L-Università ta' Malta
Faculty of
Medicine & Surgery

Department
of Pharmacy

Dissertation Abstracts and Project Descriptions

2024

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L-Università ta' Malta
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FOREWORD

Contemporary and Futuristic Dimensions of Pharmaceutical Processes

Professor Anthony Serracino-Inglott
Pharmacy Practice Projects Co-ordinator

This year's Pharmacy Symposium serves as a notable demonstration of the advancement in a fundamental component of tertiary education, specifically the research endeavours that underpin the academic and administrative principles of the Department of Pharmacy. A review of the topics covered in the presentations reveals the extensive breadth and depth of student involvement in productive investigations aligned with the progression of pharmaceutical practice. These topics encompass a spectrum ranging from the evaluation of service quality to the regulatory aspects of pharmacy prescribing and the extension of community pharmacy services. The explored concepts contribute to the nurturing of future pharmaceutical professionals. Pharmacy students are guided to expand their proficiency not only to navigate through an environment characterized by demanding service requisites but also to excel in delivering a patient-centric approach resilient to external disruptions. As demonstrated by their presentations, which delve into areas such as certification and competence frameworks, integrated care, digital technology, disease management, and patient education, students exhibit exemplary performance. The educational framework adopted by the Department of Pharmacy offers a platform for the cultivation of leadership within the healthcare domain, fostering the establishment of an optimal health management system. Another cornerstone of the department's strategy involves providing students with opportunities to oversee their research projects, thereby fostering communication skills and fostering a mindset conducive to innovation. Such innovative initiatives are evident in the exposure to contemporary evolving concepts such as signal management, process optimization, sustainable practices, risk assessment, nanotechnology, and trend analysis. The paradigm shift towards increasingly smart and interconnected medical devices, coupled with the imperative to address the visibility of rare diseases within the healthcare landscape, underscores the importance of leveraging real-world data for the advancement of pharmaceuticals. Medication safety remains paramount across all pharmaceutical processes, as reflected in numerous student projects focusing on this foundational aspect of pharmaceutical science. Education emerges as a cornerstone of patient safety, as evidenced by research projects exploring educational interventions aimed at informing the general public about health medication risks, pharmacists' interventions regarding high-risk medications, patients' involvement in pharmaceutical care plans, and pharmacist-led educational initiatives addressing inflammatory bowel disease.

During the COVID-19 pandemic, the ethos of the Pharmacy Department was subjected to rigorous scrutiny. The Department made substantial investments to address the unprecedented disruptions to healthcare systems, financial landscapes, and societal norms. As evidenced by this Symposium, the Department not only withstood these challenges but also emerged with fortified determination towards achieving success. Students within the department have understood the importance of mutual support and collaboration. The utilization and incorporation of digital platforms have become integral to healthcare practices, as both millennials and Gen-X individuals have adapted to utilizing applications for medication management. In this context, there is a growing recognition of the necessity for a human-centred approach, indicating a shift in attitudes among a significant portion of Gen-Z and millennials towards enhancing healthcare outcomes. To facilitate this transformation, biotech and healthcare enterprises must rapidly evolve in a disciplined manner.

Students in the Department have been exposed to these contemporary and futuristic dimensions of pharmaceutical processes. Pertinently, in the context of projects concerning the development of courses in pharmacoeconomics, the comparison of medication pricing, the impact of pricing on medication accessibility, and the principles of patient-centeredness in medication procurement and inventory management are crucial considerations. In a highly regulated domain, like the pharmaceutical industry, regulatory perspectives cannot be overlooked. Areas such as European clinical trial regulations, entitlements pertaining to medical aids, supplier qualifications in the pharmaceutical sector, challenges in dossier compilation, and preparation for successful good manufacturing inspections are indicative of the research focus on regulatory sciences. Contemporary topics such as sustainable practices, medicinal cannabis use, and drug design remain areas of ongoing excellence within the Department, forming a significant part of Symposium presentations that continually enhance the Department's research portfolio.

The symposium serves as a platform that unites students enrolled in various programs within the Pharmacy Department, including Doctorate in Pharmacy, MPharm, M.Sc in Pharmaceutical and Regulatory Sciences, B.Sc (Hons) Pharm Tech, and B.Sc (Hons) Pharm. Sci. The students are the focal point and primary contributors to this event. The Department has embraced diversity by welcoming students from over twenty-eight different countries, a considerable number of whom are presenting their research findings at this symposium. This commitment to diversity in the field of pharmacy contributes to the global advancement of the profession, discipline, and scientific knowledge, showcasing rapid and significant progress. Developments in vaccination, biotechnology, and geriatric care indicate a golden era for our pharmacy department, where a shift from product-centric scientific practice to patient-focused care has been realized.

The cornerstone of the Department's success lies in the spirit of cooperation and collaboration, uniting students, administrative and technical staff, academics, and all stakeholders who generously contribute their expertise towards shaping tomorrow's pharmaceutical scientists and practitioners. This concerted effort enriches scientific discourse and ultimately benefits individuals afflicted by diseases.

PROFESSOR ANTHONY SERRACINO-INGLOTT
Pharmacy Practice Projects Co-ordinator

INTRODUCTION

Educating Changemakers in Pharmacy

Professor Lilian M. Azzopardi
Head, Department of Pharmacy

The European Sustainable Development Report for 2023/2024 released by the United Nations Sustainable Development Solutions Network underlines aspects in Europe that require attention to advance sustainable development. A particular area that is highlighted is 'access to and quality of services'. This dimension is intertwined with pharmacy and pharmaceutical sciences with reflections across a wide spectrum ranging from how pharmaceutical services are proposed and delivered, to ensuring access to safe and quality medicines and medical devices. We are at a point where the pharmaceutical community is called to action to turn its contribution in the development of new medicines and services in the healthcare ecosystem, into powerful tools for transformation towards achieving sustainable development in the healthcare sector. Key features that guide the contribution of pharmacy towards achieving sustainability and improved access to and quality of services include pharmaceutical workforce resource, interconnectedness, innovation and global perspective.

Traditionally the Department of Pharmacy, is recognized for being a pioneer in pharmacy education models with a vision of supporting pharmaceutical evolvements by providing graduates with skills to participate in change-making. The Department has evolved its portfolio to provide opportunities to develop pharmaceutical workforce that is relevant and meets the needs of the local pharmaceutical sector. The course leading to the Bachelor of Science in Pharmaceutical Technology is preparing graduates who are especially significant for the evolvement of pharmaceutical sciences in the pharmaceutical sector in Malta, through the opportunities presented in the pharmaceutical industry. The Master of Science in Pharmaceutical and Regulatory Sciences is the post-graduate programme dedicated to develop critical skills in pharmaceutical regulatory sciences whilst inspiring graduates to reflect and contribute to game-changing approaches that whilst ensuring patient safety increase equitable access to medicines and medical devices. The Department provides the students following the Bachelor of Science in Pharmaceutical Sciences and the Master of Pharmacy programmes, with transferable skills that are applicable to the different facets of pharmacy whilst ensuring that these skills are positioned within the greater dimension of patient-centricity. The groundbreaking approach to post-graduate professional education witnessed through the Doctorate in Pharmacy course, offered by the Department in collaboration with the College of Pharmacy of the University of Illinois, Chicago, gets pharmacists from different countries (over 20 countries) to reflect, investigate, problem-solve and develop a creative critical thinking mindset towards pharmacy services whilst addressing patients' needs within a collaborative effort.

The Department is committed to develop relevant graduates prepared to meet contemporary needs and lead initiatives that contribute to addressing sustainability and supporting achieving sustainable development goals in healthcare. By investing in a pharmaceutical workforce which during pharmacy studies is exposed to 1) international activities through collaborative programmes and dynamic European and international networking, 2) real-world practice during placements at public and private pharmaceutical settings 3) collaborative efforts through the engagement within the Faculty of Medicine and Surgery for interprofessional education and research initiatives, and 4) development of research skills to support innovation and critical thinking, the Department is showcasing pharmacy education models that provide tangible results in sustainable skills and competence development of graduates.

Within the Department of Pharmacy, students participate in projects and dissertations which rely on scientific study that facilitate the uptake of evidence-based practice and research outcomes into policy, procedures and services. Through this formative experience, students are supported to take actions by adopting a scientific approach to questioning, reflecting, and thinking. The staff within the Department is investing their efforts to empower students to develop these skills, so that graduates grasp the essential commitment to transformation in pharmacy and pharmaceutical processes.

PROFESSOR LILIAN M. AZZOPARDI
Head, Department of Pharmacy

Doctorate in Pharmacy

DISSERTATION ABSTRACTS

Doctorate in Pharmacy

DISSERTATION ABSTRACTS

Quality Evaluation of Clinical Pharmacy Services in an Intensive Care Unit

Ruth Agius

Background: Pharmacists' participation in Intensive Care Units (ICUs) has been shown to improve patient outcomes and it is important to ensure that the service provided is effective and of quality to actually achieve this.

Purpose: To develop and implement a quality system for pharmaceutical service provision within ICU and to evaluate the activities of clinical pharmacists in intensive care by assessing surrogate clinical outcomes.

Method: Phase 1 included assessment of current practices within ICU to propose a hospital policy based on the Pharmacists' Patient Care Process to provide a structured framework and standardise the provision of clinical pharmacy services in ICU. The policy was reviewed by an expert panel through a multi-level approach. During Phase 2, a data collection tool was developed and validated to capture and classify drug-related problems (DRPs) and pharmaceutical interventions (PIs) suggested by pharmacists in ICU. PIs recommended by a team of clinical pharmacists over 3 months were recorded in the data collection tool, categorised, and evaluated by an expert panel to assess the probability of a potential adverse drug event (ADE) occurring in the absence of the PI.

Results: The developed policy includes responsibilities and comprises 7 main practices of the ICU pharmacy team. Over 10 weeks, the ICU pharmacist-patient profiles of 130 patients were considered, where 408 DRPs had been identified; 38% (n=153) were related to dose selection, 25% (n=104) involved drug selection, and 12% (n=48) were related to monitoring. Most suggested PIs were related to change in dose 40% (n=162) and addition of medication 17% (n=71). Anti-infectives for systemic use were the most common group of medications identified in DRPs. Clinical pharmacists optimised fluid management for 14 patients and managed therapeutic drug monitoring for 35 patients to achieve therapeutic serum concentrations for medications with a narrow therapeutic index. Of the 30 PIs assessed by the expert panel, 11 were of medium and 13 were of low probability in preventing a potential ADE.

Discussion: This study aids to standardise the participation of clinical pharmacists in ICU and harmonises the quality of services. This research shows the benefits of clinical pharmacists in supporting to optimise patients' surrogate clinical outcomes in an intensive care area.

Biosimilars in Community Pharmacy Practice

Francesca Borg

Background: Biopharmaceutical manufacturers have been prompted by high costs and patent expiration of biologics to explore the development of biosimilars. Biosimilars increase patient access to biologic treatment, and can be placed on the market at lower prices, since their development can draw upon previously obtained data from the originator biologic. Biosimilar acceptance is still a topic of debate.

Purpose: To 1) assess patients' perceptions and concerns of biosimilars and clarify information needs, and 2) assess how pharmacist interventions affect perception on biosimilar use.

Method: A questionnaire and informational material in the form of infographics about biosimilars were developed in Maltese and English and validated. The research was conducted in 10 community pharmacies around Malta. These were selected out of 27 pharmacies managed by a pharmacy chain, where the researcher practices at one of these pharmacies. The 10 pharmacies were geographically selected to include the north, centre, and south regions. Sixty-five patients, around 6 patients from each pharmacy, took part in the study. They were provided with the validated questionnaire, to identify perceptions and concerns on biosimilars, and were all subjected to an educational pharmacist intervention, with the aid of infographics.

Results: Fifty out of 65 interviewed patients on biosimilars were not aware that they were taking a biosimilar and not the originator biologic. Nineteen patients were apprehensive with this fact pre-pharmacist intervention. Post-pharmacist intervention, six patients were still apprehensive. The main concern with biosimilars was side-effects (n=17). When asked which sources of information patients refer to when they require more information about biosimilar medications, 60 patients refer to the consultant, 39 refer to their family doctor, 32 to the pharmacist, 24 to online sources, 19 to the package insert, 2 to family members, 2 to the charge nurse, 1 to books and 1 to the relevant association. Forty-four patients agreed that a pharmacist intervention prior to initiation with a biosimilar would have benefitted them. Fifty-eight patients either strongly agreed or agreed that there is not enough education on biosimilars.

Discussion: A pharmacist intervention, which involved the use of infographics, proved to be beneficial in increasing the confidence of patients with the use of biosimilars.

Pharmacist Prescribing in Community Pharmacy Practice

Abigail Buttigieg

Background: The pharmacist role within a community pharmacy is an integral part of the healthcare system whereby pharmacists are responsible for the appropriate and safe use of medications. Pharmacist prescribing is being implemented around the globe as a means to increase patient access to healthcare services and to optimise use of medicine.

Purpose: To investigate the concerns and advantages of pharmacist prescribing by analysing different pharmacist interventions within the community and identifying scenarios in which pharmacist prescribing should occur.

Method: Patients were recruited within a community pharmacy and divided into two groups based on the presenting complaint. Group A patients were given a pharmacist intervention and/or a pharmacist recommended medication. Group B patients were referred to a doctor (GP) and the intervention was compared to medication given if the pharmacist could have prescribing rights. All patients were followed up after at least a week through a telephone interview where the therapeutic outcome was determined.

Results: One hundred patients (49F; 51M) with an age range between 25 to 34 years were included in the study. Fifty-six patients (Group A) accepted a pharmacist recommended medication and 44 patients (Group B) were referred to a GP. Forty-six patients from Group A reported symptomatic relief. From the 10 patients without symptomatic relief, 7 requested a doctor's appointment while 3 opted not to follow-up. Twenty-seven patients from Group B following the doctor's recommendation, reported symptomatic relief. From the 17 patients with unresolved presenting symptoms; 12 patients opted for a specialist consultation, 3 were admitted to the hospital and 2 opted not to follow up. From the 44 Group B patients, the pharmacist in 29 cases would have prescribed the same medication as that actually prescribed by the GP. In 15 cases from Group B, there were different medications prescribed by the GP than the pharmacist would have recommended.

