a nursing home (30% dependents and 70% in social exclusion). \Anticholinergic exposure was calculated using the Anthicolinergic Risk Scale (ARS), Anthicolinergic Cognitive Burden (ACB) and Drug Burden Index (DBI). Higher scores are associated with increased RAE. We collected age, sex and pharmacotherapy for each patient. We measured the RAE (patients treated with at least one anticholinergic drug according to ARS, ACB and DBI) and frequently prescribed anticholinergic drugs.

Results: We included 64 patients (mean age 74±9 years and 76.6% men). The mean number of medications was 10±5. The ACB identified 46 (71.9%) patients with RAE: 21 (45.7%) with ACB level=1, 13 (28.3%) with level=2 and 12 (26.1%) with level≥3. The ARS identified 31 (48.4%) patients with RAE: 22 (71.0%) with ARS level=1, 6 (19.4%) with level=2 and three (9.7%) with level≥3. 57 patients (89.0%) had DBI score>0: 25 (43.9%) at low risk (DBI<1) and 32 (56.1%) at high risk (DBI≥1). The most common drugs were furosemide (28.1%) with ACB level=1 and lorazepam (21.9%) included in DBI.

Conclusion: There is a high rate of nursing home patients with a certain degree of anticholinergic burden due to treatment. The detection of patients with RAE can be an important strategy to optimise drug therapy in nursing home patients.

Evaluation the effect of methotrexate on psoriasis based on specialised patient education by pharmacist

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Background: Methotrexate is still the gold standard therapy for moderate to severe psoriasis. There is a marked interpersonal variation in the therapeutic response and toxicity profile of MTX which brings difficulty for clinical application.

Purpose: We considered it of interest to establish the specialised patient education (SPE) mode for psoriasis administrated with MTX and assess the therapeutic effect between cases received SPE and usual health care in the real-world.

Methods: In this retrospective cohort study, patients of usual health care received prescription as proof of properly taking medicine and being required return to the hospital every four weeks. Patients of SPE intervention were referred to the pharmaceutical clinic for SPE. Body surface area (BSA), psoriasis area severity index (PASI) at zero, four, eight and twelve weeks, PASI 75 of twelve week and times of self-adjusting dosage were observationally noted and analysed.

Results: Twelve (12) cases of usual care and 16 cases of SPE were included in the final analysis. The decline range of BSA of SPE was higher than that of usual care at four weeks, and the difference was statistically significant (p=0.043).The decline range of PASI of SPE was higher than that of usual care at eight weeks and 12 weeks with statistically significant differences separately(p=0.048; p=0.029).Times of self-adjusting dosage was zero of SPE and was statistically significantly different compared to that of usual care (p=0.026).

Conclusion: Statistically significant faster improvements on efficacy with no significant differences in safety in the SPE than usual care was concluded. The SPE conducted by the pharmacists appears suitable for real world implementation.

Dolutegravir-based ART for HIV patients at secondary care hospitals in Kwara-Central Nigeria

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Keywords: Dolutegravir, Viral Load Suppression, Undetected Viral Load, HIV Patients, Antiretroviral Therapy

Background: Current guideline from WHO recommends dolutegravir (DTG) an integrase strand inhibitor (INSTI) as a core component of antiretroviral therapy (ART) for first line treatment. The efficacy of DTG has been demonstrated in several randomized control trials (SINGLE, SPRING, FLAMINGO and STRIIVING). Dearth of information on the efficacy of DTG-based ART in Kwara-Central has attracted concerns.

Purpose: Hence, the aim of this study was to assess DTG-based ART for HIV patients at secondary care hospitals in Kwara-Central, Nigeria.

Methods: This multi-centre retrospective study involved data abstraction from 310 eligible HIV patients' medical records and HIV programme records. The pilot study was conducted in another HIV treatment centre. Data were analysed using both descriptive and inferential statistics. Ethical approval for the study was obtained from Institutional Ethical Review Committee.

Results: Of the 310 eligible HIV patients on ART, 75.5% had suppressed viral load. Study participants that were on Tenofivir+lamivudine+Dolutegravir ART were 30.4% of which 88.5% had suppressed viral load. Of those with suppressed viral load, only 45.5% had <20 copies/ml. Bivariate analyses showed that duration of illness since diagnosis, cotrimoxazole and isoniazid preventive therapies have significant associations with viral load suppression (p<0.05)

Conclusion: DTG-based ART used in management of HIV patients in the study centres had good viral load suppression. However, more patients should be placed on DTG-based ART.

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Completion of isoniazid preventive therapy in HIV patients at a secondary hospital in North-Central Nigeria

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Keywords: HIV-TB Co-infection, Antiretroviral Medicines, Isoniazid Preventive Therapy (IPT), IPT Completion

Background: Human immunodeficiency virus-tuberculosis (HIV-TB) co-infection constitutes a major public health challenge. Although isoniazid preventive therapy (IPT) has been shown to prevent progression of latent TB infection to active disease, there is paucity of information on completion of IPT in North-Central Nigeria.

