OVERDOSE SYMPOSIUM '25

24-28TH FEBRUARY

Malta Pharmaceutical Students' Association

MPSA EXECUTIVE TEAM 2024/2025

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Pharmacy Elevator Pitch

Prof. Lilian M. Azzopardi

Professor and Head, Department of Pharmacy

Chair, International Pharmaceutical Federation (FIP) Academic Institutional Membership Advisory Committee

Last October, 30 first year students were welcomed into the pharmacy and pharmaceutical technology courses. This group of freshers joined i) 71 students following Bachelor programmes leading to the BSc (Hons) in Pharmaceutical Sciences and the BSc (Hons) in Pharmaceutical Technology degrees, ii) 40 students in the Master of Pharmacy course, iii) 24 students in the MSc Pharmaceutical and Regulatory Science course and iv) 27 in the PhD and Doctorate in Pharmacy prorammes.

Every October, fresher students joining the Department of Pharmacy bring in a sense of motivation, renewal and joy as they represent the continuum for the advancement of pharmaceutical sciences, pharmacy practice and research. One of the responsibilities of being a member of the Department, as a student, an alumnus or a member of staff is to provide visibility to society of the values, contributions and opportunities of being part of the pharmaceutical workforce. The messages serve to inform students about the application of science through a career in pharmacy and pharmaceutical technology and the ability to contribute in diverse ways to developments in the of medicinal products and patient care. This is where all of us, at different instances in our professional life, are providing 'elevator pitches' to convey the message. Elevator pitches are short, clear, sincere and engaging positive messages that are intended to convey a snapshot of the personal experiences.

Pharmacy students are in continuous interaction with a variety of stakeholders, both internal (such as other pharmacists, health care professionals) and external to the profession such as patients, other students, former educators. These connections serve as a powerful meaning of what pharmacy stands for as a profession, career prospects, pharmaceutical workforce strengths, priorities and opportunities, as well as characterising student life and personal aptitudes and motivations. Developing a 'Pharmacy elevator pitch' serves to effectively accomplish a snapshot of who you are as a student at the Department of Pharmacy.

The Malta Pharmaceutical Students Association is one example of student-led activities which support leadership skills development and provide opportunities for participation in advocacy activities. All students in the Department are ambassadors for the University of Malta, the Faculty of Medicine and Surgery, the Department of Pharmacy and the pharmaceutical workforce. I encourage all to develop your own elevator pitch to convey your unique values as a person highlighting your aspirations, motivations and passion towards being part of the world of pharmacy. Whether on your placements, on campus, at national fora, during the Erasmus student mobility experience or in international fora, pharmacy students can help spread the word how pharmacists and pharmaceutical technologists positively influence pharmaceutical innovations and patient care.

Guided by the motivation to participate in advancement of the pharmaceutical profession, the investment in persons is an objective that is at the heart of the Department of Pharmacy. To

achieve the pharmaceutical workforce capacity, we need to expose the diverse opportunities of joining courses leading to pharmacy and pharmaceutical technology. Furthermore, the dedication within the Department to encourage pharmacists, pharmaceutical technologists and pharmaceutical scientists to invest in their own professional development through post-graduate studies at Master and Doctoral level is an effective way of person empowerment and professional capacity building.

I invite you all to take the opportunity to reflect on your personal Pharmacy elevator pitch and join community outreach activities exposing your personal contribution to the professional effort towards creating visibility to the meaningful insights within the pharmaceutical workforce.

Overdose 2025

Pharmacy Practice and Education: What's new?

Prof. Anthony Serracino-Inglott

Professor, Department of Pharmacy, University of Malta

The future beckons for pharmacy and the pharmaceutical sciences-newer and futuristic concepts include clinical reasoning, critical thinking and patient-centred practice. The pharmacist makes more and more critical decisions in every day care. Pharmacy will integrate in future action in various phases of development such as the biopsychosocial model including physiological concepts (genomics, CRISPR, pathological, bedside testing-point-of-care), psychological (coping skills, autonomy, needs, quality of life) and sociological (pharmacoeconomics, ethics, confidentiality, decision making). Promotion of good health would require fresh communication theories and strategies which continue to evolve at a faster pace. Patients and their carers will be more actively involved in decision making. In pharmacotherapeutic practice, one would witness an evolvement from compliance to adherence to concordance. In the area of regulatory sciences, we will witness the basic pillars of quality, safety and efficacy extend to include accessibility and environmental considerations. As pharmaceutical professionals, the movement entails the stride to achieve excellence beyond compliance through a lifelong commitment to improvement.