Discussion: The 17 cases, where prescribing differences between GP and pharmacist would have occurred, consisted of 10 cases where minor ailments were treated with a broad-spectrum antibiotic which was not recommended as first-line treatment, 2 cases of contraindications and 5 cases where a glucocorticoid was recommended with no clinical indication.

Seamless Care Between Community Pharmacy and Pharmacy-of-Your-Choice Service

Elmery Gem Estorque

Background: The Pharmacy-of-Your-Choice (POYC) scheme in Malta provides free medicine and medical devices. Improving care transitions across various healthcare settings is essential for improving patient outcomes.

Purpose: To enhance seamless care under the POYC scheme, thereby reducing fragmentation and maximising the efficient use of POYC services.

Method: Flowcharts were developed and validated to illustrate the patient journey within the POYC scheme by consolidating information obtained from online pharmacy websites, official government websites, and the researcher's personal experience as a pharmacist. A validated questionnaire was disseminated to POYC patients. The validated questionnaire has a Likert scale (1–5) and multiple-choice questions exploring knowledge, experiences, barriers, and facilitators in care continuity, and recommendations for enhancing POYC services.

Results: Six flowcharts illustrating the process for: i) acquiring POYC medications; ii.) obtaining blood glucose monitor by diabetic patients, iii) opting for home delivery of complete nutrition preparation, iv) acquiring newly added medication(s) and/or medical devices, v) change in pharmacy and vi) patients entitled to schedule II to obtain their medication, were developed. Twenty-two POYC patients answered the questionnaire. Sixteen participants have adequate or superior knowledge of registering with POYC, 2 have adequate knowledge of logistics, and 1 has adequate knowledge of renewal of entitlement documents. Regarding entitlements, 10 qualify for open treatment, 12 for glucometers, 5 for complete nutrition, and 14 for controlled substances. Eight participants are entitled to medical devices, out of which 6 lack knowledge about the required documents, 11 learned about POYC from healthcare professionals, 13 need more information about POYC services. Nine waited over 28 days to receive the medications they were first prescribed, while eight received newly added medications within 2–7 days. Thirteen participants faced disruptions, mainly due to stock shortages. Ten suggested collaborating with suppliers or distributors and implementing a system for early detection of stock shortages, and 18 proposed adding more medications and devices to enhance POYC services.

Discussion: Analysing medication acquisition streamlines complex processes within the POYC scheme. Incorporating POYC patients' insights allows a comprehensive understanding of challenges in the current scenario, enabling the identification and resolution of issues to enhance seamless care transition.

Accessibility of Unavailable Medication

Andy-Vince Falzon

Background: The importance of health has been extensively recognised as a fundamental human right throughout history. This does not diminish that barriers arise which limit everyone from accessing and enjoying the highest possible standard of both physical and mental health. Limitations to accessibility and affordability to adequate treatment always significantly impacted public health, especially in the aftermath of geopolitical (Brexit) and pandemic (COVID) exigencies.

Purpose: This research aims to develop rational and prompt alternative treatment strategies based on availability while meeting patients' needs. The objectives of enhancing these aspects are to retrospectively analyse queries and propose frameworks to deal with such issues.

Method: The methodology involves two stages. Stage I, retrospective medication requests and sales recorded at the Mater Dei Hospital Pharmacy for medications that are not available within the private sector were analysed. Stage II consists of focus group discussions conducted to identify treatment barriers associated with accessibility and affordability by in-patients at Mater Dei Hospital.

Results: Initial analysis of retrospective data collected provided the top five medications dispensed from the Mater Dei Hospital Pharmacy due to lack of availability from the community pharmacies. The majority exhibited an increasing trend and the remainder a constant trend over ten years from December 2013 to November 2023. These are acetazolamide 250mg tablets (Dec 13-Nov 14; 27,531 tablets - Dec 22-Nov 23; 48,833 tablets), labetalol 200mg tablets, (Dec 13-Nov 14; 4,948 tablets - Dec 22-Nov 23; 22,867 tablets), propranolol 10mg (Dec 13-Nov 14; 56,585 tablets - Dec 22-Nov 23; 113,229 tablets), verapamil 40mg tablets (Dec 13-Nov 14; 11,828 tablets - Dec 22-Nov 23; 14,805 tablets) and liothyronine 25mcg tablets (Dec 13-Nov 14; 2,987 tablets - Dec 22-Nov 23; 10,771 tablets).

Discussion: This data should provide a list of medicines to suppliers frequently requested by patients which are not available in the community pharmacies. The availability of the medications would decrease the inconvenience caused to the patients being redirected to the hospital pharmacy and decrease unnecessary pressure on the hospital pharmacy.

Establishing a Pharmacist-led Helpline Service for Paediatric Oncology Patients

Sarah Marie Falzon

Background: The pharmacist holds a key role in detecting, preventing, and resolving drug-related problems (DRP's). Consequently, as part of the Medication Management and Use (MMU) strategy in achieving safe and effective pharmacotherapy and its optimisation, it becomes a pharmacy obligation to ensure the effective provision of patient-centred pharmacotherapy. One important aspect of this would be to reduce the differences between patients who are actively receiving treatment at the hospital and those who are discharged on treatment at home.

Purpose: The aim is to establish a pharmacist-led helpline framework for paediatric onco-haematology patients, with adequate outreach to keep track on pharmaceutical care outcomes. The objectives are is to evaluate the expectations of physicians, nurses, and parents/legal guardians for the proposed service, compile and validate tools required to run the helpline service, develop a quality management system required to run the service and to identify training needs for pharmacists required d to support the helpline.

Method: This study is set at the Paediatric-Adolescent onco-haematology ward within Sir Anthony Mamo Oncology Centre at Mater Dei Hospital. The methodology focused on the development and validation of the pharmacist-led helpline framework.

Results: Key study findings include the individualisation of documentation required to run the helpline and for setting up the quality management system of the framework; including training needs for individuals running of the helpline, as well as development of tools to monitor and evaluate the service.

Discussion: The significance of the research relates to providing a link between oncology patients within the community and the hospital team by enabling response to patients' needs in a more timely and efficient manner. The developed framework is versatile and can be adapted to be used in other clinical settings.

Best Practice Implementation Strategy In the use of Oxytocin During Labour

Rebecca Marie Falzon

Background: Different practices are followed globally with no uniformity in Oxytocin (OT) concentrations, doses, rates, and duration of infusion.

Purpose: To analyse local use of OT with the scope of developing a Best Practice Implementation Strategy for OT use during labour.

Method: The 'Safe Administration of Oxytocin Implementation Toolkit' developed by the Provincial Council for Maternal and Child Health[1] was identified as being the most appropriate tool to carry out a gap analysis. Weaknesses in the local system were highlighted and addressed using the algorithms, checklists, and patient resources within the toolkit. Cases from 2022 were analysed retrospectively using a pre-validated data collection tool. The Best Practice Strategy was developed and was validated by an expert panel consisting of four obstetricians, two senior midwives and two pharmacists.

Results: The gap analysis indicated that local practice fulfils most of the required clinical checks with weaknesses in documentation practices. Data of 30 parturients during 2022, excluding elective caesarean sections was compiled and divided into 2 groups according to use of OT. OT was used in 17 cases, 10 of which were inductions. The average Apgar Score at 5 or 10 minutes was 9 and no NPICU admissions were recorded. From the 7 cases where the frequency of contractions was more than 4 in 10 minutes, OT was used in 6 cases. Two out of the four cases where variable decelerations with concerning factors were noted, OT had been used. The strategy developed focused on optimising practice through the development of checklists to support documentation to reduce risk of errors. The identified checklists were validated by an expert panel for practicality and applicability. Sessions were carried out with midwives working at Labour Ward to disseminate the strategy by sensitising to safe use of OT and the implementation of the identified checklists.

Discussion: Efforts are required to avoid the routine use of OT and improve patient safety by adhering to best practices. Checklists that are feasible and practical to use contribute to documentation practices that ensure standardisation of use and improve patient safety.

Reference:

1. Provincial Council for Maternal Health and Child Health. Safe Administration of Oxytocin. Implementation Toolkit. Ontario: 2022.

Risk Management for Antidote and Emergency Preparedness

Paula Gambin

Background: Antidote preparedness is a major challenge for both acute emergencies and mass casualties. Identification and management of risks is a crucial aspect in the development of risk management strategies to ensure no disruptions in antidote supply chain.

Purpose: To review the management of antidote preparedness in Malta and to develop local guidelines on emergency preparedness based on risk management principles.

Method: This study was divided into three phases. Phase one assessed local antidote availability and identified risks in emergency preparedness in Malta. A risk assessment was performed through the performance of (i) vertical audits of eight chosen antidotes at Mater Dei Hospital (MDH), Gozo General Hospital (GGH) and, at the Central Procurement and Suppliers Unit (CPSU), (ii) onsite observations at the Emergency Department at MDH, Pharmacy Department at GGH and at CPSU, and (iii) discussions with experts in the field. Phase two involved the validation of the risk assessment by a focus group composed of two toxicological consultants, six pharmacists and one charge nurse, in relation to acute cases and mass health threats. Risk matrices were developed for the prioritisation of validated risks. Phase three included the development of guidelines and recommendations for enhanced local emergency preparedness.

Results: Phase 1: Thirteen risk themes emerged from the thematic analysis of data collected from the vertical audits, onsite observations and meetings with experts in the field. Phase 2: All thirteen risk themes were validated by a focus group. The risk matrices developed from the identified, validated hazards, revealed three hazards as being major risks in local emergency preparedness. Phase 3: Algorithms were developed for optimisation in emergency preparedness focusing on (1) Problematic sourcing (2) Inadequate stocking of antidotes and (3) Lack of transparency, poor communication and record keeping on local antidote availability.

Discussion: Findings indicate the need for healthcare system optimisation in emergency preparedness. Risks associated with availability can be mitigated through the establishment of international cooperation agreements at European and global levels. Risks in antidote and emergency preparedness call for a better coordinated national strategy in the management of emergency preparedness.

Pharmacy-of-Your-Choice Service Improvement through Digital Technology

Janelle Bianca Doria Mary

Background: The adoption and integration of digital technology to services such as the Pharmacy-of –Your-Choice (POYC) are essential to meet the increasing demand of a constantly dynamic world and population. Digitalisation has already been partially implemented with the POYC scheme, however, challenges seem inevitable.

Purpose: To optimise the POYC service through the exploitation of digital technology.

Method: The study is divided into two phases. Phase I involves the formulation of the processes adopted in the current system of the POYC scheme in the POYC unit and community pharmacy through (i) the review of standard operating procedures at the POYC unit and (ii) interview of full-time community pharmacists, respectively. Phase II consists of the development and validation of a questionnaire to evaluate the POYC service carried out in the community pharmacy using information technology (IT) system.

Results: The processes employed in the operation of the POYC scheme in the POYC unit is formulated. The outlined operational process emphasizes the distribution and movement of pharmaceutical stocks in the POYC unit, commencing from the stage of acquisition from the Central Procurement and Supplies Unit to the stage of allocation among the respective participating pharmacies to patients. The developed questionnaire is composed of dichotomous and multiple-choice questions in English to determine the strengths and challenges within the current system of the POYC scheme. The questionnaire incorporates a five-point Likert scale to analyse the processes employed in the operation of the POYC scheme in the community pharmacy and investigate the challenges encountered during the service while using the IT interface.

Discussion: The process flowchart may help community pharmacists to better understand the operation of the POYC scheme which may render the service they provide to patients more effective and efficient. The questionnaire will be disseminated to community pharmacists across Malta and Gozo to identify the challenges encountered during the POYC service which may need improvement to enhance resource allocation and productivity, reduce production costs and medication wastage, and increase quality health outcomes.

Enhancing Medication Error Reporting

Julia Micallef

Background: Medication errors within health care settings are a cause for concern. Reporting of such errors may contribute to a reduction in medication error occurrence.

Purpose: To increase medication error reporting (MER) in a local rehabilitation setting by identifying and addressing barriers which inhibit submission of such reports.

Method: A validated anonymised questionnaire was formulated and distributed to the study population consisting of doctors, pharmacists and nurses, to acquire feedback on awareness on the current MER system in place at Karin Grech Rehabilitation Hospital (KGRH). Analyses of data from the questionnaire were utilised to determine strategies for an improvement in error reporting. Presentation sessions focusing on MER were organised for each faction within the study population. To enhance accessibility to MER forms, QR code flyers were developed and strategically placed on wards at KGRH. A graphic report format to provide feedback to KGRH staff was developed and validated by a team of healthcare professionals (HCPs). Following implementation of the new strategies, trends in MER from June-September 2023 and October 2023 - January 2024 were compared.

Results: Questionnaire results indicated that 88% of the study population (N=86) are aware of the current MER system in place at KGRH, but 55% have never reported a medication error. Most HCPs (87%) regarded the MER form to be accessible, but 35% encounter barriers to report errors. Over 58% of the study population did not know how to access the electronic version of the medication error report form. Periodic feedback reports for submitted MERs are considered helpful to increase reporting by 84% of HCPs, while 52% are not aware of the 4-monthly feedback provided. Following implementation of the new strategies, a twofold increase in the number of reports submitted was noted, from an average of 13 to 27 reports per month. The new report format was implemented for provision of feedback to KGRH staff.

Discussion: Increasing awareness on MER and improving MER systems enhances a safety culture for HCPs, improves patient safety, and contributes towards continuous quality improvement.

Piloting Extended Community Pharmacy Services

Valerie Ariane Rivera

Background: A previous study[1] proposed a framework for implementing standardised clinical community pharmacy services in Malta. The present study addresses piloting of these services.

Purpose: To test the feasibility of implementing extended community pharmacy services.

Method: 1) Observation was conducted in the study setting to identify extended services to be piloted and infrastructure for service implementation in accordance with literature. The 17 proposed standard operating procedures (SOPs) categorised into medicine use review, patient review and advice/treatment services[1] were appraised. 2) Eleven services were selected and SOPs updated based on literature review reflecting patient impact and practicality, a new SOP (urinalysis) was compiled, and a pharmacist checklist for each service developed. 3) SOPs and checklists were validated for relevance of content, comprehensibility and presentation by 4 community pharmacists and 3 general practitioners. 4) Feasibility testing was conducted in a community pharmacy (300 hours), with a target of 10 participants identified by convenience sampling for each service.