Purpose: To assess IPT completion and their predictors in HIV patients at a secondary hospital in North-Central Nigeria.

Methods: This retrospective cohort hospital-based study involved data abstraction from patients' medical records and HIV/IPT programme records from 2013 to 2017. Data were analysed using descriptive, inferentials (Chi-square and Fisher's Exact tests) and logistic regression analyses.

Results: The hospital commenced a six-month IPT programme in 2014 until 2017; 896 patients received IPT. Their median age and weight were 38 years and 66.0 kg respectively. Majority were females (68.4%), married (90.6%), had no formal education (60.7%), unemployed (68.4%), practiced the Islamic religion (79.5%) and were on WHO HIV Clinical Stage I (68.4%). Also, 44.5% had >400 CD4+ cells/mm3 and 71.8% were on Tenofovir/ Lamivudine/Efavirenz. Their mean IPT completion rate from 2014 to 2017 was 42.08 ±17.97%. 59% of those who did not complete the six-month IPT used the isoniazid for one month. Neither demographic variables, clinical variables nor treatment variables were statistically significant predictors of completion of a six-month course of IPT.

Conclusion: Poor mean IPT completion rate calls for intensive and massive awareness campaigns about the usefulness of IPT in HIV care.

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Comparative analysis of lipid profile management in ischaemic heart disease

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Background: The European Society of Cardiology guidelines for management of dyslipidaemias recommend a target low density lipoprotein cholesterol (LDL-C) goal of <1.4 mmol/L or ≥50% relative reduction. Patients with documented cardiovascular disease and elevated individual risk factors are candidates for early intervention with higher intensity statins.

Purpose: To compare effectiveness and safety of statins in patients with ischaemic heart disease (IHD)

Methods: Patients with IHD on statin therapy, matched for age, gender, hypertension and diabetes, were recruited from the Cardiology Department at Mater Dei Hospital. LDL-C levels and side effects at time of recruitment (t1) and six-month follow-ups (t2) were documented. Mean LDL-C level and percentage LDL-C reduction from t1 achieved with different statins was analysed.

Results: Eighty-four (84) patients (64 male, mean age 70 years, 45 with previous revascularisation) were recruited. Statin therapy prescribed was simvastatin (n=36), atorvastatin (n=40) and rosuvastatin (n=8). Twelve (12) patients switched from simvastatin to atorvastatin at t2. Mean LDL-C t1 on simvastatin was 1.96 mmol/L and decreased by 3% to 1.90 mmol/L at t2. Mean LDL-C t1 on atorvastatin was 2.28 mmol/L and decreased by 28% to 1.64 mmol/L at t2. Mean LDL-C t1 on rosuvastatin was 3.16 mmol/L and decreased by 23% to 2.43 mmol/L at t2. Four cases of myalgia and one case of deranged liver function tests with simvastatin and no side-effects with atorvastatin and rosuvastatin were documented.

Conclusion: Mean LDL-C levels achieved with all statins after six months were higher than 1.4 mmol/L. A more intensive LDL-C lowering regime is required to attain targets recommended in the guidelines.

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CONFERENCE ABSTRACTS

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Regulatory Sciences

Regulatory aspects of radiopharmacy

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Background: Radiopharmaceuticals have been around for several decades. Their increasing applications have revolutionised diagnostic and therapeutic fields but they require, due to their nature, specific regulatory and safety requirements.

Purpose: To review international, EU and national regulations regarding regulatory aspects of radiopharmaceuticals and to understand educational needs about awareness and protection of patients and healthcare professionals.

Methods: IAEA, EudraLex and the national legislation were used to identify and classify regulations mentioning radio-pharmaceuticals. General chapters in the European pharma-copoeia (EP) and US pharmacopeia (USP) were analysed and compared and three specific monographs found in both were chosen at random and compared.

Results: Twenty-five (25) regulations were found in total; five international, 14 from the European Union and six nationals. The majority of regulations focused on safety for healthcare professionals, patients or general safety. The USP has more detailed procedure descriptions whereas the EP is more general and allows for more flexibility. Within the specific monographs, differences can be attributed to information being provided in general chapters rather than in the specific monographs. Four regulations were found regarding education with a main focus on training, qualification and radiation protection.

Conclusion: Radiopharmaceuticals are a promising technology for innovative diagnostics and treatment for multiple sectors of the healthcare industry and is a promising technology where safety is a prominent feature. It is an evolving sector, where education of the healthcare professional and the patient is crucial.

Mercury - the element of challenge

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Background: With the arrival of new instrumental technologies to pharmaceutical laboratories, such as ICP-MS equipment and Microwave Digestion Systems, for the application of new requirements in the control of elemental impurities in pharmaceuticals, new technical challenges have also arrived.

Arsenic, Cadmium, Mercury and Lead are extremely toxic metallic elements and rank amongst the priority metals that are of public health significance.

