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DRUG INFORMATION BULLETIN

CRITICAL ANALYSIS OF THE DISPENSING PROCESS AT MATER DEI HOSPITAL

PHARMACIST-LED DIABETIC PATIENT MONITORING

Picture taken by Jakov Cordina (B.Pharm) from Actavis Malta Ltd Analytical Laboratory.

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Editorial Mission:
JEMP publishes original research manuscripts, subject reviews and other contributions related to all aspects of research within the field of pharmacy. JEMP is dedicated to improve the dissemination and interpretation of results of scientific investigation and evaluation of pharmacy processes, pharmaceutical services and interventions and economic outcomes of pharmacy services.

Pharmaceutical Technology

The front cover features a High Performance Liquid Chromatograph (HPLC) at the Actavis Malta Ltd analytical laboratory. HPLC is a chromatographic technique used to separate a mixture of compounds in analytical chemistry and biochemistry with the purpose of identifying, quantifying or purifying the individual compounds of the mixture being analysed. HPLC is used in pharmaceutical processes such as for the chemical analysis of active pharmaceutical ingredients, excipients and finished good products. Various tests are performed which include assay, related substances, uniformity of content and dissolution. This system relies on pumps to pass a liquid under pressure which carries the sample mixture through a column filled with a phase with which components can interact with varying degrees, leading to the separation of the sample mixture. Different types of detectors such as Ultraviolet (UV)/Diode Array Detector (DAD), Fluorescence and Refractive Index are used, depending on the analyte being tested.

The Department of Pharmacy ensures that students are exposed to practical aspects of processes in pharmacy through the use of instrumentation such as the HPLC and through student placements. Student placements are an important aspect of the programme of studies leading to an M.Pharm degree and in the newly developed course leading to a career in Pharmaceutical Technology. This new course targets specifically the needs of the industry and is intended to attract graduates who are interested in pharmaceutical sciences as applied to research and industrial aspects of pharmacy.

Pharmaceutical Technology combines scientific aspects that are critical in the development and manufacture of new drugs, handling of medicines and medical devices. It consists of a number of categories; namely Pharmaceutical Chemistry, Pharmaceutical Process Technology, Pharmaceutical Drug Analysis, Pharmaceutical Regulatory Affairs, Applied Pharmaceutical Sciences, Pharmaceutical Quality, Pharmaceutical Microbiology and Pharmaceutical Quality Assurance. Various skills are developed throughout the B.Sc. (Hons) Pharm Tech degree including, the ability to deal with details and ensure safety, understand and apply medical and pharmaceutical terminology, adopt correct handling, storage and stock maintenance of medicines, accurately process written instructions and follow Standard Operating Procedures and follow regulations according to local, European and international requirements such as Good Manufacturing Practice. Graduates of this programme can pursue a variety of career and job opportunities. They are trained and educated to work as scientists and researchers in the pharmaceutical industry and in pharmaceutical and healthcare organisations such as: Quality Assurance and Quality Control departments in the pharmaceutical industry, production and partial manufacturing facilities and government pharmaceutical services.

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EDITORIAL

Risk is part of our daily language and we use it in a variety of contexts and scenarios. One might talk about 'risk' as the probability of an incident happening or not happening, about success or failure. One can also refer to risk in a negative manner when dealing with opportunities and threats. Taking a risk is an option and not an ultimate fate. One's freedom of choice depends from the action one dares to take. The study of risk began in the Renaissance, when people freed themselves from the compulsion of the past. It was a time when the world was extensively explored and discovered and a lot of resources were found.

Organisations would never evolve without taking risks. However, risks affecting organisations can have overwhelming consequences with respect to economic performance and professional status. The key to success is to manage the dangers and threats by applying techniques of 'risk management', maximising the chance of a successful outcome and limit the chance of failure. Managing risk is increasingly becoming a fundamental part of respectable practice.

The utility of quality systems for the pharmaceutical and biopharmaceutical community was identified by regulatory agencies following the success of such systems in other areas such as the airline industry. The first risk management techniques were developed for the nuclear and defense industries way back in the 1940s. In the 1960s, the petroleum and chemical process industries were among the first commercial bodies to adopt these techniques. The automotive industry joined in the 1980s. The Food and Drug Administration first established risk management standards and regulations for medical devices industries later on in 1990. Usually, the Hazard Analysis and Critical Control Point methodology has been considered to be a pharmaceutical safety system that assesses hazards, measures risk and establishes specific measures that highlight prevention rather than reliance on end-product testing. Good Manufacturing Practice controls to a certain extent, the critical operations and processes in the manufacture of finished pharmaceuticals.