This student publication, the *Overdose,* reflects a fact that students are at the centre of education. Students will advance knowledge-based skills development to intellectual clinical and scientific critical thinking, optimizing the professional reasoning techniques and hence the solution of a problem specialising in root cause identification and analysis. This evolvement in education applies to the diverse pharmaceutical scenarios and occurrences whether it is an out-of-specifications in the pharmaceutical industry or an adverse effect occurring in a clinical scenario.

Two such principles in educational processes, which are reflected upon at the Department of Pharmacy are signal and risk analysis. Such processes are investigated in various scenarios and subject areas such as regulatory sciences, antibiotic use, pharmacovigilance, patient safety, medication recalls, medical device incident reports, and introduction of artificial intelligence (AI). For example, a distinct science of 'signalomics' is in the making. Risk assessment and management will complement decision making. Big data will greatly complement and even perhaps outsize contemporary statistical analysis. The evolvement of AI will impact occurrence of undesirable medication reactions and inform on safety profile of pharmaceuticals even before these pharmaceuticals are given a marketing authorisation. AI will influence personalised medicine including real-time monitoring empowering patients and professionals to make learned decisions. The future for pharmaceutical professionals predicts disruption and deconstruction of today's structures such as in clinical trials, lessons we have already learnt in the development and use of the COVID vaccines.

If we would like to address the question what would be new, we need to consider that it is said that history is like a mirror in a car whereby you are guided how to progress by looking at what's at the back to move forward. We could reflect on the historical past of tragedies with medicinal products and hence avoid tragic pharmaceutical occurrences for instance: the

chloroform deaths (1848), diethyl glycol solvent (1937), aspirin gastric toxicity (1955) and thalidomide tragedy (1961). There are historical milestones promoting drug safety in the past: US FDA established (1938), UK Yellow Card scheme (1964), EU pharmaceutical legislation developed (1965), WHO International Drug Monitoring Programme (1968), European Medicines Agency set up (1995) Eurovigilance inaugurated (2012), and EU pharmacovigilance legislation (2010).

In conclusion, one looks forward to a growing component of artificial intelligence. AI can be used to facilitate pharmaceutical processes such as the development of large and complex molecules, namely biologicals, for the treatment of a variety of diseases and also in the evolvement of processes including quality assurance processes. AI will feature in pharmacogenomics and hence personalised medicine optimising individualised dosing. One would witness development of pharmaceutical process through a greater use of algorithm approaches making use of Big Data and also of signals and risks. All these new aspects reflect a quicker, better, effective trend to dynamically improve safe patient outcomes. The fundamental food for thought is all of the above 'news' are safe if all processes and technologies are validated.

The Impact of Artificial Intelligence on Drug Design

C. Shoemake

The pharmaceutical industry is undergoing a profound transformation, and at the heart of this revolution is artificial intelligence (AI). AI is reshaping drug discovery and design by accelerating processes, improving accuracy, and reducing costs. This article explores how AI has impacted drug design, its applications, challenges, and what the future might hold for AI-driven pharmaceutical innovation.

Drug discovery and development have historically been lengthy, complex, and expensive processes. On average, developing a new drug takes 10–15 years and costs billions of dollars. The traditional pipeline involves multiple stages, including target identification, lead compound discovery, preclinical testing, clinical trials, and regulatory approval.

A significant bottleneck in this pipeline has been the design and optimization of drug candidates. Scientists must sift through vast chemical libraries to identify molecules that interact with specific biological targets while meeting criteria for safety, efficacy, and manufacturability. The trial-and-error nature of traditional methods slows progress, with a high failure rate even in late-stage clinical trials. This inefficiency makes AI an attractive solution.

AI employs algorithms and machine learning (ML) models to process and analyse large datasets, identify patterns, and make predictions. In drug design, AI's ability to handle massive volumes of data- such as genomic information, molecular structures, and biological pathways, has opened up new possibilities.

The application of AI in drug design can be categorized into three main areas:

- ***Target Identification***

AI-powered tools analyse genetic, proteomic, and transcriptomic data to uncover new drug targets—molecules or pathways involved in disease processes. For example, AI systems can predict how mutations in specific genes contribute to disease, enabling researchers to develop therapies targeting those mutations.