Purpose: Among these elements, Mercury (Hg) is particularly challenging in analytical terms, especially in multi-element analysis. With this work we aim to develop a more robust and reliable methodology to quantify this relevant element.

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Methods: Hg is a highly volatile element in nature, easily adsorbed on polymeric materials, not stable in water or nitric solutions and frequently forms complexes that volatilise. The maximum temperature set-point, in the sample digestion method has been reduced and the addition of intermediate steps on the heating ramp making the process less abrupt. Gold (Au) and Hydrochloric acid (HCl) were added to pre-digestion samples, standards and rinse solution.

Results: We managed to avoid the loss of analyte in the digestion process, increasing the recovery percentages up to 60% compared to the previous results. Au acts as a competitor of the adsorption effect on polymers, reducing the number of rinses required. The stability of solutions was also improved with the addition of HCl ensuring the formation of a stable Hg complex [HgCl4]2-.

Conclusion: After the implementation of this technical modifications, the authors were able to perform a more robust and accurate Hg analysis, measure at lower concentration limits and obtain results with more statistical confidence.

Study of the occurrence of aflatoxin M1 in raw cows' milk samples in the Bekaa Valley, Lebanon

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Background: Milk is considered a major component of a healthy human's daily diet which is known to have a wide range of nutritional and health benefits. However, in addition of being a key source of macro- and micronutrients, milk might contain natural food contaminants such as aflatoxin M1 (AFM1) which is known for posing serious health concerns.

Purpose: This study aimed to assess the occurrence of AFM1 in raw cow's milk in the Bekaa Valley using competitive enzyme-linked immunosorbent assay (ELISA) technique and compare the findings with permissible limits of international standards.

Methods: A total of 40 samples of raw cow's milk were collected between March and May 2018 from 40 different farms located all across the Bekaa Valley (West Bekaa, Zahle, and Baalback Districts) and were analysed for their AFM1 content using ELISA technique.

Results: AFM1 was found at a detectable level in 35 (87.5%) of the Bekaa Valley's samples: in 11 (78.6%) of West Bekaa District's samples, in 14 (100%) of Zahle District's samples, and in ten (83.3%) of Baalback District's samples. AFM1 mean concentration was 17.667±1.735 ng/L in the Bekaa Valley's samples: 21.028±3.808 ng/L, 16.299±2.660 ng/L, and 15.884±2.399 ng/L in West Bekaa, Zahle, and Baalback Districts' samples respectively. None (0%) of the positive samples had a concentration above the Lebanese Ministry of Agriculture, European Union (EU) countries, and United States AFM1 regulatory limit.

Conclusion: Despite the low incidence of AFM1 in the Bekaa Valley's raw cow's milk compared to other regions worldwide, AFM1 should be evaluated on a regular basis throughout the year across Lebanon given the hazardous nature that AFM1 imposes on human safety.

Knowledge, perceptions, and practices of pharmacists towards generic drugs in China: A cross-sectional study

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Background: Generic substitution has been performed in China with the national centralised procurement pilot programme launched in 2019 in 11 pilot cities.

Purpose: This study aimed to evaluate the pharmacists' knowledge, perceptions and practices towards generic drugs in the 11 pilot cities.

Methods: An online questionnaire was undertaken. A convenience sampling technique was implemented. Mann-Whitney-U or Kruskal-Wallis tests were used to compare the differences. Spearman's rho rank correlation was applied to see the associations between variables. P-values of <0.05 were considered significant.

Results: Two thousand, two hundred and ninety-one (2,291) pharmacists participated in the study. Most of the respondents had a good knowledge of the consistency evaluation of quality and efficacy (92.4%), and the definition of generic drugs (90.7%). However, only 9.8% of the respondents gave a correct judgement on the acceptance criteria of bioequivalence. A significant high correlation between the perception of efficacy and safety of generic versus brand name drugs and their supportive attitude to generic substitution was demonstrated. 45.7% of the respondents stated a dramatic increase in the amount of generic drugs used. Efficacy, safety of generic drugs, national policies and hospital regulations were three main factors affecting application of generic drugs.

Conclusion: There were gaps identified in the knowledge and perceptions among respondents. Reliability and quality of generic drugs were still top concerns for pharmacists. The feedbacks suggested a demand for interventions to develop

public awareness on generic drugs. Pharmacotherapy monitoring and patient education of generic drugs provided by pharmacists could be considered to ensure safety or quality of medication.

Discriminant analysis of tablets using an ultra-compact Raman spectrometer

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Background: Falsified medicines have been becoming more common worldwide. An accurate and simple method to identify falsified medicines is required for field use.

Purpose: The authors performed non-destructive analysis of tablets using an ultra-compact Raman spectrometer. In addition, we established a technique for discriminating falsified medicines by performing multivariate analysis on the Raman spectra.