Results: Infrastructure present comprised a private consultation area, one pharmacy support staff, medical devices/consumables, and documentation forms. Updates to the SOPs included provision of outcome of review/result to patient, improved documentation, reference to evidence-based guidelines, and treatment options. SOPs and checklists were rated highly (>4 out of 5) by the validation panel. Eighty-three participants were recruited; number of participants (n) and time (mean M, range R, in minutes) for the services piloted were: Medicine use review (n=10, M=14, R=10-24), patient review (n=20, M=20, R=14-28), including blood pressure measurement, weight management, or urinalysis, and advice/treatment services (n=53, M=17, R=11-26), including eye, ear, skin conditions, sore throat, urinary tract infections, smoking cessation, routine immunisation, or international travel health. Pharmacist interventions were non-pharmacological advice (n=83), referral to general practitioner (n=42), and/or pharmacotherapy recommendations (n=40). The majority of participants (n=82) were satisfied with pharmacist interventions.

Discussion: Availability of the necessary infrastructure and utilisation of practical checklists support the feasibility and successful implementation of extended community pharmacy services within a collaborative care context. Service implementation led to pharmacist interventions which were accepted by patients.

Reference:

1. Cancellu O. Clinical Pharmacy Services in Primary Care [dissertation]. Msida (Malta): Department of Pharmacy, University of Malta; 2022.

Clinical Pharmacy Services within an Interdisciplinary Model of Care in Adult Oncology

Brandon Sultana

Background: Identifying effective clinical pharmacist contributions within the provision of pharmaceutical services, enhances outcomes of therapy and supports interdisciplinary oncology patients' management.

Purpose: To develop, implement and evaluate a pharmaceutical care model within oncology, reflecting the relevant contribution of pharmacists through optimisation of patient care. The objectives were to undertake a gap analysis assessing current pharmaceutical service with established practice guidelines, to develop a standard policy and linked standard operating procedure (SOP) for the service provision, and to implement the pharmaceutical care model and consolidate it.

Method: The research was divided into three phases. The first two phases included the evaluation of the existing policy framework, gap finding and identification of weaknesses and opportunities. An SOP was tabulated and consequently a pharmaceutical care model was developed through adoption and adaptation of guidelines obtained from various international bodies and validated by an expert panel (n=4). Phase three of the research involves the implementation of the developed framework whereby the application of the policy and the proposed SOP, is undertaken across the compounding unit and oncology wards over three months. Anonymised data from patients receiving treatment was used to develop medication records highlighting pharmacotherapeutic profile and identification of drug-related problems.

Results: From the gap analysis (Phase 1), the pharmacist prescription validation was limited to the data presented at prescription phase rather than a clinical pharmacist evaluation of the patient profile, limiting a personalised patient appraisal. The developed policy and SOP (Phase 2) consist of three dimensions namely patient parameters, pharmacotherapeutic choice including dosing, and drug delivery systems. For the implementation aspect (Phase 3): 307 cases were investigated, from which 72 drug related problems (DRPs) were identified. These DRPs included occurrence of side effects (n=38), issues with dose selection (n=28), and issues with drug selection (n=6).

Discussion: Expanding the pharmacist contribution to oversee a holistic patient approach within oncology pharmacotherapy management, strengthens the interprofessional care model that streamlines patient needs within a personalised patient approach. This phased study design is intended to achieve the transformation from a product-centric to a patient-centric approach in a controlled and solid manner, respecting principles of change management dynamics.

Blood Pressure Monitoring in Community Pharmacy

Michaela Vella

Background: Home blood pressure monitoring (HBPM) and ambulatory blood pressure monitoring (ABPM) compliment patient monitoring, assess white-coat hypertension and diagnose masked hypertension.

Purpose: To identify pharmacist-led contributions in patient empowerment of blood pressure (BP) self-monitoring and the application of ABPM in community pharmacies. The objectives were to: 1) Appraise HBPM and ABPM devices, 2) Propose pharmacist interventions supporting patient empowerment of BP self-monitoring, 3) Assess the feasibility of introducing ABPM in community pharmacies.

Method: In phase 1, HBPM and ABPM devices available on the market were appraised. In phase 2, a data collection sheet to assess practice of BP patient self-monitoring and an action plan to facilitate patient empowerment were developed and validated. The data collection sheet and action plan were implemented by means of an interview to 120 participants on antihypertensive therapy recruited from 4 community pharmacies by convenience sampling. In phase 3, 10 patients satisfying the inclusion criteria (newly diagnosed with hypertension, recent change in medication or dose, or patient reported non-compliance to hypertension management), were recruited from phase 2 for 24-hour ABPM monitoring. The feasibility of introducing ABPM in community pharmacies was evaluated.

Results: For phase 1, 25 HBPM devices and 3 ABPM devices available locally were analysed and compared for technical specifications and user accessibility. Based on cost and availability, GIMA® 24 hours ABPM + Pulse Rate Monitor was chosen for this study. For phase 2, 69 participants were female, the majority were between 69-78 years (n=48) and 43 participants were on antihypertensive medications for 11-20 years. Adoption of HBPM was reported by 66 participants (55%). Pharmacist intervention to empower patients for HBPM included information on benefits and devices available (n=54) and adequate frequency of HBPM (n=21). For phase 3, the application of ABPM was accepted by patients (n=8), achieved the 24-hour monitoring (n=9), required 30-60 minutes of pharmacist time, and led to a report which was used by the pharmacist to provide patient recommendations, where 4 patients required physician referral.

Discussion: The pharmacist-led ABPM service adopted in this study was feasible and contributed to identify patients requiring further assessment. The action plan developed addresses strategies applicable to patients defaulting HBPM.

M.Pharm. Students

DISSERTATION ABSTRACTS

M.Pharm. Students

DISSERTATION ABSTRACTS

Social and Administrative Pharmacy

Certification and Competency Frameworks

Mouna Fazaa

Background: In the pharmacy profession, technical, organisational, communication skills, values and behaviours learnt through education and work experience are put together to form a competency framework for pharmacists to meet the standards of the profession.

Objective: To identify and compare competency frameworks for pharmacy that are available internationally.

Design: Competency frameworks available globally, regionally and at a national level were identified through an online search using "competency frameworks for pharmacist" as key words.

Settings: Department of Pharmacy, University of Malta.

Main Outcome Measures: Comparison of competency frameworks for pharmacists available globally.

Results: To date 11 frameworks have been identified. The frameworks of Australia[1], Canada[2], the United States[3], and the global competency framework developed by the International Pharmaceutical Federation (FIP)[4] were compared. The content showed commonalities in core domains namely health promotion, pharmaceutical care, professional and personal development, communication. Differences were found with the inclusion of new emerging domains such as entrepreneurship.

Conclusion: The frameworks showed similarities in the outline of the core domains. The distinctions were associated with practical training requirements and inclusion of new aspects reflecting the evolving nature of the profession.

References:

1. Pharmaceutical Society of Australia, National Competency Standards Framework for pharmacist in Australia: Australian Capital Territory, 2016.
2. National Association of Pharmacy Regulatory Authorities, Professional Competencies for Canadian at Entry to Practice, Canada: Ontario, March 2014.
3. Accreditation Council For Pharmacy Education, Accreditation Standards And Key Elements For The Professional Program In Pharmacy Leading To The Doctor Of Pharmacy Degree, United States: Illinois, February 2015.
4. International Pharmaceutical Federation, FIP Global Competency Framework Supporting the development of foundation and early career pharmacists, The Netherlands: The Hague, version 2 2020.

Pharmaceutical Workforce Demographics

Akhila Narayanan Nair

Background: The World Health Organization (WHO) estimates that there is a global healthcare workforce shortage of 7.2 million, which is predicted to grow to 12.9 million by 2035.[1] The shortage in the pharmacy workforce has a negative impact on the profession and the public, including job-related stress, long working hours, low job satisfaction, and short time for patient counseling.[2] Understanding pharmaceutical workforce demographics nationally and in the global context contributes to providing solutions in the healthcare workforce needs.

Objective: To understand Malta's pharmaceutical workforce demographics and analyse trends.

Design: Anonymised data of registered pharmacists is accessed through the registering body. Five components namely gender, area of practice, years of practice, pharmacy education, and experience are analysed.

Setting: Department of Pharmacy, University of Malta.

Main Outcome Measures: Demographics and trends of pharmacists' workforce.

Result: The data analysed contributes to provide a horizontal spectrum of pharmacists' distribution in practice and pharmacist education profile. This evaluation allows for trends analysis across the pharmacist workforce which can be adopted to support stakeholders to overcome challenges and predict needs in addressing workforce shortage.

Conclusion: The study contributes data on the present pharmacist workforce and gives an insight into trends. Recommendations can be made to reflect workforce diversity, society needs and foster an atmosphere of skills and vision evolvement.

References:

1. Bates I, John C, Bruno A, Fu P, Aliabadi S. An analysis of the global workforce capacity. Human Resources for Health 2016;14(59):1. doi: 10.1186/s12960-016-0158-z.
2. Parvez D. Pharmacy workforce: Trend analysis [dissertation]. Msida (Malta): Department of Pharmacy, University of Malta;2022.

Lessons Learnt from the COVID-19 Pandemic

Joseph Scerri

Background: The rapid evaluation of COVID-19 vaccines resulting in limited authorisation elucidated a people discussion on the scientific aspects surrounding the safety aspects behind vaccine use.

Objective: To investigate different COVID-19 vaccines available considering science aspect together with clinical studies.

Design: A questionnaire is administered to 50 individuals from the general population who will be approached and invited to participate in the study. The questionnaire contains 4 sections: personal background, information related to the COVID-19 vaccine, COVID-19 experiences, and behavioural practices regarding belief in vaccine safety and efficacy. The results correlate the data obtained in sections 1-4 with emphasis on myths and beliefs.

Setting: Department of Pharmacy, University of Malta

Main Outcome Measures: Beliefs in vaccine safety and efficacy

Results: Results were obtained from 49 respondents. The myths selected for investigation included that certain blood groups are less likely to get severe infection of the COVID-19 virus, the side effects of the COVID-19 vaccine are dangerous and that the COVID-19 vaccine may affect fertility in women. A highlighted myth in the literature namely that COVID-19 vaccine may affect fertility in women was included in the questionnaire in the form of a Likert scale. On the Likert scale respondents scored a 3 which corresponded to neutral, 8 respondents scored 4 or 5 which (agreed or strongly agreed) whilst 13 scored 1 or 2 (disagreed or strongly disagreed).

Conclusion: The analysis of the questionnaire with regards to the myths investigated showed that 57% (n=49) agreed with the scientific explanation rather than with the perception of myths.

Policy Framework on Biosimilars Introduction

Sarah Xuereb

Background: At present, in Malta, there is no published national policy available for clinicians to follow up in case of switching from a biologic to a biosimilar. The policy would aid clinicians in terms of reassurance and harmonization practices.

Objective: The study's objective is to draft a policy from the data collated through the interviews undertaken in the previous study titled "Market Entry and Competition: Biologics and Biosimilars" in relation to new published evidence and to compile validated questions to evaluate the proposed policy.

Design: A policy was drafted post the SWOT analysis of the use of biologicals and the switchovers to biosimilars. The relevant questions for psychometric analysis were compiled and validated. The proposed policy was referred to the expert group for review and validation.

Setting: The study was carried out within the local Health system – involving clinical, policy and procurement professionals.

Main Outcome Measures: The endpoint of this study is to have a validated policy for clinicians and policymakers to refer to when switching from a biologic to a biosimilar or to other biosimilars.

Results: From a previous study carried out, a questionnaire was created and validated by healthcare professionals. This questionnaire was submitted to consultants with knowledge in the field where data obtained from this study was analysed using SWOT analysis. These results, together with a literature review, aided in the creation of a policy draft with the aim of encouraging interchangeability. A set of questions were assembled in order to validate the policy draft.

Conclusion: The proposed policy was created to include a guidance note in terms of interchangeability so that the clinical decision is accountable and supported. Introduction of the policy will aid in more biosimilar prescribing and hence, reduction of costs that will allow the introduction of new medicines on the formulary leading to more treatment options for the patient.

Digitalisation in Pharmacy: Community Pharmacist and Patient Empowerment

Amber Zerafa

Background: Pharmacists and patients might feel overwhelmed with the rapid development of digitalisation in healthcare.

Objective: To understand how pharmacists and patients feel towards digitalisation and identify which areas can be further explored.

Design: Two questionnaires were prepared as research instruments, one for community pharmacists and one for patients. The questionnaires were validated and a test-retest reliability check was conducted for both questionnaires. A framework is developed which identifies how challenges are addressed and describes digital opportunities in pharmacy.

Setting: University of Malta.

Main Outcome Measures: Digital skills pharmacists feel they need to be equipped with, how pharmacists can use their expertise to maximise patient preparedness and what digital tools are relevant to address disease management. The framework developed serves to identify action plans to address pharmacist needs and patient empowerment.

Results: For the pharmacist questionnaire: 43 pharmacists completed the questionnaire, 40 felt confident with their digital skills, 28 said they had not acquired digital skills during their education and 39 said they are interested in learning more about digitalisation. Chi square testing showed a significant association with the amount of years working in a community pharmacy and the pharmacist's confidence in answering queries about digital health technologies. For the patient questionnaire, 56 responses were received, 54 said they view the pharmacist as having an important role in assisting them with when and how to use digital health technologies. The framework identifies digital health technologies that can be applied in practice.

Conclusions: Patients have a positive view of digital health technologies and pharmacists are interested in expanding their digital health skills.

M.Pharm. Students

DISSERTATION ABSTRACTS

Pharmacotherapeutics

Pharmacogenetics-guided Proton Pump Inhibitor Therapy in Clinical Practice

Leanne Borg Gauci

Background: CYP2C19 genetic polymorphisms influence response to proton pump inhibitor (PPI) therapy.

Objective: To appraise evidence on the clinical relevance of CYP2C19 genetic variation and PPI response and propose a framework for pharmacogenetics (PGx)-guided PPI therapy.

Design: A bibliographic study (2012-2022) was conducted using PubMed® and ProQuest®. Search terms were (proton pump inhibitor) AND ((pharmacogenetic) OR (pharmacogenomic) OR (CYP2C19). A framework for PGx-guided PPI therapy was compiled reflecting bibliographic study findings and adapting a previously developed algorithm.[1]

Setting: Department of Pharmacy, University of Malta

Main Outcome Measures: Clinical relevance of CYP2C19 genetic variation and PPIs; framework for PGx-guided PPI therapy.