- ***Drug Candidate Generation***

AI accelerates the process of identifying and optimizing potential drug candidates. Techniques such as deep learning and generative adversarial networks (GANs) are used to design novel molecules with desired properties. This approach reduces the need for exhaustive experimental screening.

- ***Predicting ADMET Properties***

AI models predict absorption, distribution, metabolism, excretion, and toxicity (ADMET) properties early in the design process. This helps identify molecules likely to fail due to safety or bioavailability issues, saving resources.

A number of key contributions that AI has made to the rational drug design process have been identified. These include:

- ***Speeding Up the Discovery Process***

One of the most significant advantages of AI in drug design is its ability to drastically reduce timeframes. Where traditional methods require years to identify viable compounds, AI-powered systems can analyse data and generate candidates within weeks or months. For instance, the startup *Insilico Medicine* used AI to identify a drug candidate for fibrosis in less than 18 months- a process that traditionally takes up to five years.

- ***Enhancing Precision***

AI excels at processing and integrating diverse data types, enabling the creation of highly specific models for drug design. Precision medicine, which tailors treatments to individual patients based on genetic and phenotypic information, benefits immensely from AI-driven insights. For example, *IBM Watson Health* uses AI to match cancer patients with the most effective treatments based on their unique profiles.

- ***Virtual Screening and Optimization***

AI-enabled virtual screening methods allow researchers to evaluate millions of compounds computationally, prioritizing those most likely to succeed. Once potential leads are identified, AI optimizes their structure to improve binding affinity, stability, and pharmacokinetics.

- ***Overcoming Chemical Space Limitations***

The term “chemical space” refers to the universe of all possible molecules, estimated at 10^60 compounds. Exploring this space manually is impractical. AI-driven models can navigate chemical space efficiently, identifying molecules that might otherwise remain undiscovered.

- ***Repurposing Existing Drugs***

Drug repurposing has gained momentum with AI. By analysing existing drug-target interactions and disease pathways, AI can suggest new applications for old drugs, saving time and resources. This approach proved especially valuable during the COVID-19 pandemic, where AI systems identified potential therapies from existing drugs.

AI-Driven Success Stories in Drug Design are already starting to emerge. These include the nobel winning prize for chemistry, whose recipients were the architects behind AlphaFold. To date, this has been one of the most groundbreaking AI applications in drug design. Marketed by *DeepMind*, AlphaFold predicts protein structures with remarkable accuracy. Understanding a protein’s 3D structure is crucial for drug design, as it reveals binding sites and functional mechanisms. AlphaFold has accelerated the identification of druggable targets, particularly in diseases with complex protein structures.

Exscientia is an AI-driven drug discovery company that has advanced multiple compounds into clinical trials. The company developed the world’s first AI-designed drug to enter human clinical trials—DSP-1181, a therapy for obsessive-compulsive disorder. The entire design process took less than 12 months, showcasing AI’s potential to shorten timelines.

BenevolentAI combines machine learning with knowledge graphs to identify drug candidates for diseases with unmet needs. During the COVID-19 pandemic, BenevolentAI identified baricitinib, an existing drug for rheumatoid arthritis, as a potential treatment for severe COVID-19 symptoms.

Despite its transformative potential, AI in drug design faces several challenges. These include:

- ***Data Quality and Availability***

AI models require vast amounts of high-quality data to function effectively. However, biological and chemical data can be noisy, incomplete, or biased. Integrating data from different sources, such as clinical trials, academic research, and proprietary databases, adds complexity.

- ***Interpretability***

AI models, particularly deep learning systems, are often criticized as "black boxes" due to their lack of interpretability. In drug design, understanding why a model predicts a certain outcome is critical for regulatory approval and scientific validation.

- ***Regulatory Hurdles***

AI-designed drugs face unique regulatory challenges. Agencies like the FDA must establish guidelines for evaluating AI-generated data, which requires a balance between innovation and safety.

- ***Ethical Considerations***

AI raises ethical questions, including concerns about data privacy and the potential misuse of powerful technologies. Ensuring equitable access to AI-driven drugs is another pressing issue, as these innovations might disproportionately benefit wealthier regions.

- ***Integration with Existing Workflows***

The adoption of AI requires significant investment in infrastructure and training. Pharmaceutical companies must integrate AI into traditional workflows without disrupting established processes.