Methods: The subjects were three medicines for erectile dysfunction and one antifungal medicine: tadalafil (Cialis) 20-mg tablets, vardenafil (Levitra) 20-mg tablets, sildenafil (Viagra) 100-mg tablets and fluconazole (Diflucan) 100-mg tablets sometimes advertised as female Viagra. For each medicine, the standard product and products obtained by personal import via the Internet (genuine or falsified) were used. Discriminant analysis was performed on the Raman spectra with soft independent modelling of class analogy (SIMCA) and partial least squares discriminant analysis (PLS-DA).

Results: It was possible to identify all falsified products by SIMCA using the standard product model. With PLS-DA, the authors could not create a good model because of many outlier products. It could, however, show that standards and genuine products were different from falsified products. SIMCA might be more suitable than PLS-DA for discriminating falsified medicines.

Conclusion: Non-destructive analysis using an ultra-compact Raman spectrometer could be accurate and useful to distinguish falsified medicines with multivariate analysis.

Factors influencing reporting of medical device related incidents in the Maltese healthcare system

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Background: The use of medical devices (MD) is associated with adverse incidents. Reporting of MD-related incidents by healthcare professionals (HCPs) is essential for successful post-market surveillance systems.

Purpose: The research objectives were used to investigate the incident reports (IRs) received within the National Healthcare System (NHS) and to explore factors influencing the reporting of incidents by HCPs.

Methods: Incident Reports submitted at the NHS by HCPs in 2019 were collated in a database and analysed. A focus group consisting of HCPs and regulatory experts was set up to identify barriers to HCP IR and to provide recommendations for the development of an improved IR system.

Results: A total of 107 MD related incidents were submitted in 2019, with injury to patient reported in 18 cases. Barriers to MD IR identified during focus group session include attitudes of HCPs, blame culture, legal liability, deficiencies in the MD procurement process, lack of training and education, recognition of MD incidents, and deficiencies in the current reporting method. Areas identified for improvement in the reporting form were (i) incident details, (ii) details of reporter, (iii) administrative information and (iv) checklist of procurement documentation.

Conclusion: The results indicated that there is under-reporting of MD incidents in the NHS. Changes to the current system are warranted to improve the reporting rates. Strengthening a safety culture based on lessons learnt and educational needs of HCPs, in the context of MD IR is proposed to improve patient and user safety.

Comparison of medical devices effectiveness, safety and quality regulation in Europe and Africa

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Background: Medical device regulation worldwide is diverse. Regulation is evolving as a result of the necessity to enhance patient safety. In Europe, the medical device directives were reviewed leading to the development of the Medical Device Regulation (EU 2017/745). Scandals such as those involving the silicone breast implants and metal to metal hip implants drove the need to institute changes in regulation.

Purpose: To evaluate the regulations and guidelines for medical devices in Europe and five selected countries in Africa, namely, Uganda, Kenya, Tanzania, Rwanda and Ghana with the goal of identifying gaps and proposing areas of improvement.

Methods: Questionnaires were administered to 20 regulatory officers and a key informant guide used to interview key informants from the different regulatory agencies in the countries stated. Questionnaires were self-administered and the key informant interviews conducted via telephone, Skype or face-to-face. Data analysis of audio interviews, transcripts and notes based on qualitative thematic content was conducted and reviewed for consistency for qualitative data. Questionnaires were used to carry out quantitative data triangulation on the interviews.

Results: Regulation of medical devices in Africa is limited. The results of the study demonstrated different maturity levels with regards to existence of medical device regulations, guidelines and actual practice in the countries that participated.

Of the seven countries that participated, three namely Kenya, Rwanda and Uganda lacked regulations.

Conclusion: The absence of a regulatory framework for medical device regulation in Rwanda, Kenya and Uganda implies that the scope of regulation is ill defined

Falsified medicines directive: Challenges faced by small member states

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Background: Falsified medicines might not satisfy requirements for safety, efficacy and quality. The Falsified Medicines Directive (FMD) Directive 2011/64/EU was introduced to European member states in 2013 to address the problem of falsified medicines and came into force in 2019.

Purpose: The study aims to assess perspectives of the different National Medicines Verification Organizations (NMVO) and National Competent Authorities (NCA) as they supervise national implementation progress of the FMD and to identify problems with daily operations of FMD in local community pharmacies and wholesalers.

Methods: Three validated questionnaires were prepared to assess the implementation perspectives of NMVOs and NCAs of European member states, local community pharmacies and medicines wholesalers.

Results: Questionnaire one is intended for NMVOs and NCAs of the member states and is divided into three parts: part one assessed the NMVO and NCA connection with repository systems, parts two and three evaluated the access to the repository systems and alert auditing. Questionnaires two and three were also divided into three parts: part one assessed the pharmacists' and wholesalers' preparedness for FMD implementation, part 2 assessed the set-up of pharmacies and wholesalers for FMD scanning and part 3 is related to FMD processes.

Conclusion: Questionnaires assessing perspectives regarding current FMD implementation can benefit NMVOs and NCAs to identify potential problems met by member states and provide viable suggestions to improve the execution of the FMD.