Results: From the 108 eligible articles appraised, most (63%) were research articles. The majority (87%) of research articles evaluated the correlation between CYP2C19 genetic polymorphisms and PPIs. The correlation was statistically significant in 67% of the articles in the following patients designated as 'priority groups': Helicobacter pylori infection (37%), paediatrics (22%), patients experiencing side-effects (15%), oesophagitis (12%), gastro-oesophageal reflux disease (10%), and others including oesophageal stricture, gastro-intestinal bleeding, and peptic ulcer disease (14%). PGx-guided PPI therapy to improve outcomes was recommended in 15% of the articles. The proposed framework considers newly diagnosed patients/previously exposed to PPIs, 'priority groups', inadequate response/side-effects, and pre-emptive/reactive PGx testing.

Conclusions: A clinically relevant association between CYP2C19 genetic polymorphisms and PPI therapy response was identified. The research contributes a framework for clinical implementation of PGx-guided PPI therapy.

Reference:

1. Harris DM, Stancampiano FF, Burton MC, Moyer AM, Schuh MJ, Valery JR, et al. Use of pharmacogenomics to guide proton pump inhibitor therapy in clinical practice. Digestive Diseases and Sciences. 2021;66(12): 4120–4127. doi:10.1007/s10620-020-06814-1

Educating the General Public on the Risks of Self-Medication

Miguel Camilleri

Background: The relevance and impact of self-medication in the primary healthcare system is an area that receives focus as a means to empower patients and increase efficiency in the healthcare ecosystem.

Objectives: To determine the prevalence and the risk associated with self-medication practices.

Design: Two questionnaires regarding the risks of self-medication, one intended for the general public and one for healthcare professionals, were developed and validated. Questionnaires were disseminated through social media and physically through a community pharmacy. Data analysis was carried out.

Setting: Primary care and community pharmacy.

Main Outcome Measures: An information sheet to raise awareness of the risks of self-medication is developed, validated and disseminated to the general public.

Results: The general public's questionnaire was answered by 261 participants of which 71% (n=184) were female and 77% (n=201) admitted to self-medicating with the main reason being that the illness was minor (63%/n=163). The most popular type of medication used for self-medication was cough syrups (63%/n=165) whilst the main risk associated with self-medication was the incorrect choice of treatment (54%/n=140). The correlations between level of education and patients knowing the meaning of self-medication (p=0.039) and patient's level of education and whether or not they self-medicate (p=0.022) were statistically significant. The health care professional's (HCP) questionnaire was answered by 66 participants of which 58% were female (n=38) and 64% were doctors (n=42). The main reason HCP believed patients self-medicate was due to the waiting times at healthcare facilities (73%/n=48) whilst menstrual pain and cough and common cold were the main medical issues HCP think patients opt to self-medicate for (74%/n=49).

Conclusion: The general public is self-medicating, with the main reason being that the illness was minor. Cough syrups are the medications that the general public is self-medicating with the most.

Management and Outcomes of Patients with Aortic Stenosis

Samuel Cremona

Background: Selecting an optimal antithrombotic strategy post-transcatheter aortic valve implantation (TAVI) is challenging.

Objective: To assess antithrombotic therapy and outcomes in patients undergoing TAVI.

Design: A data collection sheet was developed and validated. After ethics approval, all patients who underwent TAVI (Jan 2019-May 2022) were identified. Patient characteristics, comorbidities, investigations, medications and outcomes (bleeding or drop in haemoglobin, acute kidney injury, mortality) were collected from hospital records at baseline, during procedure and up to one-year post-TAVI.

Setting: Cardiac Catheterisation Suite, Mater Dei Hospital

Main Outcome Measures: Antithrombotic therapy; outcomes post-TAVI

Results: From the 200 patients assessed (54% male, 58% age 80 years or older), the most predominant comorbidities were hypertension (76%) and dyslipidaemia (63%). Previous percutaneous coronary intervention was documented in 22.5% of patients. Patients were discharged on antithrombotic therapy consisting of single antiplatelet therapy (SAPT) with aspirin or clopidogrel indefinite (48.5%), dual antiplatelet therapy (DAPT) for 6 months followed by SAPT indefinite (26%), oral anticoagulation (OAC) only (22.5%) indefinite, or triple therapy with clopidogrel for 6 months, aspirin for 12 months and OAC indefinite (3%). Bleeding or drop in haemoglobin (Hb) between one-week and one-year post-TAVI was documented in 16% of patients; triple therapy (33.3%), DAPT (19.2%), SAPT (14.4%), OAC (11.1%). Acute kidney injury in the week post-TAVI was documented in 9% of patients. Mortality in the year post-TAVI was documented in 2% of patients.

Conclusions: The outcomes observed present an opportunity for pharmacists to collaborate within the cardiology team in the identification and monitoring of TAVI patients at risk of bleeding and/or renal impairment towards personalisation of therapy.

Remote Monitoring in the Management of Heart Failure

Elena Mirone

Background: Remote monitoring (RM) is increasingly being integrated in the management of heart failure (HF) patients with cardiac implantable electronic devices (CIEDs).

Objectives: To identify benefits and challenges of RM and assess the contribution of pulmonary fluid status RM in HF patients.

Design: A bibliographic study (2012-2021) was conducted using PubMed to identify benefits and challenges of RM in HF patients. After ethics approval, a cohort study was performed including all patients (2015-2021) diagnosed with HF with a CIED incorporating a pulmonary fluid status monitoring feature (OptiVol™ 2.0), which can also be monitored remotely. A data collection sheet was developed and validated, and outcomes were assessed over one-year post-CIED implantation.

Setting: Department of Cardiology, Mater Dei Hospital

Main Outcome Measures: Benefits and challenges of RM; outcomes of pulmonary fluid status RM in HF patients

Results: From the 25 eligible articles appraised, benefits of RM were: improved health status (n=11), new opportunities to identify and manage risk factors (n=5), and feasibility (n=3). Challenges included: cost issues (n=1), data privacy concerns (n=1), maintenance of system efficiency and data quality (n=1). From the cohort of 45 patients assessed (35 male, mean age 69 years, mean left ventricular ejection fraction 29%, 23 New York Heart Association Class II), 21 had RM switched on. Alerts were recorded in 19 of these patients, which led to no action deemed necessary (n=12) or action taken (n=7) by cardiologist. Actions taken were: increase in diuretic dose (n=5), hospital admission (n=3), limit fluid intake (n=1), and/or increase in dose of disease-modifying drug (n=1).

Conclusions: Literature shows that benefits of RM in HF patients outweigh the challenges. In practice, pulmonary fluid status RM identified patients requiring therapy optimisation in the outpatient setting or through hospital admission. More than half the patients opted to have RM switched off, indicating a need for more patient awareness on benefits of RM.

Development of Guidelines for High-Risk Medication Dispensing

Nicole Schembri

Background: High-risk medications can cause an increased risk of significant harm to patients when misused or used in error.

Objective: To evaluate whether high-risk medications are treated differently to non-high-risk drugs during dispensing.

Design: A high-risk documentation sheet (HiRisk) and interview questions were developed and validated by four community pharmacists and two general practitioners. The dispensing of the first ten high-risk medication prescriptions from each pharmacy was observed. Observational studies were carried out in five community pharmacies chosen by random sampling from five different districts. Data gathered by the 'HiRisk' documentation sheet through observational studies was analysed. Fifty patient interviews were then conducted in two out of the five community pharmacies, chosen by convenience sampling. Interview responses were thematically analysed.

Setting: Community pharmacies

Main Outcome Measures: Development of guidelines disseminated to pharmacists dispensing high-risk medications.

Results: From the dispensing of 50 high-risk medication prescriptions observed using the HiRisk tool the direct oral anti-coagulants (DOACs) were the most commonly dispensed (n=20) having presented 13 rivaroxaban prescriptions and 7 apixaban prescriptions, followed by warfarin (n=11), insulin (n=7), zolpidem (n=5), biologics (n=2) and disease modifying anti-rheumatic drugs (n=2). Opioids namely morphine (n=1) and fentanyl (n=1) together with heparin (n=1) were the least high-risk medications dispensed. Similarly to the observational studies, DOACs were the most common high-risk medications dispensed as stated by 16 interviewees. All 50 patients were aware of the indication for use of the high-risk medication they were being dispensed, and 46 patients never experienced any side effects with the high-risk medication.

Conclusion: Findings from the observational studies and patient interviews show that the direct oral anticoagulants are the most commonly dispensed high-risk medications.

Enhancing Deprescription of Benzodiazepine Receptor Agonists in Older Patients

Keith Joseph Tabone

Background: Despite recommendation for short-term use of benzodiazepine receptor agonists (BZRAs) for anxiety and sleep disorders, long-term use persists. This leads to increased dependency and significant health risks, especially among the older population.[1]

Objective: To assess the extent of deprescribing of BZRAs in older patients and to enhance deprescription by clinical pharmacist intervention.

Design: In a two-phase retrospective study at Karin Grech Rehabilitation Hospital, pharmacy profiles of patients 65 years or over, prescribed at least one BZRA, are reviewed. Patients on BZRAs as-needed, discharged to acute care, or deceased are excluded. A data collection tool was compiled and validated by an expert group. Phase 1 evaluated patients discharged from January to December 2022. A researcher intervention was conducted with clinical pharmacists. Phase 2 will assess patients discharged during April 2023 to March 2024.

Setting: Karen Grech Rehabilitation Hospital

Main Outcome Measures: Extent of deprescribing of BZRAs; Documentation of clinical pharmacist interventions on pharmacy patient profiles.

Results: In Phase 1, 173 patients (58% female, average age 79) met the inclusion criteria. Lorazepam (52%) and bromazepam (21%) were the most commonly prescribed BZRAs. 67% (n=115) of patients initiated treatment at home prior to hospital admission. Of these, 57% (n=66) were referred due to BZRA-related risks such as falls, fractures, or confusion. Deprescribing was conducted in 48% (n=83) while clinical pharmacist intervention documentation occurred in 39% (n=68). During the researcher intervention, clinical pharmacists stressed the importance of patient education for enhanced BZRA management.

Conclusion: Despite substantial deprescribing, clinical pharmacist documentation was lacking. Phase 2 will allow for a comparative assessment of the effectiveness of researcher intervention.

References:

1. Markota M, Rummans TA, Bostwick JM, Lapid MI. Benzodiazepine use in older adults: Dangers, management, and alternative therapies. Mayo Clinic Proceedings. 2016;91(11), 1632-1639.

M.Pharm. Students

DISSERTATION ABSTRACTS

Vaccinology

Perception and Awareness of Vaccinations in Autoimmune Inflammatory Rheumatic Diseases

Jonathan Joseph Attard

Background: Rheumatology is an umbrella term for conditions where pain and stiffness in the musculoskeletal system are the prominent features. Complications arising from autoimmune inflammatory rheumatic diseases (AIIRD) lead to a burden on healthcare as approximately 25% of European citizens suffer from AIIRD. Patients suffering from AIIRD are at an increased risk of having infections due to their dysregulated immune system, showing that vaccines are highly important in this high-risk cohort.

Objective: Undertake a gap analysis of vaccine recommendations guidelines by European Alliance of Association for Rheumatology (EULAR) and the American College of Rheumatology (ACR) for AIIRD patients and capture the adherence of the national scenario with European recommendations on vaccines in this cohort.

Design: A gap analysis was carried out and compiled, comparing vaccine recommendations put forward by EULAR and ACR. A questionnaire for rheumatologists was developed, validated and after ethics approval, disseminated to rheumatologists.

Setting: University of Malta and Mater Dei Hospital

Main Outcome Measures: Information regarding vaccinations to immunocompromised patients suffering from AIIRDs.

Results: EULAR and ACR guidelines agree on recommendations put forward for vaccinations related to influenza, pneumococcal, Hepatitis A and B, HPV, *Herpes zoster*, and varicella zoster. Only EULAR puts recommendations regarding *Haemophilus influenzae*, tetanus toxoid, yellow fever and MMR. Both EULAR and ACR guidelines are similar in terms of vaccinations against SARS-COV-2 in AIIRD patients. Out of six rheumatologists (N=6), 50% responded the questionnaire (n=3), all of them agreeing that AIIRD patients should be vaccinated, including influenza and SARS-COV-2 vaccines, except live vaccines in those who are on immunosuppressive therapy.

Conclusion: There is a need for patient education and informative support assisting them towards decision making regarding vaccinations. This will reduce the risk of life-threatening infections or comorbidities in this cohort.

Establishing an Education Framework for Pharmacist-Led Vaccination Services

Tamara Attard

Background: Pharmacist-led vaccination services implemented in several countries are proving to be a paradigm shift in improving vaccination rates across the globe.

Objective: To identify pharmacy students, pharmacists and patients' perspectives of pharmacist-led vaccination services, to compile and validate an education framework aimed at pharmacy schools in Europe, for the advancement of pharmacist-led vaccination services.

Design: Three self-administered questionnaires were compiled, validated and distributed to pharmacy students, pharmacists and patients, respectively. An education framework was compiled and this proposed framework is validated through a Delphi technique amongst a sample of European pharmacy educators.

Setting: University of Malta, Msida, Malta

Main Outcome Measures: Perception of pharmacy students, pharmacists and patients on pharmacist-led vaccination services and a validated education framework applicable for European countries.

Results: Fourteen students (N=16) feel confident to provide vaccination services after completing a training programme, 48 pharmacists (N=62) are willing to administer vaccines, and 146 (N=163) patients trust the pharmacist to administer the influenza vaccine.
An education framework was compiled, outlining the following aspects of pharmacist-led vaccination services; regulatory aspects, national guidelines, responding to patient needs, vaccine handling and storage, preparation and reconstitution of vaccines, administration of vaccines and documentation practices.

Conclusions: There is a need to establish a standardized training programme for pharmacy students and pharmacists. The validated education framework can then be used by pharmacy schools to include vaccination preparation and administration training in their curricula, serving as a basis to implement pharmacist-led vaccination services.