The future of AI in drug design is promising, with advancements likely to address current limitations and unlock new possibilities. For example, it is expected that AI will increasingly integrate data from genomics, proteomics, transcriptomics, and metabolomics, providing a holistic understanding of diseases and improving target identification. It will enable the development of personalized drugs

tailored to individual genetic profiles, moving closer to the goal of truly precision medicine. Furthermore, it will facilitate the automation of entire drug development pipelines- from target discovery to clinical trials, consequently reducimg human intervention, minimizing errors and accelerating timelines. It is envisaged that partnerships between AI companies, pharmaceutical firms, and academic institutions will drive innovation. Open data initiatives and collaborative platforms will further democratize access to AI tools. AI's efficiency makes it feasible to design drugs for rare diseases, which are often neglected due to their limited market potential.

In conclusion it is evident that AI is revolutionizing drug design by making it faster, more precise, and cost-effective. From identifying novel targets to predicting the properties of potential drugs, AI is transforming every stage of the process. However, challenges such as data quality, regulatory approval, and ethical considerations must be addressed to fully realize its potential. As AI technology continues to evolve, it will likely play an even more central role in drug design. The convergence of AI, biotechnology, and genomics heralds a future where drug discovery is not only more efficient but also more personalized, paving the way for innovative treatments that improve patient outcomes worldwide.

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Cosmetics: How Safe Are These Products?

Prof. Everaldo Attard

Cosmetics, often considered adjuncts to pharmaceutical products, play a prominent role in community pharmacies. Consumers frequently request a wide range of products, including skincare, makeup, hair and nail products, fragrances, oral care, and personal hygiene items. Within the EU, these products are regulated under the Cosmetics Regulation (EC) No 1223/2009, which provides a clear framework for their manufacture, documentation, and market placement. This regulation emphasizes safety assessment, bans on animal testing, labeling and claims, and includes a list of prohibited and restricted substances.

Despite these regulations, many cosmetic products contain harmful substances that pose risks to human health. These toxic ingredients include heavy metals, synthetic organic compounds, and even some natural products with potentially dangerous properties. Exposure to these substances through the skin, inhalation, or ingestion can lead to adverse health effects ranging from skin irritation to more severe conditions such as organ toxicity, hormone disruption, and even cancer. This article explores the dangers of toxic substances in cosmetics, focusing on heavy metals, although other potentially toxic contaminants such as synthetic organic compounds and toxic natural products should also be given importance.

Heavy metals are naturally occurring elements that can become toxic at certain exposure levels. Although not allowed in cosmetics, traces may be present due to their natural occurrence in mineral-based ingredients. Some of the most concerning heavy metals in cosmetics include lead, mercury, arsenic, cadmium, and chromium (Attard and Attard, 2022).

Lead is a neurotoxic metal with no safe level of exposure. It is often found as a contaminant in lipsticks, eyeliners, and foundations. The Joint Research Centre (JRC) of the European Commission has set the maximum allowed limit at 2 ppm. Chronic exposure to lead has been linked to kidney damage, high blood pressure, and cognitive impairments. Mercury, commonly used in skin-lightening creams and some anti-aging products due to its ability to inhibit melanin production, has a limit of 0.1 ppm. Mercury is highly toxic, especially in its organic form (methylmercury), leading to kidney damage, nervous system disorders, and developmental defects in unborn children. Arsenic, sometimes found as a contaminant in face powders, eyeliners, and skin-whitening products, has a limit of 0.5 ppm. Chronic exposure to arsenic is linked to skin disorders, liver damage, and an increased risk of cancers, including skin, bladder, and lung cancer. Cadmium, a carcinogenic heavy metal found in some makeup products, including eyeshadows, lipsticks, and powders, is primarily introduced as a contaminant during the manufacturing process. The limit for cadmium is 0.1 ppm. Cadmium exposure is associated with kidney failure, osteoporosis, and increased cancer risk. Unlike other metals, cadmium has a long biological half-life, meaning it can accumulate in the body over time. Chromium, particularly in its hexavalent form (Cr(VI)), is a known carcinogen. It is often present in nail polish, hair dyes, and certain makeup products. The limit for chromium is 1 ppm. Chromium exposure can lead to skin irritation, allergic reactions, and an increased risk of lung cancer upon inhalation (Attard and Attard, 2022).

Additionally, synthetic organic compounds like parabens, phthalates, and formaldehyde may also be present in cosmetics (Regulation (EC) No 1223/2009). These may disrupt hormones and increase cancer risks. Even natural products, perceived as safer, can contain toxic compounds or allergens that lead to adverse effects. Regulatory oversight and consumer awareness are crucial in minimizing exposure to these harmful substances. Choosing certified non-toxic and organic cosmetics, reading ingredient labels carefully, and advocating for stricter regulations can help reduce health risks associated with such cosmetics.