Low-quality medicine discrimination of metformin tablets by Raman scattering analysis

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Background: Low-quality medicines are becoming a problem in developing countries. In Southeast Asian, it has been confirmed that low-quality diabetic medicines (metformin) are in circulation.

Purpose: The purpose of this study was to test the applicability of Raman scattering analysis in the detection of low-quality medicine.

Methods: Low-quality products (n=3) and high-quality products (n=30) of metformin were collected via the internet. The model tablets containing metformin hydrochloride content of 8% to 100% with lactose and containing three types of metformin hydrochloride contents with different additive were made. Raman scattering analysis was performed using handy Raman.

Results: The spectra obtained by Raman and the result of PCA of spectra revealed that there was no significant difference between low-quality products and high-quality products of metformin bought over the Internet. As a result of the Raman analysis using model tablets, a change in the spectra according to the metformin content was observed. The results of PCA of spectra revealed that they were divided into three groups, and the tablets containing metformin content were 8%~46%, 47%, 48%~100%. In the result of the additive test, the spectra were confirmed that the peaks from metformin, but the shape of the overall spectra varied according to the composition of the additives. The result of PCA of spectra, one group was the tablets with high content of metformin. And when the tablets with medium and low content of metformin were classified besides these areas.

Conclusion: By Raman scattering analysis, it was possible to distinguish low-quality medicine.

When technology precedes regulation: A scoping study of the challenges and opportunities of e-pharmacy in LMICs

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Background: Medicine sales over the internet is a new, yet growing phenomenon in low- and middle-income countries (LMICs). E-pharmacy in high-income countries has raised public health concerns, including sales of prescription-only medicines without a prescription, the sale of counterfeit and substandard medicines, and inadequate provision of information to patients. E-pharmacy also presents opportunities for enhancing health systems, improving both patient experience and public health outcomes.

Purpose: The regulatory environment in which firms operate is likely to have a major effect on its impact; yet little is known about this emerging sector. This work aims to address this gap.

Methods: Drawing on a set of in-depth interviews, we review the scale of the e-pharmacy business, the regulatory frameworks that are developing in response to it, and the regulatory challenges and opportunities e-pharmacy poses in three LMICs: Kenya, Nigeria and India.

Results: Regulation has not kept pace with this innovation and in some contexts e-pharmacy markets have evolved in a regulatory vacuum. Informants raised concerns over the danger of online medicine sales in the absence of regulation; the lack of regulatory capacity; and of both under- and over-regulation. They also identified the opportunities associated with consolidation in the sector and the prospect of traceability and the transparency that online records of medicine sales may bring.

Conclusion: E-pharmacy could potentially prove to be a catalyst for re-thinking regulatory approaches in this sector.

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CONFERENCE ABSTRACTS

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Pharmaceutical Practice: Clinical Biology, Military & Emergency Pharmacy

Rapid biosensor for differentiation of types of bacteria as point-of-care testing

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Background: Detection of the bacterial cell type is an essential process in determining the treatment protocol. Analysis of detecting the type of bacteria, such as bacterial culture, takes a lot of time or is high cost such as PCR test.

Purpose: Development of a biometric sensor to detect the type of bacterial cells within 45 to 90 minutes with high accuracy.

Method: The idea of the sensor depends on a distinctive fingerprint for each type of bacteria. Its concentration is estimated to be 0.5 McFarland after exposing it to an amount of oxygen of 0.5 ml/dl for a period of 30 minutes, then exposing it to an increase in osmotic pressure to stimulate the osmo-regulation mechanism, which leads to speeding up the process by accelerating the absorption of oxygen by the bacteria, and thus Speed of obtaining the distinctive fingerprint in a time ranging from 45 to 90 minutes and the code is analysed by a computer. Experiments were conducted on 15 different types of aerobic bacteria and ten types of anaerobic bacteria at the University of Misr for Science and Technology, Faculty of Pharmacy and Cairo University and Faculty of Veterinary Medicine.

Results: The results showed a distinct and clear fingerprint for each type of bacteria; and the test can be relied upon to distinguish between the different types of bacteria in lab in a period ranging from 45 to 90 minutes.

Conclusion: This method is the fastest and least costly method globally for clinical uses, which is also appropriate for the capabilities of developing countries and can be applied as point of care testing.

Infertility factors and success in conjugal artificial inseminations

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Background: In clinical practice the authors observed that, when complying with the WHO (2010) requirements proposed as a candidate for artificial conjugal insemination (ACI), that this may not increase the possibility of pregnancy compared to couples who do not use ACI.

Purpose: To investigate a possible relationship between the number of inseminated sperm (IS) and female sterilisation-causing (SC) pathologies with the success of insemination.

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Method: Retrospective study of ICAs in our hospital (249 couples: 643 ICAs). Data collected: IS, female SC and whether or not pregnancy occurred. We selected patients who became pregnant and those with four or more ICAs without pregnancy. Classification based on the origin of the pathology: ovarian, tubal, uterine and sterility of unknown origin (SUO). Uterine and tubal pathologies were excluded due to low sample size.