Quality risk management is a systematic procedure for the assessment, control, communication and review of risks to the quality of a medicinal product across its lifetime. This component of a quality systems framework can direct the setting of the requirements and process parameters for drug manufacturing, assessment and risk reduction. Risk management is a preventive and predictive tool, combining aspects of economics, maturation of quality management systems, standards, global harmonisation, new strategic models and allied responsibility.

Most of the regulation of drugs in the twentieth century came about as result of catastrophes. Risk analysis is not only appropriate in situations where the results of occurrences can have clear immediate devastating consequences. The basis of optimal usage of medicines is an assessment of risk and benefit. The aims behind risk analysis are to help decision makers better understand the risks and opportunities they face and to evaluate the options available for their control and reduction. A detailed risk analysis can provide answers to a multitude of questions. However, risk analysis could also be used to induce pertinent questions which otherwise could have been missed. The eventual goal of such a practice is to strike a balance between the effect of risk on the company and the cost of implementing preventative measures. This is especially true in cases of risk analysis in pharmacovigilance.

The endeavour of the Department of Pharmacy in investigating risk as an area of excellence is undertaken not only by studying aspects through a magnifying glass but more so through innovative vision and technologies. Such an investigative process follows the same trends that were adopted by the Department when in 1995 the process of Validation in Community Pharmacy, taken up by the present Head of Department Professor Lilian M. Azzopardi, led to outstanding research results that placed the Department of Pharmacy Validation Research Group at the centre of such studies in the international pharmaceutical arena. Professor Azzopardi is invited to address the forthcoming International Pharmaceutical Congress of the International Pharmaceutical Federation in Dublin on the subject.

The Department of Pharmacy at the University of Malta is actively participating in 'Risk' projects by dedicating a research group on 'Risk' under my leadership, highlighting the importance and value of this area in the pharmaceutical scenario. Some of the research questions being studied by this research group are issues concerning risks of patients self-administering medication, risks in dispensing over-the-counter (OTC) preparations, risks of products being OTC rather than pharmacist recommended, risks of medicines being available from supermarkets, risks encountered in the pharmaceutical industry, risks involved in the partial manufacturing of pharmaceuticals, risks implicated within the pharmaceutical distribution chain, risks of pharmacist prescribing as compared to present prescribing practices by medical doctors, risks related to changing 'old concepts' such as certain pharmacopoeial requirements; example storage temperature ranges, risks of reducing bioequivalence demands and other traditional requirements which increase significantly drug costs and risks of establishing good quality through in-process controls versus final product analysis.

Such studies will help pharmacists identify risk scenarios in different pharmaceutical processes, rank and analyse the different risks, devise risk management plans and implement risk mitigation strategies to improve outcomes in various pharmaceutical settings. However, the research team is also verifying means of identifying 'myths' related to risk, such as bureaucratic specifications and controls that crept into regulatory systems with the good intention of decreasing risk, but in reality they have only increased costs and consequently created therapeutic orphans in a world where finance is limited even in the health arena.

The editorial board would like to recognise the contribution of Actavis, who are supporting this journal, through a collaborative agreement with the Department of Pharmacy.

Professor Anthony Serracino-Inglott

DRUG INFORMATION BULLETIN

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Abstract

Objective To develop and implement an online bulletin intended to provide information on locally available medicinal products undergoing variation in their Summary of Product Characteristics (SmPC) and inclusions of medicinal products in the Government Formulary List (GFL) and to evaluate the usefulness of the bulletin among healthcare professionals and students.

Method Lists of locally available medicines that had undergone variations and medicinal products added to the GFL during a 6-month time frame were compiled. Additional information was obtained from regulatory authorities and local agents. A concise article was written on each drug, reviewed by a panel of experts and subsequently published in the online bulletin. Following completion of the contents and layout, the material was uploaded on the website of the Department of Pharmacy, University of Malta. A pilot study was carried out to identify shortcomings in the online bulletin design. The launch of the online bulletin started the promotional process which was mainly focused on electronic mail marketing. The data obtained from the validated questionnaire was coded and analysed using SPSS® v.20 and Microsoft® Excel Vista®.