Pharmacist Vaccination Preparedness

Abdullah Tariq

Background: "In 2020, the World Health Organization launched the Immunization Agenda 2030 to reduce mortality and morbidity from vaccine-preventable diseases, improve equity of access to vaccination, and increase immunization coverage rates across all ages and special-risk groups, leaving no one behind".[1] As the role of pharmacists in vaccine administration continues to evolve, understanding their preparedness is crucial for effective public health interventions.

Objective: To assess the readiness of pharmacists to provide immunization services.

Design: A self-administered questionnaire will be developed using Google Forms and validated by a five-member expert panel consisting of pharmacists from the community, hospital, regulatory sciences, and academia. The questionnaire will be distributed to all pharmacists. Results from the questionnaire will be analysed to provide an understanding of pharmacist preparedness for vaccine administration.

Setting: Pharmacists from all areas of practice.

Main Outcome Measures: Pharmacists' preparedness for vaccine administration and needs for competence evolvement.

Results: The questionnaire will capture data on education and training on vaccine administration, perceived barriers and facilitators, and engagement in continuous professional development activities. The knowledge, competence, and confidence of the pharmacists will be assessed and variations across practice settings will be evaluated. Aspects that pharmacists would prefer to have covered in updated training sessions will be identified.

Conclusions: Findings will inform strategies to enhance the role of pharmacists in public health initiatives and guide future initiatives for professional development.

Reference:

1. World Health Organization (WHO). Immunization Agenda 2030: a global strategy to leave no one behind[Internet]. Geneva: WHO; 2023 [cited 2023 Dec 20]. Available from: https://www.who.int/teams/immunization-vaccines-and-biologicals/strategies/ia2030

M.Pharm. Students

DISSERTATION ABSTRACTS

Pharmacoeconomics

Developing a Course in Pharmacoeconomics

Mohamed Ameen

Background: Pharmacoeconomics (PE)is crucial for medication assessment and pharmaceutical reimbursement decisions, requiring specialists with proper training and education to achieve optimal results.

Objective: To developing a course on pharmacoeconomics

Design: Information on pharmacoeconomics courses was gathered and compiled from published reports. A search was conducted using the HyDi, Pub Med, Google Scholar, ISPOR, and Google databases. In the undergraduate and graduate pharmacy curriculum, both mandatory and elective pharmacoeconomic courses were examined.

Setting: Department of Pharmacy, University of Malta

Main Outcome Measures: Development of a pharmacoeconomics course

Results: The course topics are the following:
1. Pharmacoeconomics principles: definition, theory, methods, and applications. Pharmacoeconomics as a mean to access to the therapeutic benefits provided by contemporary medications. 2. Pharmacoeconomics evaluation: drug therapy costs and benefits, aiding resource allocation and utilisation. Pharmacoeconomics as an integral part of health policy decision-making, clinical trials, accessibility to medicines and the quality, safety, and efficacy of medicines .
3. Techniques: cost-minimization, cost-effectiveness, cost-utility, and cost-benefit analysis with special reference to developing countries. 4. Perspectives: -patient, prescriber, provider, payer and societal. 5. Improvement in health system through the application of Pharmacoeconomics techniques.

Conclusion: Pharmacoeconomics education is offered in most institutions and pharmacy schools. The fields of study taught in various universities and colleges varied, as did the amount of time dedicated to pharmacoeconomic studies. Although most colleges and pharmacy schools offer Pharmacoeconomics courses, precise guidelines are necessary for the specific components and themes that must be exposed to students.

A Comparison of Pricing of Medicines in Different Countries

Swetha Gopalakrishnan

Background: Cost of medications can impact availability and the general health of the population. Discrepancies in medication prices between nations can raise concerns about affordability, equity, and accessibility of medication.

Objective: To identify and compare the cost of antibiotics and antidiabetic drugs available in Malta with those available in four other countries.

Design: Antibiotic and antidiabetic classes of medication are selected. Countries to be included in the comparative study are identified. Retail unit pricing of medications is compared according to active ingredient and rounded up to two significant values. For each country, the least expensive retail product with the same active ingredient, dosage form, and potency is compared. Medicinal product prices are converted to euro and analysed per unit dosage form. For each medication, the price range, average, and standard deviation between countries are computed.

Settings: Retail Community Pharmacies in Malta

Main Outcome Measures: Identification and comparison of prices of antibiotics and anti-diabetic medications available for retail in Malta with other countries.

Results: Identified countries to be included in the study are Malta, Greece, Slovenia, United Kingdom and India. Antibiotic medications (n=12) to be included in the study are macrolides, fluroquinolones, urinary antiseptics, cephalosporins, aminoglycosides and antidiabetic drugs (n=14) are biguanides, sulfonyl urea, DPP4 inhibitors, SGLT2 inhibitors and insulins.

Conclusion: Understanding price variation between countries can help in understanding the impact on medication accessibility and affordability.

The Effect of Prices of Medicines on Accessibility

Shaheen Mubarak

Background: The effect of medicine prices on accessibility has an important impact on public health. High medication costs can limit access, leading to delayed or inadequate treatment, compromising health outcomes. Understanding these dynamics helps formulate policies and strategies to ensure affordable access to essential medicines, promoting equitable healthcare.

Objective: To assess how the cost of medications influences medicines accessibility. To identify barriers created by high medication prices, and propose solutions to help improve affordability and equitable access to essential medicines.

Setting: Local community pharmacy

Study design: Open access peer reviewed journal articles published in English on PubMed between 2017-2023 were identified. Keywords such as 'medicine prices', 'accessibility', 'prices', 'affordability' were used to identify articles which described the impact of prices of medicines on accessibility.

Main Outcome Measures: Identification of issues and factors related to effect of medicine prices on accessibility and proposal of solutions to help improve the affordability.

Result: Twenty articles were identified. Nine studies reveal that medicine prices are prohibitively high for many countries (EU countries, Canada, Nigeria, China, Sudan, Cameroon and Congo). Discounts, new schemes, or promoting generic medicines emerges as a promising strategy for enhancing affordability. Four studies emphasize widespread medicine affordability, with a noticeable prevalence of branded medicines in urban private sectors and generic medicines in rural public sectors. Eight studies report limited medicine availability in various countries, proposing that annual needs calculations and effective stock management could mitigate these accessibility challenges. These findings underscore the nuanced landscape of medicine accessibility worldwide.

Conclusion: The literature review from 2017-2023 highlights the impact of high medicine prices on global accessibility, posing challenges to public health. It calls for innovative solutions like discounts and generic medications. The complexity of accessibility dynamics and disparities between urban and rural sectors highlight the need for targeted interventions.

Patient-centered Principles in Medicines Purchasing and Inventory Control

Sikendar Pathath

Background: Patient-centered principles in medicine purchasing and inventory management enhance healthcare delivery, reduce stockouts, and improve patient safety, aligning with quality of care, cost effectiveness, and overall patient outcomes.

Objective: The goal is to improve healthcare systems by optimising medication supply management, minimising delays, preventing shortages, and promoting safe use, ultimately enhancing patient outcomes and service quality.

Design: A comprehensive MCQ questionnaire is conducted among patients to understand their experiences, perceptions, and satisfaction levels regarding accessibility, communication, safety, and patient-centeredness in medication procurement and inventory management processes. The questionnaire covers key dimensions such as accessibility, communication, safety, patient involvement, waiting time, medication information, staff interaction, prescription fulfilment, and overall experience. Participants are diverse across different demographics, and data is collected through in-person interviews, phone surveys, or electronic platforms.

Setting: Government pharmaceutical services (POYC) and community pharmacy

Main Outcome Measures: Patient-centered concepts are evaluating the impact of pharmaceutical procurement on patient experience, including staff interactions, waiting times, drug safety, accessibility, effective communication, and patient engagement.

Result: The study highlights the positive impact of patient-centered principles in medicines purchasing and inventory control, resulting in improved patient satisfaction, enhanced medication accessibility, effective communication, increased patient involvement, and optimised prescription fulfilment.

Conclusion: The study highlights the positive impact of patient-centered principles on medicines purchasing and inventory control, highlighting improved satisfaction, accessibility, safety, and enhanced communication in healthcare processes.

M.Pharm. Students

DISSERTATION ABSTRACTS

Pharmaceutical and Regulatory Sciences

Reporting Vaccine Adverse Drug Reactions

Kristina Filletti

Background: Despite their benefits, vaccines have the potential to exert toxic effects. Effects vary between patients and range from mild, moderate to severe effects.

Objective: To compare toxicity of vaccines, to develop a questionnaire for healthcare professionals (HCPs) related to vaccine adverse drug reaction (ADR) reporting.

Design: Literature review on toxic effects caused by COVID-19, *Varicella zoster* and influenza vaccines documented in open-access journal articles from PubMed published between 2012-2022 was conducted. A questionnaire used to identify vaccine ADR reporting tendencies was developed, was validated and is disseminated to HCPs.

Setting: Community pharmacies

Main Outcome Measures: Identifying common vaccine-related ADRs encountered by HCPs and ADR reporting tendencies.

Results: One hundred and fifty articles about common vaccine related ADRs were identified. Commonly identified ADRs were thrombosis (n=15) for COVID-19 vaccines, injection site reactions (n=16) for *Varicella zoster* vaccines and fever (n=18) for influenza vaccines. Questionnaire had 12 questions and was divided into three sections: demographics, ADR reporting awareness and vaccine related ADRs. Questionnaire was found to be relevant and comprehensive by all the members of the validation expert panel (N=4).

Conclusion: ADR reporting of vaccines by HCPs is essential to help mitigate and prevent toxic effects that can be produced by them.

Digitilisation of Adverse Drug Reactions Information Source

Rachel Gauci

Background: Computer technology is playing an important role in almost all health-related areas of expertise.[1] Ever since it appeared on the market, it has become an essential tool in our everyday life and is necessary in almost every sector and aspect of life including science.

Objective: To assess the value and relevance of an online platform that presents adverse drug reactions of medications. This online platform can then be accessed by healthcare professionals and the general public. To propose an online platform that presents adverse drug reactions, based on the findings of the evaluation study.

Design: An excel workbook where side effects presenting with drugs for cardiovascular, gastrointestinal and respiratory systems was set up. Anonymous questionnaires for health-care professionals and general public were left in different pharmacies. Based on the information gathered from the evaluation, a design of the online platform is proposed.

Setting: The study is carried out in community pharmacies in Malta and includes participants from eight different localities.

Main Outcome Measures: An updated excel workbook with side-effects pertaining to the three chosen body systems. A proposal with a potential design of the adverse drug reactions database online platform.

Results: The evaluation from questionnaires aims to gather feedback and recommendations regarding the significance of having an online database of adverse drug reactions specifically for drugs currently licensed in Malta.

Conclusions: Based on feedback provided by participants in the study, a redesigned version of the website for the online adverse drug reactions database website is proposed.

Reference:

1. Higgins O, Sixsmith J, Barry MM, Domegan C. A literature review on health information seeking behaviour on the web: a health consumer and health professional perspective. Stockholm: ECDC; 2011.

The Impact of Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) in Pharmacy

Blessing Ifunanya Maduelosi

Background: Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) are deoxyribonucleic acid (DNA) segments present in prokaryotes that contain short repetitive sequences, serving as a defense mechanism against viral DNA. Conditions like Huntington's disease, cancer, cystic fibrosis, type 1 diabetes and sickle cell anaemia result from genetic mutations.[1] Many of these diseases currently lack effective treatments. CRISPR/Cas technology holds substantial promise as an effective tool to address these conditions.

Objective: To develop, validate and evaluate material to be used in a seminar targeted to pharmacists, which highlights the ways in which CRISPR can influence the practice of pharmacy.

Method: Literature review on CRISPR's role in pharmacy was conducted, focusing on its application in chronic and hereditary diseases. Information was used to prepare and deliver a presentation to a focus group (n=6) of pharmacists selected by convenience sampling.

Setting: Online (Zoom)

Main Outcome Measure: Development of adequate material to educate pharmacists on the importance of CRISPR in pharmacy.

Results: The focus group (n=5) evaluated the presentation and feedback indicated that they were satisfied with the quality of the presentation. Requests were made for basic training of pharmacists on genetics and gene editing.

Conclusion: Leveraging pharmacists' expertise in drug therapy and patient care can position them as valuable contributors to the successful integration of CRISPR technology in healthcare. There is a vital need for ongoing CRISPR education in pharmacy.

Reference:

1. Lomov NA, Borunova VV, Rubstov MA. CRISPR/Cas9 technology for targeted genome editing. Biopolymers and Cell. 2015. Vol. 31. N 4. P. 243–248. doi: http://dx.doi.org/10.7124/bc.0008E7

Cannabidiol and the Pharmaceutical Industry

Yasmine Smaoui

Background: The rise in awareness of cannabis therapeutic benefits has led to a growing medical application. Malta is among the first EU countries in the legalization of cannabis for medical use.

Objective: Study the development of the cannabinoids pharmaceutical Industry in Malta through a SWOT analysis and investigate pharmacists' dispensing practices on cannabis medical use.

Design: Phase 1: a questionnaire was developed, validated, and disseminated to 30 local community pharmacies. Phase 2: Interview questions were developed, approved, and directed to 3 cannabis pharmaceutical companies. The format of the questions was divided in 4 sections (strength, weaknesses, opportunities, and threats). In-depth information was collected through the interviews.

Setting: Industry and community pharmacies.

Main Outcome Measures: Community pharmacists' perception on cannabis medical use and Malta's position as a hub for the development of cannabis pharmaceutical industry.

Results: A total of 30 pharmacists completed the questionnaire. Most pharmacies (n=24), provide cannabis medical products. Preliminary data shows that most pharmacists (n=19) consider that in future there will be an increased demand of medical cannabis. A total of 2 industries out of 6 were interviewed. These industries provide respectively cannabis manufactured products and testing and packaging of cannabis raw material. Lack of harmonized guidelines across Europe constitute the main weakness of this industry. Accessibility to more educational courses and technological progress, could help the growth of the industry. As this market is evolving, more competition is present.

Conclusion: Cannabidiol (CBD) is not available as the major active ingredient for medicinal use in local pharmacies. There is a trend for the availability of over-the-counter CBD products such as CBD oils and creams. These products are imported, and the local pharmaceutical industries aim to develop further these CBD OTC lines.