Results:

-645 cycles, 72 pregnancies were obtained, calculating the relative frequencies for the different SI ranges. Similar results (approx. 20%) obtained in all ranges.

- x^2 statistic: p=0.16

- 249 couples, 89 with ovarian pathology and 52 with SUO were selected. ODDs ratio>1: higher probability of pregnancy in ovarian pathology.

Conclusion: There is no IS range in which the pregnancy rate is significantly higher. Probably because the sperms are previously selected by capacitation techniques, recovering the fittest. In ACI sperm are deposited directly at the bottom of the uterus, avoiding the physiological barrier of the cervix, losing SI importance.

SC ovarian pathologies are mainly related to hormonal imbalances, so the drugs used in ovarian stimulation prior to IAC can improve the chances of pregnancy. Patients with ovarian pathology are more than twice as likely to achieve pregnancy (OR=2.68) than the rest of the patients.

Results of Prevecolon programme in a sanitary district for a year

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Background: Prevecolon programme is aimed to asymptomatic population between 50-69 years old. This study is applied to faecal occult blood test (FOBT). A positive FOBT test indicates an intestinal bleeding, whose etiology must be determined performing a colonoscopy.

Purpose: To carry out a study of the results of FOBT from the Prevecolon programme in the authors' sanitary district for a year and associate it with the result of the colonoscopies performed to find out its usefulness in the early diagnosis of colon cancer.

Method: This test is based in antigen-antibody agglutination between human haemoglobin in the sample and polystyrene particles coated with human anti-haemoglobin antibodies.

It is a retrospective study with 14,285 samples included: 13,667 processed and 618 rejected.

Results: Thirteen thousand, six hundred and sixty-seven (13,667) samples were processed, with 948 positives; 863 colonoscopies were performed and 85 not performed. The results of the colonoscopies were:

- 43 adenocarcinomas; 53.0% corresponded to patients >68 years: 21 samples with results >1000ngHb/mL. Only three had results in the critical range (117-130 ngHb/mL)

- 49 adenomas with high grade dysplasia; 55.0% corresponded to patients >68 years: 21 samples with values >1000 ngHb/mL and four with values in the in the critical range.

- 480 adenomas with low grade dysplasia; 52.5% corresponded to patients > 68 years, 96 samples with values >1000ngHb/mL and 95 with values in the critical range.

Conclusion: A higher incidence of malignant processes has been observed with increasing age of the patients. The severity of the pathology is correlated with the concentration of FOBT. Results >1000ngHb/mL must be prioritised. Malignant processes are really low in the critical range.

Measurement of glomerular filtration rate (GFR) in live renal donors

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Background: Renogram in live renal donors is routinely performed using 99Tc-labeled diethylene-triamino-pentaacetic acid (99mTc-DTPA). Correlation and concordance with other measures of GFR is not already cleared.

Purpose: Comparison of GFR measurement methods in live renal donors.

Method: Retrospective study of 22 patients over 14 months. Measurement of GFR using 99mTc-DTPA, creatinine clearance (CrCl) and calculated GFR (MDRD6, MDRD4-IDMS and CKD-EPI). GFR (99mTc-DTPA). Intravenous dose of 150 µCi of DTPA. Blood sampling in contralateral limb two, three and four hours post-administration. Serum drug activity is counted in solid scintillation counter (Packard Cobra I). Mistry method with three extractions is used to calculate GFR. Serum and urinary creatinine. Spectophotometry (Jaffe method) in Abbott Architect c16000.

Correlation between variables was analysed using the Spearman coefficient and concordance with the Bland Altman method. Data were managed with SPSS 15.0 (Chicago, SPSS Inc.) and Epidat 4.2 (Consellería de Sanidade, Xunta de Galicia).

Results: Correlation with GFR (99mTc-DTPA). Significant correlation (p<0.05) with CrCl (ρ=0.551, p=0.008) but not with calculated GFR. Concordance. GFR (99mTc-DTPA) did not show concordance with calculated GFR. Bland Altman analysis between CrCland GFR (99mTc-DTPA) showed an average of the differences of 3.92 (IC95 (-11.03 to 18.87)) with a standard deviation of 33.74.

Conclusion: GFR (99mTc-DTPA) is widely used in live renal donors due to its high correlation with the gold standard (inulin). Our results show positive correlation and lack of bias between CrCl and GFR (99mTc-DTPA) suggesting both methods could be exchangeable.

Comparative analysis of two methods of sperm cryopreservation

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Background: Assisted reproductive techniques with frozen semen are dependent on sperm quality post-thaw. There are several sperm cryopreservation methods and every laboratory must use the most optimal

Purpose: To test the performance of two cryopreservation methods through sperm survival estimated with motility (MES) or vitality (VES).