Key findings Sixty seven per cent (n=223) of the respondents returned the questionnaire. The online bulletin was evaluated by 27 medical practitioners, 34 pharmacists, 37 medical students and 51 pharmacy students; of which 35% (n=52) were male and 65% (n=97) were female. The respondents agreed that the bulletin was up-to-date, clear and concise (91%, n=136), user-friendly (97%, n=144), useful (95%, n=142), well-designed (91%, n=136) and easy to access (87%, n=130). Ninety seven per cent (n=145) of the respondents stated that the information present in the bulletin was new to them, whilst 97% (n=144) agreed that the bulletin helped to keep them informed.

Conclusion The online bulletin provided an accessible means to deliver unbiased information about the introduction of recent medicinal products on the GFL and variations in SmPCs of products available on the local market. It was positively received by both healthcare professionals and students.

Keywords Drug bulletin, drug information, government formulary list, variations in Summary of Product Characteristics.

Introduction

The medical and pharmaceutical fields are continuously bombarded with innovative medicinal products, technologies and new information about products present on the market.[1] Rational use of medicines involves the right treatment for a particular condition, at the right dose, right time and for the right duration.[2,3] Improvements in drug therapy require healthcare professionals to filter and assimilate information to keep informed in their practice. This denotes the need of impartial, updated and high quality material for healthcare professionals to keep abreast with these scientific advances.[3,4] Continuing professional development must be a lifelong commitment for every practising health care professional.[5]

Drug bulletins were developed with the aim to provide reliable information about medicines in a summarised form. Since the production of a drug bulletin involves many challenges, initiating and sustaining a publication is essential. The design, production and distribution of issues are crucial to a bulletin's success.[3]

The aims of this study were to develop and implement an online bulletin intended to provide information on locally available medicinal products undergoing variation in their Summary of Product Characteristics (SmPC) and inclusions of medicinal products in the Government Formulary List (GFL) and to evaluate the usefulness of the bulletin among healthcare professionals and students.

Method

Lists of locally available medicines that had undergone variations via the centralised procedure and inclusions of medicinal products in the GFL within a 6-month time frame were compiled. Additional information was obtained from regulatory authorities, local pharmaceutical agents and the website of the 'Ministry of Health, Elderly and Community Care'. A concise article on each drug was written. A schematic overview of the website design and the articles were reviewed by a panel of 5 experts prior to publication.

Following completion of the contents and layout, the material was uploaded on the website. A web counter was installed on the homepage to automatically record the number of visitors who access the website. The online bulletin was hosted in the research section within the website of the Department of Pharmacy, University of Malta.

Ninety seven percent (n=144) of the pharmacists agreed that the bulletin helped them to keep informed about medicines available locally.

Prior to online availability of the bulletin to all the participants, a pilot study was conducted to identify shortcomings in the online bulletin design. The pilot study involved 10 healthcare professionals from the medical and pharmaceutical fields.

The launch of the online bulletin initiated the promotional process which was mainly based on electronic mail marketing. Various pharmaceutical, medical and student associations and the Registrar's office of the University of Malta were contacted. A business card was also created and distributed to physicians and pharmacists to increase promotion of the online bulletin.

A questionnaire, created by KwikSurveys®, was adapted from the validated questionnaires used in the research projects 'Developing a Drug Information Bulletin' and 'Methods for Dissemination of Protocols on the Management of the Common Cold'.[7] The questionnaire acted as a tool to collate information regarding the impact of the online bulletin on the readers. The data was coded and analysed using SPSS® Statistics v.20 and Microsoft® Excel Vista®.

Results

The online bulletin, 'Drug Information Bulletin' was launched online in December 2011. It included 37 medicinal products that had undergone a variation in the SmPC between January and June 2011 and 20 medicinal products which were introduced in the GFL between January and November 2011.

One hundred and forty-nine participants (N=223, response rate of 67%) completed the evaluation questionnaire of the online bulletin. These included 27 medical practitioners, 34 pharmacists, 37 medical students and 51 pharmacy students. Fifty two participants (35%) were male and 97 (65%) were female. Most of the respondents were between 18 and 24 years (63%, n=93).

Contents of the bulletin

The online bulletin was well designed according to 91% (n=136) and easily accessible for 87% (n=130) of the participants. Ninety seven per cent (n=144) remarked that the bulletin was user-friendly. Moreover, 95% (n=142) of the participants agreed that it was useful. According to 91% (n=136) of the respondents, the information presented in the bulletin was up-to-date, clear and concise (Table 1).

Bulletin as a means to keep informed and its need locally

Ninety seven percent (n=144) of the pharmacists agreed that the bulletin helped them to keep informed about medicines available locally. Moreover, 98% (n=146) of participants were in favour of the need of a similar bulletin locally (Figure 1).