M.Pharm. Students

DISSERTATION ABSTRACTS

Pharmaceutical Analysis and Medicinal Chemistry

Characterisation of Steroids

Giulia Baluci

Background: The extent of action of steroids is affected by their characteristics, namely pKa and logP. To date, in literature there are no experimentally found values of these characteristics for difluprednate (DFBA) and 6α,9α-difluoroprednisolone (DFP).

Objective: To develop, validate and conduct an HPLC/UV-Vis method to determine pKa and logP of the steroids, and compare the results with values found through potentiometric titrations (PT), shake-flask and computational methods.

Design: A literature review was conducted investigating pKa and logP determination methods using HyDi and Reaxys. The purity of steroids was evaluated using a melting point apparatus. The solubility of steroids was assessed in acetonitrile (ACN), methanol (MeOH) and water (H20) and determined using UV spectroscopy at 242nm to aid solvent selection. PT were conducted to determine the pKa of the selected steroids using H20 with ACN or MeOH.

Setting: Pharmaceutical Synthesis and Technology lab, University of Malta.

Main Outcome Measures: To determine the logP and pKa of selected steroids using HPLC/UV-Vis method and compare results to traditional and computational methods.

Results: The melting points of DFBA and DFP were found to be 188-189°C and 210-220°C respectively. DFBA had a solubility of 0.72mg/ml in 10% MeOH and DFP of 1.92mg/ml in 10% ACN. PT for DFP using H20:ACN indicated a pKa of less than 9. Eight articles related to HPLC use for pKa and logP determination were identified through the literature review and evaluated. The method developed by Chiang and Hu[1] was selected and adapted for the study.

Conclusions: The melting points determined were found to be in accordance with literature values. DFBA was found to be more soluble in MeOH and DFP in ACN. The found method will enable simultaneous determination of pKa and logP.

Reference:

1. Chiang P and Hu Y. Simultaneous Determination of LogD, LogP, and pKa of Drugs by Using a Reverse Phase HPLC Coupled with a 96-Well Plate Auto Injector. Combinatorial Chemistry and High Throughput Screening, 2009;12:250-257. Doi: 1386-2073/09

Determination of Cannabinoids in Plasma

Neve Borg

Background: The use of cannabis in the medical industry is constantly increasing.

Objective: To develop and validate a quick and efficient method to quantify cannabinoids, in plasma, using High Performance Liquid Chromatography (HPLC) with Ultraviolet (UV) detection.

Design: An analytical method to determine the concentration of tetrahydrocannabinol (THC) in plasma was developed, and analytical parameters including stationary phase, mobile phase, detector, sample preparation technique, and biological matrix were identified.
The method is validated for accuracy, intra-day and inter-day precision, linearity, selectivity and stability, in compliance with the International Council of Harmonisation1 (ICH) guidelines. Method is applied to determine concentrations of cannabinoids found in the plasma of patient samples.

Setting: Pharmaceutical synthesis and technology laboratory, University of Malta

Main Outcome Measures: Identification and quantification of cannabinoids in plasma using quick and efficient developed and validated HPLC method.

Results: Protein precipitation was performed on plasma samples using ice cold acetonitrile in a 1:1.5 plasma to acetonitrile ratio, followed by vortex mixing, centrifugation and filtration using syringe filters. Sample was then analysed using ACE C18 chromatographic column as the stationary phase (250 x 4.6mm; 5µm i.d) and a 30:70 water with 0.01% acetic acid: acetonitrile with 0.01% acetic acid, as the mobile phase. THC was detected using a UV spectrophotometer at a wavelength of 225nm and had a retention time of 4.94 minutes.

Conclusions: Application of such a developed method can help in quick and efficient determination of concentrations of THC in human plasma.

Reference:

1. International Council of Harmonisation (ICH) Harmonised Guideline. Bioanalytical Method Validation and Study Sample Analysis M10.; 2022. [cited 2023 Dec] Available from: https://www.ich.org/page/multidisciplinary-guidelines

Drug Design at the HIV Capsid Hexamer using the Inhibitor GS-6207 as a Lead

Matthew Cassar

Background: HIV and AIDS-related illnesses have been the cause for roughly 40 million deaths since the start of the epidemic, with an estimated 1.3 million people newly infected with HIV in 20221.

Objective: To identify high affinity HIV-1 capsid hexamer modulators with a propensity for in vivo bioavailability, using GS-6207 as a lead molecule scaffold in tandem with PF-3450074 to model a consensus pharmacophore.

Design: A consensus pharmacophore was generated in LigandScout® by superimposing GS-6207 and PF-3450074, which were obtained from PDB crystallographic depositions 6V2F and 4XFZ respectively, and was then read into ZINCPharmer® for virtual screening with Rule of 3 filters applied.

Setting: Department of Pharmacy, University of Malta

Main Outcome Measures: Identification of novel high binding affinity lead-like HIV capsid hexamer modulators.

Results: A total of 1,037 structurally diverse Lipinski-Rule compliant molecules which had the ability to modulate the HIV capsid hexamer were identified through virtual screening. After docking into the protomol, the 4 highest affinity molecules with total scores ranging from 5.3 to 6.4 were identified.

Conclusions: Analysis of the highest affinity structures identified via virtual screening showed that all four have the ability to bind to the HIV capsid hexamer. Despite all the molecules being compliant to the Lipinski rule with regards to molecular weight, their LogP values are considered problematic as they are close to zero – indicating they are hydrophilic, which results in malabsorption and unchanged excretion in urine. With a LogP of 3.09, Molecule 4 is most suitable for optimisation via structural modifications at non-essential binding sites, which could further increase lipophilicity, hence increasing absorption and oral bioavailability.

Reference:

1. Global HIV & AIDS statistics — Fact sheet [Internet]. UNAIDS; c2023 [cited 2023 Dec 26]. Available from: https://www.unaids.org/en/resources/fact-sheet

Green Pharmacy in Pharmaceutical Processes

Christine Gauci

Background: The application of green pharmaceutical practices during pharmaceutical processes strive to minimise the environmental impact of the pharmaceutical industry.

Objective: To evaluate the application of green pharmaceutical practices within the pharmaceutical manufacturing industry.

Design: A set of questions has been developed and validated by a panel of experts. The developed questions were applied during structured interviews with stakeholders to discuss the use of green pharmaceutical practices, including solvent use, wastewater treatment systems, and challenges and barriers in their implementation. Data collected is analysed thematically to propose solutions to lacunae identified.

Setting: Pharmacy Department, University of Malta

Main outcome measures: Stakeholder's perspective on green practices, challenges and methods of improvement.

Results: Two out of five participants utilise wastewater treatment systems, green metrics, renewable energy and solvent recovery. Among challenges in implementing green practices, financing (n=3) and regulatory aspects (n=3) were noted as major limitations. Of three API manufacturing sites interviewed, one considers solvent environmental impact during solvent selection while the other two stated that it is not considered since process development is not carried out locally. Lack of waste treatment plans (n=1) was noted as an area for improvement to the current local infrastructure. Waste reduction methods suggested included reject product minimisation (n=2), single use plastic and packaging reduction (n=3) and paperless systems (n=2).

Conclusion: The study shows that company size has an influence on the ability to apply, fund and incentivise green practices, with large companies being more willing. While concern about pharmaceutical concentrations in the environment varies, results indicate that ethical obligations, perception of contractors about a company and return on investment are drivers to green practice applications.

Regulations of Pesticides in Cannabis

Audrey Muscat

Background: Accurate determination of pesticide residues in medicinal cannabis is increasingly recognised as a necessary contributor to the safety of medicinal cannabis.

Objective: To identify and compare regulations related to allowed limits of pesticides in medicinal cannabis and to propose guidelines for the use of pesticides in cannabis.

Design: Regulations for the use of pesticides in cannabis were identified using official government websites. The following parameters were compared; testing requirements, pesticides tested for, allowed limits and analytical techniques used. Guidelines for the use of pesticides in cannabis are proposed.

Setting: Department of Pharmacy, University of Malta.

Main Outcome Measures: Guidelines for the use of pesticides in medicinal cannabis are proposed.

Results: Nine countries with regulations on the use of pesticides in cannabis were identified. In Thailand, analysis is done in accordance with the Thai Pharmacopoeia which sets residue limits for 70 pesticides. Malta, Australia and New Zealand follow the European Pharmacopoeia guidelines, which require testing of 69 pesticides. Denmark set 3 criteria for pesticides to be approved for cannabis: pesticides must be approved in EU, active ingredient must be within maximum levels and must be approved by the Danish Agricultural Agency. The Netherlands follows rules set by Vermont Agency of Agriculture, which identifies 33 pesticides that are permitted for use on cannabis. In America, 17 states were identified, in which no pesticides were federally registered for use on cannabis, however, each state has its own guidelines and lists of approved pesticides. No countries in South America have defined regulations. In Canada 96 pesticides are to be tested for, each having different limits of quantification, depending on whether it is in dried cannabis, cannabis oil or fresh cannabis.

Conclusion: The study helped identify differences and similarities between guidelines and regulations for the use of pesticides in cannabis. Harmonised regulations can help improve the quality and safety of cannabis as medicinal products.

Master of Science in Pharmaceutical and Regulatory Sciences

DISSERTATION ABSTRACTS

Human Error in Root Cause Analysis

Kurt Axisa

The study explores human error as the primary cause of manufacturing deviations within the pharmaceutical industry. It seeks to enhance understanding of root cause identification, improve non-conformance justifications, address root causes, and reduce methodological inadequacies. This study consists of three phases. Phase 1: An exploratory case study on a pharmaceutical company, Phase 2: A qualitative data collection through questionnaires targeting root cause analysis in deviations, and Phase 3: Analysis of data collected in the initial phase and present literature.

Principles of Risk Management in Pharmaceutical Industry

Matthew Borg

The aims are to develop risk assessment tools to identify and assess risks within change controls in the pharmaceutical industry. Two change controls, 'Update of dissolution method' and 'Update of product carton artwork', were identified through frequency counts of change controls issued between January and November 2023. Fishbone diagrams illustrating risks from these change controls are prepared and quantified by a focus group composed of subject matter experts using Failure Mode Effects Analysis. Strategies to control identified risks are proposed.

Challenges Encountered in the Process of Accreditation for Testing and Calibration Laboratories

Naomi Delia

The aims are to identify gaps and challenges in the process of attaining and maintaining accreditation, as per ISO/IEC 17025, and to propose solutions to reduce challenges. Literature was reviewed systematically to identify challenges and each challenge was grouped under one of the ISO requirements. Ways in which the proposed approach can be implemented to facilitate accreditation processes are determined.

Qualification of Suppliers in the Pharmaceutical Industry

David Gafa

Supplier qualification is essential for ensuring compliance with quality standards throughout the various stages of medicinal product manufacture and is one of the safeguards to ensure patient safety. A comparative mapping of the requirements for qualification of suppliers in the EU, USA, and Japan, analysed in the context of ICH guidelines, is undertaken. A focus group discussion is adopted to achieve consensus concerning key markers underlining the qualification ethos, as identified from the assessment of these various regional regulatory frameworks.

Green Aspects in Quality Control

Daniel Grech

The study aims to evaluate the application of Green Analytical Chemistry (GAC) in Quality Control within the pharmaceutical sector. A literature review is conducted to identify green practices employed in the pharmaceutical industry. The factors identified from the literature review are used to develop a Standard Operating Procedure and tool that measures the conformity of analytical methods with GAC. The developed tool is validated by a panel of experts employed in the pharmaceutical industry and a pilot study is conducted.

Accreditation of Analytical Processes

Corinne Lagana

Accreditation ensures that a laboratory meets specific quality standards and can provide reliable analytical services. The aim is to identify the requirements and costs involved with attaining and maintaining ISO/IEC 17025 accreditation. The need for a laboratory in Malta which performs determination of tetrahydrocannabinol (THC) in Medium-Chain Triglycerides (MCT) oil is recognised through discussions with a number of local cannabis manufacturing facilities, The Maltese Authority for the Responsible Use of Cannabis, the Maltese Customs Department and National Accreditation Bodies.

Pitfalls in Compiling a Dossier: A Module 3 Marketing Authorisation Dossier

Lawrence Long

The aim is to identify the pitfalls encountered when Module 3 of the Common Technical Document (CTD) is compiled with a secondary purpose being to explore solutions to minimise the seriousness of the pitfalls identified. The research design is split into phases of Data Collection, Data Processing, and Issue Investigation. Data is collected from questionnaires directed to personnel working on Module 3. A pitfall identified in the study is the need to communicate effectively between the team.

Digitalisation in the Pharmaceutical Industry: An Example of Pharmaceutical Application of Enterprise Resource Planning Software

William Micallef

This dissertation explores Enterprise Resource Planning (ERP) system upgrades in a pharmaceutical industry context. The research integrates a systematic literature review with observational data from a real-world ERP upgrade case study and a focus group validation. A specialised framework for ERP upgrades, tailored to the pharmaceutical sector's unique requirements, was developed and validated. Results from expert focus groups and the case study highlight the framework's practical applicability. The framework emphasises the importance of customisation, data management, and continuous improvement in ensuring successful ERP implementations in GMP environments.

Preparing for a Successful Good Manufacturing Practice Regulatory Inspection

Julia Mifsud

The project aimed to identify critical effective strategies that are relevant for Good Manufacturing Practice (GMP) inspections. Focused on enhancing readiness, compliance, and performance during inspections, this qualitative study integrates a systematic literature review and insights from expert consultations. A validated guideline, emphasising foundational aspects of GMP compliance and proactive approaches to emerging challenges was compiled. The validated guideline provides essential insights for successful regulatory inspections in a dynamic pharmaceutical landscape.

Pharmacoeconomics and Access to Osteoporosis Management

Nadia Portelli

This study aims to assess the current situation within the public health system with respect to osteoporosis therapy and evaluate the cost value impact. A mixed methodology approach is adopted with both quantitative and qualitative research design. Structured interviews among medical practitioners are undertaken to evaluate their perspective. Pharmacoeconomics analysis is carried out to consider potential need to introduce new therapeutic modalities.

Optimisation of Tablet Coating Process

Malcolm Sacco

The study aims to enhance pharmaceutical tablet film coating quality. Employing a Design of Experiments (DoE) approach with a 23-factorial design, it examines spray rate, inlet air temperature, and pan rotation speed. Visual and defect assessments of coating quality were conducted. ANOVA analysis found significant influences of spray rate and air temperature on coating defects ($P<0.050$), with notable interactions among these parameters, indicating synergistic and counteractive effects. This project contributes to optimised tablet coating processes, considering existing tablet shapes and formulations.