Method: A prospective study was carried out over 29 semen samples. Every sample was divided in two aliquots in order to test both cryopreservation methods. All aliquots had 0.7 mL of a glycerol-based cryoprotectant (SpermFreeze from FertiPro) added per mL of sample.
Cryopreservation methods:

Method 1: Aliquots are at room temperature for 10 minutes, then they are frozen in nitrogen vapours for 15 minutes.

Method 2: Aliquots are left for one hour at 4°C and they are frozen in nitrogen vapours for 15 minutes. Both are stored in liquid nitrogen for at least 24 hours.

Samples were thawed in cold water bath for five minutes. MES and VES were calculated as the percentual difference between the fresh sample (unfrozen) and after thawing. Aliquots assigned to each method were thawed on different days and were evaluated by the same observer.

Statistical analysis of comparison of means was performed using Student's t-test on paired samples in the SPSS 13.0.1. Results were expressed as percentual average of the difference of MES or VES between methods.

Results: MES1- MES2. 8.6% (IC95(-0.47 to 17.71) p=0.062.
VES1- VES2. 11.34% (IC95(4.59 to 18.09) p=0.002.

Conclusion: The results indicated that method one is better than method two. Using method two there is a significant decrease in VES and almost significant difference (p=0.062) in MES suggesting the lowest survival is caused by mortality of nonmotile sperm.

Pilot study of reference intervals for different parameters in a Spanish paediatric population

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Background: The reference intervals of the biochemical parameters allow interpreting the clinical status in patients, and they are established according to the values in 95% of the healthy population. Scientific societies recommend each laboratory defines its own intervals.

Purpose: To define the reference intervals for different parameters in a Spanish paediatric population.

Method: A retrospective study has been carried out on 2,611 healthy children, whose serum samples were processed during 2018 in automated analysers for the determination of glucose, LDH, GOT, GPT, uric acid, potassium, sodium and chlorine.

The results were classified by sex and age groups (<1, 1-5, 6-10, 11-14, 15-18), and were subjected to a statistical analysis in Excel to divide the sample into percentiles and obtain the lower and upper limits (p2.5-p97.5), according to the methodology used in the CALIPER programme.

Results: The intervals for glucose, GPT, uric acid and ions have been defined without significant differences between sexes. Regarding the age group, it is observed that ions have very stable concentrations, while glucose and uric acid increase their levels with age.

However, patients under one year of age, as well as the LDH and GOT parameters, cannot be considered because a sufficient sample size was not been obtained.

Conclusion: The reference intervals in clinical laboratory tests are a fundamental tool for decision making, so it is necessary to define them based on the evidence, test method and recommendations of clinical guidelines.

In the paediatric population, they are highly important because small variations can be decisive in the diagnosis.

Comparison of two methods for the evaluation of sperm vitality

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Background: The sperm vitality evaluated in a seminogram determines the percentage of live and dead sperm, based on the membrane integrity. This index correlates with mobility and is important in samples that have more than 40% of immobile sperm, allowing to identify if these sperm are really dead.

Purpose: To compare two methods for the evaluation of sperm vitality.

Method: The correlation study was carried out on 50 semen samples, with a sperm mobility of less than 60%.
Sperm vitality was quantified by the following methods:

- The staining method uses eosin that can cross damaged membranes, so that dead sperm appear with the head dyed pink.
- -The hypo-osmotic swelling method uses a sodium citrate and fructose solution, that crosses the functional membranes, so that live sperm appear with the swollen tail.

Results: The correlation was evaluated using a linear and Passing-Bablok regression. The linear regression showed a good correlation (r=0.965), while the Passing-Bablok regression proved the absence of systematic differences, with a Spearman correlation coefficient of 0.909 and 95% CI. A linearity test was also applied obtaining a *p*-value of 0.243, so there were no significant differences. A contingency table has been prepared by dividing the samples according to vitality intervals, and it was obtained a concordance index of 88%.

Conclusion: The two methods for the assessment of vitality do not present statistically significant differences, so they are considered interchangeable.
In addition, the hypo-osmotic solution method may be a useful alternative when staining should be avoided, such as in the selection of sperm for in vitro fertilisation. Therefore, the choice of a particular method may be conditioned by the clinical situation.

Clinical and molecular review of congenital adrenal hyperplasia from a laboratory point of view

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Background: Congenital adrenal hyperplasia (CAH) is a disorder in steroidogenesis caused by an enzymatic deficiency, such as 21hydroxylase due to mutations in the CYP21A2 gene. This deficiency produces a decrease in mineralocorticoids and glucocorticoids, and an accumulation of 17 hydroxyprogesterone (17-OHP) and androgens. But clinical forms can be classified into classic (salt-wasting or simple virilising) and non-classic forms.

Purpose: To correlate different forms of CAH with laboratory data.

Method: A retrospective observational study of CAH has been carried out using data from a hospital from between 2013 to 2018. In all patients, baseline 17-OHP was measured by radioimmunoassay, and some subjects also underwent an ACTH stimulation test, considering that baseline and stimulated 17-OHP levels >10ng/ml were the cutoffs. But the confirmation diagnosis is based on the genetic study by PCR-ASO.