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Movie night

Summer Campaigns

Jellyfish Campaign

Summer talks

Career talks

I CHOOSE talk

MPSA 2024/2025

Sunblock Campaign

Hydration Campaign

Fresher's week

World Pharmacists' Day

Science in the City

MPSA 2024/2025

Pink October
Bake Sale

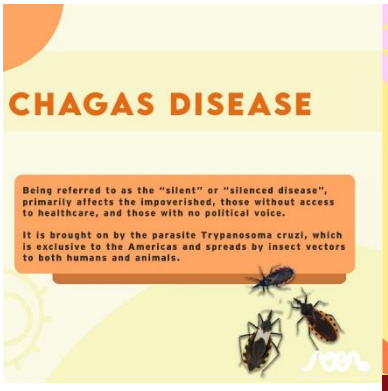
JEF talk

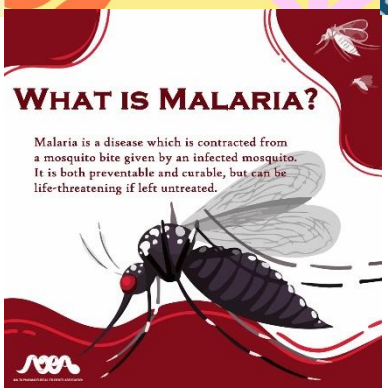
MPSA Annual Live-in

EPSA 67th General Assembly

MPSA 2024/2025

Some of our educational posts





MPSA EXECUTIVE TEAM 2024/2025

MICHAEL VICTOR FARRUGIA- PRESIDENT

Whoa! 3 years as part of MPSA, gone as fast as they started. I've have come a long way, starting out as a Health Awareness Officer, to Vice-President, and ending it off in the top step, as a President. It has been an honour to be part of MPSA's journey.

This year has been a hectic one. For starters, the team grew massively throughout the year thanks to the resurrection of MPSA Sub-Committees. We've improved on some of our standard habits, such as the MPSA Live-in, Bake Sale during Pink October, Freshers, Post-Exams Party and Summer Health Campaigns, alongside adding some new things such as our Movie Night, educational talks, and Summer Retreat. We've become more involved internationally not just attending EPSA events but also gaining Ordinary Membership, writing articles for Science Monthly, and even hosting the EPSA team in Malta. And to top it all off, we still have our Annual Gala yet to come!

There is one achievement that stands out amongst the rest for me, Philibert (MPSA's resident kokka). The felling when MPSA's name was announced as the Kokka Saħħa award for our Sun Protection Summer Campaign is something I don't think I'll be able to replicate for a while. It symbolises how far MPSA has come and I couldn't be more proud of it.

As my time in MPSA sadly comes to a close, I'll look back on the work done with a grinning smile on my face and a sense of satisfaction. Thanks needs to be given to those students, sponsors, people, or anyone really, who helped out and believed in MPSA throughout the past few years. We truly couldn't be in this position without you.

Last but not least, the current (or now past) executive. The amount of gratitude that is owed to you: Jade, Aya, Elaya, Karl, Maria, Maya, Naiya, and Nicolai; is too exorbitant to put into words or numbers. They've made me incredibly proud of the work they've done, giving it their all every step of the way, and going beyond what was and is expected for them. The future of the organization is in good hands, I have no doubts.

JADE CAUCHI- VICE-PRESIDENT

Serving as the Vice President of MPSA was an incredible journey that definitely made university life more exciting and fulfilling. Throughout this term I had the opportunity to support and collaborate with the other members in organising events, participating in health campaigns, school talks, and contributing to initiatives like bake sales. One of the most memorable experiences was representing MPSA at an EPSA event in Prague, which gave me a broader perspective on pharmacy beyond our local community. While this role equipped me with valuable skills that I will carry into my professional life, what truly made this year special were the experiences shared and the lifelong friendships I formed along the way.

AYA SWAN – FINANCIAL OFFICER

My role as Honorary Treasurer this year was a rewarding journey with MPSA. My main responsibility was to ensure the association's finances were managed effectively, allowing us to allocate funds wisely and support various events and initiatives. I would like to extend my gratitude to everyone who contributed to MPSA, as their support has been instrumental in helping us achieve our goals. Being part of this team has given me the opportunity to develop valuable skills and memories. A special thank you to my fellow committee members for their dedication and hard work.