Availability of new information

Ninety seven percent (n=145) of the respondents agreed that they found new information in the online bulletin. Seventy four per cent (n=20) of medical practitioners and 59% (n=19) of pharmacists claimed that new information was found in the section regarding variations. Forty percent (n=14) of medical students and 43% (n=22) of pharmacy students stated that they learnt about the inclusions of certain medications in the GFL through the bulletin.

CHARACTERISTIC OF ONLINE BULLETIN	STRONGLY AGREE	AGREE	NOT SURE	DISAGREE	STRONGLY DISAGREE
Easy to access	35	52	8	3	1
Well-designed	34	58	7	1	0.7
User-friendly	38	59	2	1	0
Useful	46	50	3	0.7	0.7
Up-to-date, clear and concise	41	50	7	1	0.7

Table 1: Percentage satisfaction with bulletin characteristics (n=149)

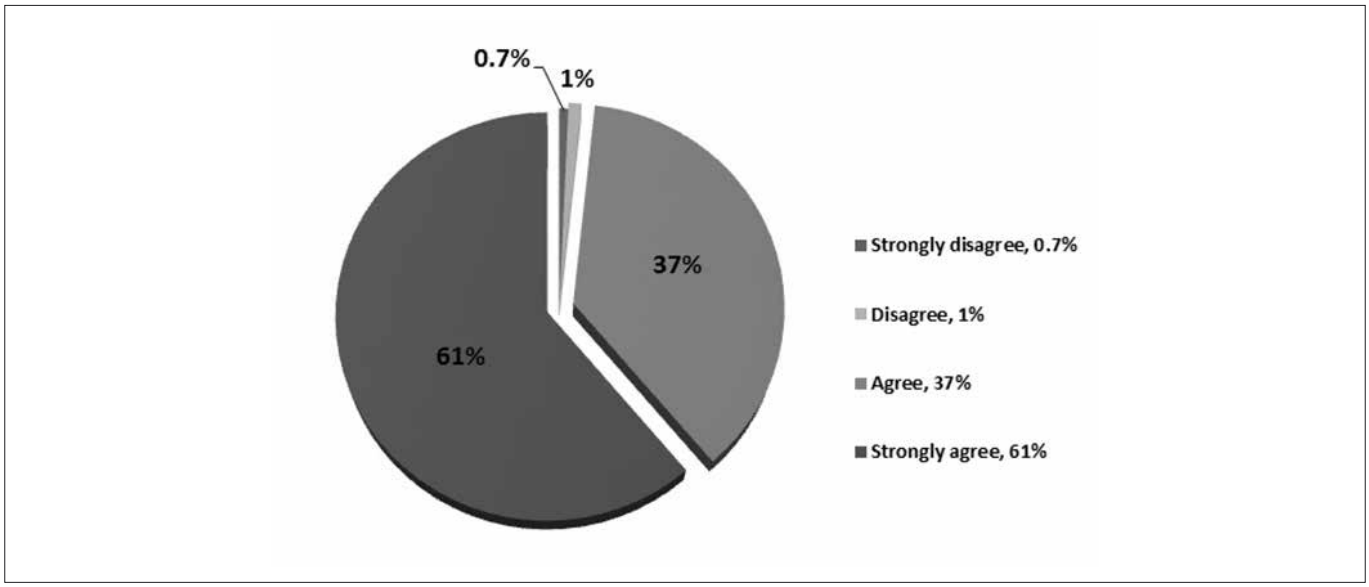

Figure 1: Opinion of respondents about the need of a similar bulletin (n=149)

Assessment of method of dissemination of information

According to 93% (n=139) of all the participants, the website is a better method of disseminating information about recent changes in the SmPC to both healthcare professionals and students. Forty percent (n=60) of participants strongly agreed that the online bulletin provided more updated information whilst 97% (n=145) of respondents claimed that the online version is more widely accessible compared to a printed version. The required information can be easily accessed as perceived by 93% (n=138) of the participants. Moreover, 77% (n=115) of the participants claimed that an online bulletin is more practical and user-friendly compared to a hard copy. The mean rating scores for all the statements about the online bulletin in comparison with the hard copy version were above 4.0. The highest mean rating score of 4.48 was achieved for the statement that 'the online version makes the bulletin more widely accessible' (Figure 2).

Discussion

The internet is a major communication channel for the transfer of information. Online publications reach greater audiences from all over the world in a fast circulation method.[8,9,10] Two hundred and twenty three healthcare professionals, medical and pharmacy students have visited the website with 149 respondents completing its evaluation. The presentation of the bulletin was greatly accepted by the participants as observed by their positive response.