Results: A total of 37 cases with 21hydroxylase deficiency have been identified:

- five salt-wasting forms were detected in the first days of life, presenting severe mutations such as p.Q318X and p.R356W.

- one simple virilising form corresponding to a 32 years old man with p.I172N mutation.

- 31 non-classic forms (28 females and three males) resulting the average age at diagnosis of 18.65 years, and average levels of baseline and stimulated 17-OHP of 13 and 35.82ng/ml respectively.

Twenty-nine patients presented a mild p.V281L mutation in one of the alleles, and 19 are homozygous.

Conclusion: Neonatal screening for the 21hydroxylase deficit is essential because it is an alteration with serious consequences. It is important to consider that mutations of the 21hydroxylase enzyme gene are frequent. However, non-classic forms remain under-diagnosed in patients who consult for hyperandrogenism.

Microfluidic device for detection of COVID-19 detection in hospitals and medical labs

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Background: COVID-19 is the current most prominent global health problem. Rapid and accurate diagnosis of disease is one of the most important factors in eliminating the spread of the virus; developing countries are currently facing many problems related to the high cost of PCR tests for COVID-19.

Purpose: To develop a fast, accurate and low-cost method for making a PCR test for COVID-19.

Method: The method was based on the use of the RPA (Recombinase Polymerase Amplification) method. By making a microfluidic device including restored (RPA) Mixture and immobilised probes designed for the RPA reaction to take place inside. The experiments were conducted on 20 clinical samples, and conducted at the Faculty of Pharmacy, Tanta University.

Results: The results were identical in approximately 90% of the samples used and results were available after 30 minutes at normal room temperature. The results were read by measuring the level of the precipitate of the RPA reaction products resulting from the interaction of the reaction mixture with the Viral RNA.

Conclusion: This method is considered one of the fastest ways to detect COVID19 infection and it is the least expensive and can be used in developing countries and as point-of-care testing.

Multi-centre full-scale simulations in hospital pharmacies to improve disaster preparedness

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Background: Disaster management in hospital pharmacies is poorly studied and trained for.

Purpose: To assess the benefit of full-scale simulations to improve hospitals pharmacists' disaster preparedness in Switzerland.

Method: Successive full-scale simulations were realised in four hospital pharmacies. The full-scale simulations were approximatively six months apart. Three scenarios were created by an inter-professional team. Each scenario represented credible regional disasters with approximatively 50 casualties (multiple-vehicle collision, terrorist attacks and internal technical failures, respectively). Four evaluators used evaluation grids to judge participants during the simulation (rating on a scale of 1-5).

Results: All hospitals performed the initial simulation, two completed the second run and a last one realised a third exercise. The mean duration of simulations was 3.3 hours. On average, the four hospitals responded to 69% (±6%) of the expected actions. Differences between exercise one and two were observed. The average rate of action achieved increased from 64% to 79% (p<0.005). Moreover, the quality of these actions improved from 3.9/5 to 4.2/5 for these two hospitals (p<0.005). The first simulation resulted in both hospital pharmacies to create a disaster plan and train their staff on it.

Conclusion: This study highlights the value of full-scale disaster simulations for hospital pharmacies. The number of correct actions increased significantly. Globally, the full-scale simulations have improved the preparedness of the hospital pharmacies involved and promoted staff awareness. Results of further simulations in the four hospitals and others are warranted to confirm these preliminary observations.

Militia pharmacy officers' roles in the Swiss Armed Forces during the COVID-19 pandemic

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Background: On March 2020, because of the COVID-19 pandemic, the Swiss Federal Council mobilised conscript formations of the Swiss Armed Forces. This was the largest military mobilisation since the Second World War.

Purpose: To assess the roles of the militia pharmacy officers deployed throughout the country to assist the healthcare system.

Method: All missions performed by militia pharmacy officers were systematically collected and evaluated. They were also compared to the official duties of pharmacists in the Swiss Armed Forces.

Results: Ten pharmacy officers were enlisted in two out of four hospital battalions deployed, as well as in the medical logistic battalion and in the staff of the logistic brigade that embedded them. Their missions were mainly planning, conduct and control of medical logistics, as well as hygiene and drug manufacturing activities. In the hospital battalions, they especially managed:

1) supply of medical material dedicated to mission-related training, civilian health facilities assistance and medical transportation;

2) establishment and application of hygiene procedures;

3) provision of conscripts' own medication. In the medical logistic battalion, the support of both military and civilian pharmaceutical production facilities was the most important activity (e.g. disinfectants and anaesthetics manufacturing).

Conclusion: Thanks to their civilian and military background, militia pharmacy officers have been quickly and effectively deployed throughout the country. The role of pharmacists within their respective battalions has emerged as especially crucial in the pandemic context and some of the performed missions were beyond their traditional duties. Their basic training has to be further developed accordingly.