Signal Management in Quality Control

Adriana Spiteri

Signal management in quality control is necessary to maintain a linear process well within the specification limit. Data trending and root-cause analysis are tools used to evaluate signals and variations in a process with respect to time. A questionnaire directed to quality control personnel was developed to determine which signals point to non-conforming test results. The laboratory environment, personnel, sample preparation, equipment, materials, methods and integration of chromatograms were analysed. Signal management can be used to improve a quality system.

Overcoming Shortages in the Availability of Medicines

Rebecca Zammit

This study aims at addressing medicinal shortages and to recommend practices to overcome the identified issues, with a special focus on the manufacturing aspect. Recommendations were determined through a scoping review of the literature available. The recommendations include the diversification of suppliers for materials required for manufacturing, initiatives to incentivise manufacture of low volume – high impact products, streamlining of manufacturing processes, performing additional stability studies following submission of the product to the market, and increased social media awareness regarding shortages.

B.Sc.(Hons) Pharm. Tech.

PROJECT DESCRIPTIONS

Risks In Pharmaceutical Packaging

Lauren Bell

The packaging of pharmaceutical products plays a significant role in ensuring product sustainability. Addressing risks of pharmaceutical product packaging can improve product quality, increase patient safety and ensure regulatory compliance. The aims are to identify risks in pharmaceutical packaging. A qualitative methodology is applied, where a literature review to identify benefits, challenges and developments of pharmaceutical packaging is conducted using PubMed, HyDi and Google scholar. Keywords used included 'pharmaceutical packaging' and 'packaging risks'. Peer-reviewed articles available as free full text, in English and published between 2013 and 2023 are included.

Innovative Methods to Quality Assurance in the Pharmaceutical Industry

Jack Carabott

This project aims to understand how innovative quality assurance ideas are viewed by professionals within the pharmaceutical industry by understanding what innovations are upcoming, how much implementation has already been done and why the implementation might be occurring at a slower pace than previous years. The project provides an in-depth literature review on innovations within quality assurance, and a questionnaire given to professionals within this sector to tackle areas which have not been addressed by literature.

Nanotechnology for Cardiovascular Diseases

Sarah Cassar

Nanotechnology approaches are being applied in the advancement of drug delivery systems and theranostic devices in healthcare. The project aims to review the application of nanotechnology approaches in cardiovascular disease management. A literature review is conducted by applying the search terms "nanotechnology" AND "cardiovascular" in PubMed®. Articles included are published between 2013 and 2023, peer-reviewed, accessible as free full-text, in English, and human studies. The PRISMA guideline is used as a reporting tool. Forty-six eligible articles are being appraised to identify developments, types of nanoparticles used, benefits, challenges, and opportunities.

Pharmaceutical Supply Chain Forecasting Methods: Predicting Trends

Nicolette Grech

The study focuses on increasing efficiency, reducing waste and shortages of pharmaceuticals by analysing demand and supply. The current adopted systems were examined in relation to an international review. Quantitative methodology was used to analyse the data. Questions were compiled and psychometrically evaluated. Setting up of a focus group with experts from the industry and the public health system to identify gaps will follow. Relevant proposals for adequate planning and identification of the correct process for the customer demand will aid for an efficient process, reducing the current challenges being faced for pharmaceuticals focusing on the real emergencies.

Updates in Child-Resistant Packaging

Maylene Muscat

This project evaluates recent developments in Child-Resistant (CR) packaging, specifically focusing on enhanced user-friendliness for older adults whilst retaining its protective functionality and the potential impact of the COVID-19 pandemic on CR packaging. Conducting an extensive literature review aids in comparing new CR packaging formats with existing designs. A questionnaire distributed to local pharmacies assesses local awareness and availability of CR packaging updates, with a focus on functionality, user-friendliness for seniors, child poisoning cases and potential pandemic-related CR packaging design alterations.

Evaluation of Greenness of Pharmaceutical Processes

Abinaya Somasekaram

The aim is to evaluate currently available tools used to determine the greenness of pharmaceutical processes. Peer-reviewed full text articles published from 2010 onwards in English were retrieved using HyDi. Nine green metrics such as the environmental factor, atom economy and carbon efficiency were identified. These metrics measure the outcomes of pharmaceutical processes by considering factors including the use and effects of reagents at a molecular level and the amount of waste generated. These tools enable the assessment of the overall efficiency of the process and the resultant environmental impact.

Automation in Pharmacy

Emilie Visanich

The project aims are to review and compile evidence of application of automation in pharmaceutical processes and to identify pharmaceutical workforce perception for the community pharmacy setting. A systematic literature review using HyDi was undertaken and a questionnaire was developed and validated. Subsequently, the questionnaire is disseminated in community pharmacies. From 298 peer reviewed articles, 122 provided examples of automation in community, 168 in industry, while 36 focused on hospitals. The developed questionnaire identifies: time spent by the pharmaceutical workforce in stock management duties, and opportunities and limitations with automation in community pharmacy.

Advances in Pharmaceutical Analysis

Eve Zammit

Over the past decade, advances in pharmaceutical analysis have enhanced the sensitivity and accuracy of analytical techniques. Systematic literature review on sample preparation and analytical techniques using journal articles published in English from 2014 to 2024 from PubMed was conducted. Amongst the improvements of sample preparation are, automated systems (n=7), selective solvents (n=9), and microscale procedures (n=8). In analytical techniques such as chromatography, innovations in ultra-high-performance liquid chromatographic techniques (n=10) and chromatographic columns (n=8) were reported. Developments in nuclear magnetic resonance have improved resolution and structural interpretation by using specialised probes (n=10) and stronger magnetic fields (n=6).

B.Sc.(Hons) Pharm. Sci Pharmacy Practice

PROJECT DESCRIPTIONS

47
Fourth Year Students

52
Third Year Students

57
Second Year Students

B.Sc.(Hons) Pharm. Sci Pharmacy Practice

PROJECT DESCRIPTIONS

Fourth Year Students

Crisis Management and Medicines Shortages

Julia Agius

Crisis management in relation to medicine shortages is studied. A literature review to determine the impact that crises such as COVID-19 and Brexit had on patients' accessibility to medicinal products was undertaken. A questionnaire was developed, validated and disseminated to community pharmacists. Preliminary results indicate that community pharmacists experience 6-8 medicine shortages monthly and that they are made aware of the shortages from medicines suppliers. A focus group to determine the severity of a crisis is set up, proposing long-term mitigation strategies to avoid medicine shortages in future health crises.

Community Pharmacists Competences in Medication Risk Management

Andrew Aquilina

The aim is to identify gaps in community pharmacists' current competence in medication risk management during routine dispensing. A questionnaire was developed and validated by three community pharmacists, three academic pharmacists and one lay person. The questionnaire intended for dissemination to community pharmacists via social media and in-person distribution covers demographic data, medication risk management competencies, perceived needs for competence development, competence in identifying medication problems, and preferred training modes. Recommendations to reduce gaps in pharmacist competences are put forward by developing a competency framework for community pharmacists, fostering competence enhancement.

Concepts of Collaboration between Pharmaceutical Industry and Education

Matthias Borg

The aim is to identify areas of collaboration between the pharmacy education sector and the pharmaceutical industry to address unmet needs through interviews. Areas of potential pharmaceutical industry-pharmacy education collaboration and collaborative models were identified through a literature review. Data collected through literature review was used to develop a set of questions for interviews. Structured interviews with stakeholders from the pharmaceutical industry are conducted to identify potential areas for academia-industry collaboration. The data collected through interviews is discussed within a focus group and areas of collaboration and collaborative models are proposed.

Pharmaceutical Services Digitalisation through myHealth

Katarina Maria Bugeja

The study aims to evaluate the extent of utilisation of the digital portal myHealth. It investigates healthcare professionals' perspectives on the advantages of myHealth and assesses the potential for optimising the delivery of pharmaceutical services by elaborating access of myHealth to pharmacists. A questionnaire intended for patients and healthcare professionals was developed and validated to assess opportunities of digitalising pharmaceutical services using the myHealth portal. Aspects of inequity and challenges for patient access are considered.

Harm Reduction Associated with Use of Cannabis

Rachel Callus

Systematic literature review was conducted on national and international harm reduction policies associated with drugs of abuse. Open access journal articles published between January 2013 and December 2023 were reviewed. Keywords used included 'harm reduction policies'; 'drugs'; 'risk reduction'; and 'drug policies'. Databases used were HyDi and Google Scholar. Comparisons of policies in European countries, the Unites States of America, Canada and Brazil are carried out. Harm reduction policies associated with use of cannabis are proposed for national use.

Clinical Trials Regulation in Europe

Bettina Camilleri

Trials performed in small communities like Malta pose challenges such as the number of available participants and facilities. The aim is to examine the challenges presented by the new Clinical Trials Regulation in Europe, with special reference to Malta. The methodology includes setting up of a template which could be used as a guide and aid during clinical trial planning and implementation. A questionnaire for healthcare professionals to investigate the experiences in clinical trial participation and their perceptions about the challenges involved is developed.

Patient Participation in Pharmaceutical Care Plans

Maria Martina Cutajar

The aim is to create a medication treatment plan that will encourage patient participation. This study addresses patients with cardiovascular diseases, as these conditions have been demonstrated to be the leading cause of death in the Maltese population. An evaluation of the patient's comprehension and participation in their treatment is undertaken. A pharmaceutical care plan template to document the patient participation assessment was developed and validated. The process is tested for practical implementation in a community pharmacy setting.

Green Pharmaceutical Practices in Hospital

Justine Decelis

The aim is to assess the use of green practices in hospitals. A literature review was conducted to identify the impact which hospital activities have on the environment and green measures used in hospital facilities. A questionnaire was developed and validated to evaluate the knowledge of hospital pharmacists, nurses and pharmacy technicians regarding green practices and assess the application of such practices within the hospital context. Green measures adopted should include first expired first out, frequent stock taking, avoid medicines hoarding and green formulary.

Pharmacist-led Education in Inflammatory Bowel Disease

Aisha Diyab

Community pharmacists' confidence in inflammatory bowel disease management is assessed and educational needs identified. A self-administered questionnaire was developed, validated, tested for reliability, and disseminated to 100 community pharmacists selected by stratified random sampling from the five districts of Malta. From the 60 responses collated, most pharmacists (n=22) have been practising for ≤5 years, and most (n=24) practice for 31 to 40 hours weekly. Pharmacists were confident in providing lifestyle advice (n=54) and non-prescription medicines to manage symptoms (n=50), but less confident with advice on biologics (n=19) and vaccinations (n=12).

Medical Aids: Regulations and Entitlements

Jade Marie Falzon

This project analyses the medical aids landscape by observing processes and identifying coordination gaps among stakeholders. Permission for the study was granted by the Central Procurement Supplies Unit (CPSU). Qualitative methodology was chosen due to limited knowledge and experts in the field. Post-ethics approval, observation sessions at Mater Dei Medical Aids Loaning Section revealed challenges. A checklist was compiled and validated by a panel prior the setting up of the focus group meeting. A SWOT analysis will identify gaps for an effective implementation strategy, optimising the current loaning entitlement system.

Community Pharmacy-based Point-of-care Testing

Natalia Ferris

The aim is to identify which point-of-care tests (POCT) are available and offered within the community pharmacy setting and to examine opportunities presented by POCT. To-date provision of POCT by pharmacies was identified by accessing pharmacies websites. Out of 52 pharmacies for which data was identified, all offer blood pressure monitoring and 51 offer blood glucose testing. A questionnaire was developed and validated and will be distributed to all community pharmacies to extract data about current POCT services offered and their uptake.

Analysis of Cannabinoids in Edibles and Cosmetics

Michael Laferla

The study aims to identify sample preparation and analytical parameters used for the determination of cannabinoids in edibles and cosmetics and to develop and validate a high performance liquid chromatography method (HPLC) for their quantification. Systematic literature review using open access journal articles published in English in PubMed between 2015 and 2023 was conducted. Keywords used included: Cannabis, THC, CBD, edibles, cosmetics and chromatography. Fourteen articles describing analysis of cannabinoids in edibles (n=8) and cosmetics (n=6) were identified. The most commonly used analytical technique was HPLC coupled with mass spectrometry (n=7).

Challenges Related to Extraction of Cannabinoids from Different Matrices

Michaela Mifsud

Systematic literature review is carried out to identify different matrices in which cannabinoids can be found, sample preparation and analytical methods used and challenges related to the extraction of cannabinoids from each matrix. Articles published between 2014 and 2024 describing the extraction and analysis of cannabinoids were identified. The most commonly analysed cannabinoids were cannabidiol (n=17) and tetrahydrocannabinol (n=16) which were mainly found in oils (n=12). The most common chromatographic technique used was high performance liquid chromatography (n=9) and most common detector used was the mass spectrometer (n=13).

Pharma Digitalisation: Risks and Opportunities

Gianluca Muscat

Digital technology is redefining pharmaceutical practices, offering innovative opportunities for healthcare optimisation. The project aims to analyse the risks and opportunities of pharma digitalisation and to develop guidelines for pharma digitalisation risk reduction. A literature review to evaluate the incorporation of pharma digitalisation was undertaken. Interview questions were developed and validated and held with different stakeholders including physicians, pharmacists and patients, to investigate the risks and opportunities of digital transformation. A focus group to quantify the identified risks using 5x5 risk matrices is set up.

Green Practices in Pharmaceutical Distribution

Maria Portelli

This project aims to assess the application of green practices in pharmaceutical distribution and to evaluate the knowledge and application of these practices by the concerned stakeholders. A questionnaire was developed and validated to identify green practices which are currently being applied in the local scenario and the environmental impact of related activity. The questionnaire was disseminated to wholesale dealers and distributors. The data gathered is analysed to identify lacunas in green practices used in distribution and to propose suggestions to adopt more sustainable measures.