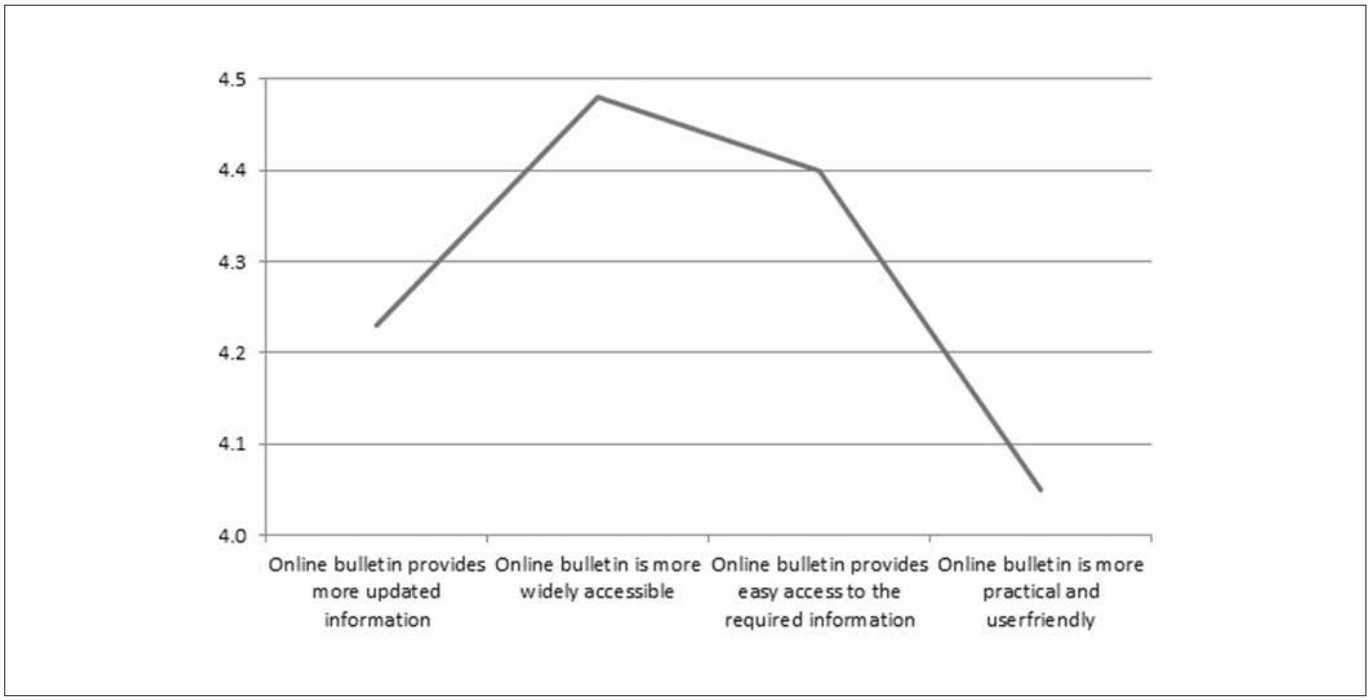

Figure 2: Comparison between different statements about online bulletin compared to hard copy (n=149)

Ninety seven percent of the respondents stated that the information presented in the online bulletin was new to them. Out of these, 61% of the respondents remarked that new information was present in the section discussing variations.

The aspect of user-friendliness of the online bulletin increased by 3% compared to the hard copy bulletin.[6] A comparable result was also obtained in all the other characteristics of the bulletin with the previous two hardcopy issues of 'Drug Information Bulletin'.[6] In this study the bulletin provided an accessible means to deliver unbiased information about the variations of medicinal products available locally. Additionally it raised awareness on additions of medicinal products in the GFL.