NICOLAI BONELLO - LEISURE OFFICER

My time as Leisure Officer with MPSA has been a great experience. My primary goal was to bring students together, fostering a sense of community and adding a social aspect to university life beyond the sometimes monotonous routine of lectures and studies. In this role, I had the opportunity to meet new people, collaborate, and organize events such as the annual live-in and gala, along with newer events like parties and a summer weekender, all aimed at creating memories students will cherish for a lifetime. However, it wasn't just about those standout events; this role emphasized the importance of the small, everyday moments that a strong community fosters, making university life more fun and meaningful for everyone.

MAYA SCIBERRAS - HEALTH AND ACADEMICS OFFICER

As the Health Officer, I had the opportunity to organize multiple beach educational pop-ups focusing on crucial public health topics such as hydration, sun protection, and jellyfish sting awareness. These initiatives allowed me to engage with the community, providing valuable health information while also developing my communication and leadership skills. Additionally, coordinating student participation such as in Science in the City, where we conducted blood pressure and blood glucose tests, enhanced my practical experience in patient interaction and health promotion. This role deepened my understanding of public health outreach and reinforced the importance of preventative care, which will be invaluable in my future career as a pharmacist. In my role as the Academics Officer, I worked to bridge the gap between prospective students and the pharmacy profession by delivering presentations in post-secondary schools about the various courses available in the Department of Pharmacy. Organizing and leading summer school talks on key health topics such as dental hygiene, sun protection, and hand hygiene also allowed me to refine my public speaking and knowledge dissemination skills. These experiences helped me appreciate the importance of education in healthcare and strengthened my ability to explain complex medical concepts to different audiences. This role not only expanded my academic

expertise but also prepared me to be an effective advocate for health literacy in my future profession.

NAIYA ABDILLA- PUBLICATIONS

Last year, I became MPSA's Publications Officer, gaining experience in scientific writing by publishing articles for EPSA's S!M and creating educational content for MPSA's social media. Being part of MPSA has been an incredible experience, pushing me out of my comfort zone and helping me grow. It has also given me the chance to connect with others in the pharmaceutical field and contribute in my own way.

MARIA YOUSSEF- SPONSORSHIPS OFFICER

Serving as the Sponsorships Officer for MPSA allowed me to secure funding for various events and support charities across the island. Additionally, we were fortunate to receive resources for our health campaigns and initiatives. This role taught me the importance of making meaningful connections and effectively balancing time between sponsors and other responsibilities.

Joining MPSA was an incredible opportunity that enhanced my ability to connect with others while deepening my appreciation for the vital role pharmacists play. Through this experience, I also honed my teamwork, communication, and organizational abilities. I am truly grateful to my fellow members for their support and would like to extend my best wishes to the incoming executive team.

ELAYA XUEREB – INTERNATIONAL OFFICER

During my first year at university, I decided to join MPSA to give my contribution to fellow pharmacy students and the organisation itself. As the International Officer of MPSA, I had the opportunity to act as a liaison between our organization and global pharmaceutical student bodies like EPSA and IPSF. This role allowed me to represent MPSA internationally, fostering collaborations and strengthening ties with fellow pharmacy students across different countries. I had the pleasure of attending EPSA's 67th General Assembly in Prague and hosting EPSA's team in Malta for their 6th/1st team meeting. This allowed me to develop essential cross-cultural communication skills, gain a deeper appreciation for diverse healthcare perspectives, and enhance my leadership abilities. This experience has been invaluable in shaping both my professional and personal growth, equipping me with teamwork and networking skills that will stay with me for years to come.

KARL CAMILLERI – PUBLIC RELATIONS OFFICER

As the Public Relations Officer for MPSA, my role involved creating and promoting various materials, including event promotions, educational posts, and other activities organised or participated in by MPSA. This position allowed me to enhance my creativity and problem-solving skills while contributing to the organisation's outreach and engagement. Being a part of MPSA over the past year has significantly strengthened my teamwork, communication, and time management skills. But more importantly, it has enriched my university experience greatly, and I am incredibly grateful to the entire MPSA team for their dedication and hard work, which not only led to outstanding results but also made the past year truly memorable.

MPSA would like to wish all students the best of luck in their studies and congratulate all graduated. We would also like to show our sincere appreciation to all the staff at the Department of Pharmacy for all your help and dedication.