Advances in the Management of Dyslipidaemia

Shanice Spiteri

Dyslipidaemia management in coronary artery disease patients, with monotherapy (atorvastatin or rosuvastatin) versus dual therapy (rosuvastatin 40mg and ezetimibe 10mg), is assessed using hospital records at the Cardiac Rehabilitation Unit, Mater Dei Hospital. Low-density lipoprotein cholesterol (LDL-C) is monitored for 18 months post-cardiac intervention (baseline). Eight patients were assessed (mean age 63 years, 8 males, 5 STEMI). Mean LDL-C was 3.73 mmol/L at baseline which decreased to 2.34 mmol/L with atorvastatin 80mg, to 2.28 mmol/L when changed to rosuvastatin 20/40mg, and to 1.61 mmol/L after 3-6 months of dual therapy.

Medical Devices: Perception and Awareness

Etienne Xiberras

This study aims to determine the perception and awareness of Maltese healthcare professionals, patients, and medical device industry stakeholders on the use of medical devices. Questionnaires aimed at healthcare professionals, medical device industry stakeholders and patients respectively are validated using an expert panel and disseminated. Medical device perception and awareness are analysed to identify gaps and solutions on how to improve the awareness of these devices are suggested.

Anticholinergic Burden in Older Patients

Kristy Xuereb

In phase 1 of a retrospective study at Karin Grech Rehabilitation Hospital (KGRH), using a validated data collection tool, the anticholinergic burden (ACB) was assessed for patients discharged from June to December 2023. An ACB score of >2 was evident in 142 out of 458 patients aged over 65, excluding patients transferred to acute care or deceased. Deprescribing resulted in reduction in ACB score in 60% of patients during admission at KGRH. An intervention with clinical pharmacists is conducted, and deprescribing practices are re-evaluated in phase 2.

Risk Management in Community Pharmacy Practice

Paula Zammit

Pharmacy risk factors impose a threat to healthcare outcomes. The aims are to determine clinical and non-clinical risks and current risk minimisation strategies in place in community pharmacies, and to develop risk management guidelines. A documentation sheet was developed and validated by seven pharmacists; community (n=4), academia (n=2) and regulatory sciences (n=1), to capture risks during observational studies carried out in twenty-three community pharmacies. Risk management guidelines, disseminated to community pharmacists, are validated by a focus group consisting of four pharmacists and one physician.

B.Sc.(Hons) Pharm. Sci Pharmacy Practice

PROJECT DESCRIPTIONS

Third Year Students

An Open-Source Maltese Medicines Information System

Loredana Agius

The aim is to develop the Maltese Medicines Information System (MMIS) portal to convey information about locally available medicinal products. The scope of the portal is based on an analysis of needs assessment. A random sample from the Malta Medicines Authority database is used to develop the MMIS for products locally available. The portal is evaluated for use, practicality and updating.

Proposal of Laboratory for Analysis of Cannabis

Maria Celine Azzopardi

Terpenes, cannabinoids, residual solvents, pesticides, heavy metals, mycotoxins, micro-organisms and moisture are analysed in cannabis. Consumables, equipment and instrumentation used in analysis of cannabis are identified and cost evaluations carried out. Discussions with experts involved in analysis are held. Facility for analysis of medicinal cannabis is proposed.

Ethics Research in Pharmacy

Gabriel Busuttil

The ethics approval for research in pharmacy is obtained after filling a form satisfying ethical and data protection requirements. Guidelines and presentations are prepared to help applicants through a smooth ethics approval protocol by means of analysing present challenges. This is carried out by comparing the University's of Malta ethics approval methods to other universities, asking student opinions by means of a questionnaire.

Health and Safety Risks in Pharmacy

Pia Caruana

The aims are to identify and quantify health and safety risks in community and clinical pharmacy settings. Observation studies in community and clinical pharmacy settings are carried out. A questionnaire to determine frequency and severity of risks is disseminated to pharmacists in these settings. Results are presented to a focus group and risk mitigation strategies are put forward.

Making Anaesthesia Green

Elaine Curmi

Anaesthesia has a detrimental impact on the environment and contributes to the footprint of public healthcare on climate. The aim is to evaluate the environmental impact of currently used gases and techniques applied for anaesthesia. A retrospective analysis is conducted to evaluate the anaesthetics used and their environmental impact. Mitigation strategies are proposed.

Towards Digitalisation of Pharmaceutical Distribution

Kyra Jade Debono

Processes have been made more efficient and streamlined through digitalisation of the pharmaceutical sector. The aim is to evaluate digitalised processes which have already been implemented. Interviews with stakeholders are conducted to identify risk factors accompanying digitalisation and possible opportunities in which new technologies could be incorporated within the distribution sector to transition towards Pharma 4.0.

Development of Tools to Demonstrate Opportunities in the Pharmaceutical Area

Maya Falzon

The aim is to develop a framework demonstrating the opportunities in the pharmaceutical area with special emphasis on continuous professional development. Questionnaires aimed at capturing factors that influence teenagers when choosing career pathways are developed, validated, and disseminated. The findings are analysed to identify a strategic framework to showcase career opportunities within the pharmaceutical field.

Cannabis for Medical and Recreational Use

Michael Victor Farrugia

Cannabis exerts different physiological effects and has been used for medicinal and recreational purposes. Local and international policies related to the use, testing, and distribution of cannabis for medicinal and recreational purposes are identified and compared. Policies related to the use of cannabis for medicinal and recreational purposes are proposed.

Arrhythmia Screening and Assessment in Primary Care

Andrea Fenech

The aim is to assess feasibility of community pharmacist-led screening of arrhythmia. Patients screened are ≥65 years, diagnosed with hypertension and one or more of the following comorbidities; heart failure, diabetes or obesity. Patients already diagnosed with arrhythmia are excluded. An automated blood pressure monitoring device enabled with arrhythmia screening technology is used, with patient referral to a physician as necessary.

Risks of Drug-related Problems in Community Pharmacy

Elena Gatt Bonanno

The aims are to develop and validate two documentation sheets; one for patients and one for pharmacists. Risks of drug-related problems (DRPs) are identified during observational studies carried out in 10 community pharmacies. A focus group to quantify the risks using a 5x5 risk matrix for 10 selected DRPs is set up. Guidelines on mitigation strategies are put forward.

Digital Health: Implications in Pharmacist-Led Patient Monitoring

Ylenia Grech

The use of wearable devices and mobile applications is assessed via the distribution of questionnaires to patients in geographically spread community pharmacies. Planned outcomes include the identification of patients most likely to find the use of these digital tools challenging, difficulties encountered by patients and pharmacists, and elaboration of possible pharmacist interventions to facilitate ease of use.

Evolvements in the Management of Cardiovascular Disease

Yosef Jarboua

The aim is to assess outcomes in a cohort of heart failure patients prescribed empagliflozin. Patients (N=250) diagnosed with heart failure with reduced ejection fraction, with or without diabetes, and prescribed empagliflozin, are followed-up for one-year from baseline using hospital records to assess efficacy and safety outcomes, including all-cause mortality, hospital readmission, congestion symptoms, NT-proBNP levels, renal function and side-effects.

Pharmaceutical Workforce Developments: A Futuristic Approach

Daniela Pisani

The project aims to identify and propose initiatives to address pharmaceutical workforce development needs to ensure preparedness by the profession to meet societal expectations. The method consists of identifying global needs, undertaking a questionnaire amongst local pharmacists and proposing initiatives for transformation. The global needs identified from literature are job satisfaction, continuous professional development, and interprofessional collaboration.

Emergency Preparedness in Pharmacy: Lessons learned from the COVID-19 Pandemic

Kathlene Saydon

Identified lacunae present in medicine and vaccine procurement, pharmacy education, sourcing of personal protective equipment for healthcare providers are evaluated. Validated questionnaires are distributed to stakeholders in the community, regulatory, industry and hospital sectors to get an insight of what issues arose during the COVID-19 pandemic. A strategic plan to prepare for future pandemics is devised based on these insights.

Medication Access: Practice Opportunities for Pharmacists

Geordie Schembri

The aims are to understand the accessibility to medication in Malta and how pharmacists in different sectors can help their patients when accessibility is challenging. Questionnaires are disseminated to different healthcare professionals to investigate the most common problems and suggest ways to improve accessibility. Data on the causes of lack of accessibility such as barriers, for example cost, is compiled.

Prescribing Cascades in Older Adults

Nicole Sciberras

A literature search to determine published tools to identify prescribing cascades is conducted. Retrospective information in a cohort of older adults in a rehabilitation hospital is reviewed to identify prescribing cascades and assess the extent of deprescribing conducted. Intervention with the clinical pharmacists is performed to enhance awareness of prescribing cascades.

Patient-centred Clinical Pharmacy Services for Older Persons

Damien Spiteri

Quality Management Systems (QMS) concerning Clinical Pharmacy Services, encompassing patient admission, treatment, and overall service delivery is investigated using specific services. The QMS development includes drafting general guidelines, protocols, and Standard Operating Procedures (SOPs). The finalised QMS will undergo discussion with stakeholders such as hospital management and clinical pharmacists, presenting a comprehensive approach to optimising the quality of clinical pharmacy services.

Community Pharmacists Interventions Supporting Ambulatory Cancer Patients

Ylenia Marie Xerri

Interventions to be carried out by community pharmacists to support ambulatory cancer patients are identified. The logistics, financing, challenges and safety issues associated with pharmacist interventions in cancer care are analysed. Proposals to overcome the challenges of pharmacist interventions are validated. Questionnaires aimed at pharmacists from different pharmacies across are developed and validated using an expert panel.

Sourcing Active Pharmaceutical Ingredients to Manage Shortages

Leanne Zammit

The process of sourcing active pharmaceutical ingredients (APIs) is analysed through an observation study of registered ingredients. Questionnaires are developed and validated. A mixed expert focus group is conducted for SWOT analysis to assess feasibility. This provides insights into current supply chain disruption and opportunities derived from API sourcing. This study investigates and reveals potential areas for enhancing the system's efficiency, reliability and effectiveness.

B.Sc.(Hons) Pharm. Sci Pharmacy Practice

PROJECT DESCRIPTIONS

Second Year Students

Digitalisation and Older Persons

Ethan Attard

The aim is to understand the extent of use of digital pharmaceutical services by older patients. The challenges regarding patient use of devices and electronic systems adopted for patient monitoring are identified and measures to help overcome these challenges are proposed.

Digital Tools in Pharmaceutical Processes

Emilie Daniela Bonnici

Advancement and development of digital tools lead to improved efficiency of pharmaceutical processes. The study aims to (i) evaluate emerging technologies for pharmaceutical processes, (ii) establish digital tools being applied locally and (iii) determine related advantages and challenges.

Digitalisation: Online Accessibility to Medicines

Celine Borg

An investigation of the present system and regulations on online dispensing is performed. Safeguards to quality, safety and efficacy of an online system are determined. Advantages and disadvantages including risks of an online dispensing system are weighed and proposals are made.

Renal Impairment after Cardiac Procedures

Katrina Borg

Use of a medical device which balances volume administration with forced diuresis was recently introduced in local practice to decrease contrast-associated acute kidney injury in at-risk patients undergoing cardiac procedures. This project aims to assess outcomes using this novel device.

Patient Monitoring Needs for Chronic Medication

Letizia Briffa

An assessment of relevant patient self-monitoring with chronic medication use for cardiovascular and endocrine conditions is undertaken. To maximise patient safety, this project analyses extent of patient monitoring within the healthcare system with chronic medication use such as lithium and amiodarone.

Implementation of Clinical Guidelines in Heart Failure Patients in Community Pharmacy

Desiree Camilleri

Recent clinical guidelines recommend quadruple therapy for management of heart failure (HF), however real-world implementation remains unclear. This project is carried out in community pharmacy and aims to assess implementation of guideline-directed medical treatment in HF patients, including patient perspectives.

Risks of Sleep Health Management in Community Pharmacy

Raquel Marie Caruana

Poor sleep health is recognised as a risk factor for chronic diseases. The aims are to evaluate risk factors related to lack of sleep, and to explore pharmacists' perspectives on the future of sleep health care in community pharmacy.

Use of Cannabinoids and Flavonoids in Pain

Kerrie Ciappara

Molecules with therapeutic properties in the cannabis plant include cannabinoids such as delta-9-tetrahydrocannabinol, cannabidiol, and minor cannabinoids; flavonoids; and terpenes. Flavonoids include flavone, flavonol, aglycones and glycosides, with prenylated flavones Cannflavin A, B, and C. Terpenes impart the plant's aroma and contribute to the entourage effect.

Management of Heart Failure in Older Patients

Yasmin D'Amato

Heart failure contributes significantly to increased morbidity and mortality in older adults. Concurrent disease and medication may limit older patients from tolerating evidence-based recommended therapeutic agents. Clinical pharmacist intervention is important to ensure that treatment prescribed is optimal and according to the latest guidelines.

Determination of Shelf Stability of Cannabinoid Products

Rowann Darmanin

Cannabis contains different cannabinoids having physiological properties, with cannabidiol and tetrahydrocannabinol being the major cannabinoids. Cannabinoid-containing products are available in different types of dosage forms and different stability tests can be applied to determine their shelf lives.

Digital Health Tools: Risks and Ethical Considerations

Emily Desira

Digital health technologies offer opportunities to reshape health systems by spreading health information and literacy. This project aims to identify risks and ethical issues associated with digital health tools and suggest strategies that can minimise the identified risks.

Anticholinergic Burden in Chronic Medication

Mariah Fava Borg

Identifying anticholinergic burden using scales may support pharmacists to contribute to collaborative practice for patient medication optimisation. The project identifies and assesses feasibility of applying such scales for community pharmacist–led impact assessment of anticholinergic burden identification with chronic medication.

Direct Oral Anticoagulants in the Older Population

Carla Harrison

Direct oral anticoagulants are used for the prevention and treatment of thromboembolism in disorders such as atrial fibrillation, deep vein thrombosis, and pulmonary embolism. Several factors need to be considered in the older patient to ensure safe and effective use.

Nuclear Medicine: Use of Radiopharmaceuticals

Aya Mahmod Giuma Swan

Radiopharmaceuticals present a number of challenges particular to efficacy and quality of the product. These challenges are identified through a systematic analysis of real-life case scenarios. Proposals are made and validated to address these challenges.

Pharmaceutical Waste Management

Julia Xiberras

Pharmaceutical waste generated during processes such as manufacturing and administration of drugs, contributes to an increased environmental footprint. The study aims to assess the waste generated during pharmaceutical processes and evaluates waste management systems in place.

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