Ninety seven percent of the respondents stated that the information presented in the online bulletin was new to them. Out of these, 61% of the respondents remarked that new information was present in the section discussing variations. This compares favourably with the hard copy bulletin issues with 97% and 96% of respondents respectively.[6] Gituma *et al* (2009) found that 22% of the final year medical students consulted books and internet to identify new medical material.[12]

The study carried out by Portelli (1992) showed that 84.53% of pharmacists found a bulletin on recent medicinal products placed on the local market useful.[11] In this study, ninety eight percent of the pharmacists agreed that there is a need for a similar bulletin to 'Drug Information Bulletin' locally. Its need is further stressed by Wirth (2007) who demonstrated that 38% of pharmacists showed interest in a continued education programme to be conducted via journals.[13] Lifelong learning is a continuous process extending from the undergraduate course and throughout the working life as a healthcare professional.[14,15]

Conclusion

The bulletin was positively received by the participants and was reported to be useful, informative and well presented. The bulletin reached its aim to inform the healthcare professionals and students about recent information on medicinal products available on the local market. Furthermore, such bulletins are required by current and future pharmacists and medical practitioners to provide practical and reliable information about medicines in Malta to promote more rational and informed decision about their use.

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CRITICAL ANALYSIS OF THE DISPENSING PROCESS AT MATER DEI HOSPITAL

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Abstract

Objective To identify strengths and weaknesses within the present out-patient dispensing system at Mater Dei Hospital and to suggest alternative processes for a more user-friendly system.

Method Standard operating procedures (SOPs) were reviewed to obtain a better understanding of dispensing activities. Dispensing practices were observed and compared to SOPs. Strengths, weaknesses, opportunities and threats (SWOT) analysis was undertaken. Areas for improvement were evaluated through discussions with pharmacists and pharmacy technicians. Review of SOPs was undertaken to minimise non-conformance to SOPs and improve user-friendliness of the system.

Key findings The dispensing process is influenced by both internal and external factors in the pharmacy setting. Strengths from within the pharmacy setting are the availability of IT systems for record keeping and stock control and access to reference sources for medical and clinical information. Limitations to the dispensing process which should be considered include an environment where patient-pharmacist relationship and patient confidentiality are not supported due to large workloads, low staff levels and patient overcrowding. Whilst trying to encourage rational and safe use of medicines, the current system has an overload of bureaucratic procedures to the extent that these were perceived to limit pharmacists' professional discretion. Current technological developments offer opportunities to improve pharmaceutical services, through bar coding and the integration of patient medication records from different health care settings.

Conclusion The potential contribution of the pharmacists to public healthcare has yet to be maximised, through the introduction of some flexibility of protocols to allow pharmacist professional judgement during the dispensing process.

Keywords Dispensing process, hospital pharmacy, critical analysis.

Introduction

The dispensing process incorporates all activities from when a prescription is presented at the pharmacy until the medicine is collected by the patient or his/her representative. Dispensing is a duty of the pharmacist and he or she must assume responsibility for its quality and outcomes.[1] The dispensing process is often underestimated, although the consequences of process failure may be significant.

Mater Dei Hospital (MDH), Malta's major public general hospital, hosts one of the main pharmacies on the island. On an out-patient basis, patients who suffer from any chronic condition listed on the 'Fifth Schedule' of the Social Security Act or have been granted a 'Schedule II' card after being 'means tested' by the 'Department of Social Security', can collect prescribed medicines free of charge. On average, 400 prescriptions are filled daily from MDH Out-Patient Pharmacy.

The aims of the study were to analyse the current dispensing process at MDH Out-Patient Pharmacy by reviewing current strengths, weaknesses, opportunities and threats (SWOT) influencing existing dispensing operating procedures and recommend improvements to the process, so as to enhance the quality and safety of service provision to patients.

Method

Approval to conduct the study was obtained from the hospital's Chief Executive Officer and the Head of the Pharmacy Department. No ethical approval was necessary since the study did not involve collection of patient data. The study involved an action research and a qualitative approach.

A comprehensive literature review of available material relating to free medicine entitlement criteria and dispensing procedures within the Maltese National Health Service (NHS) was undertaken. These included dispensing standard operating procedures (SOPs), circulars and policies followed at MDH.

Dispensing of medicines from the out-patient pharmacy was observed and compared to the steps outlined in the SOPs. Methods of documentation, manual and electronic, used for monitoring and tracking of stocks were also evaluated. Any non-conformance to written SOPs in actual practice was recorded by means of a 'Deviation Report Form' which

Whilst trying to encourage rational and safe use of medicines, the current system has an overload of bureaucratic procedures to the extent that these were perceived to limit pharmacists' professional discretion

was developed for this study. Deviation reports were kept anonymous. The 'Deviation Report Form' recorded the deviation from SOPs and reasons why standard procedures were not followed. This provided information which enabled the researcher to identify areas for improvement in the current system.

A SWOT analysis of the dispensing process was carried out. Discussions with all pharmacists (n=5) and pharmacy technicians (n=6) working at the out-patient pharmacy were held to identify all strengths, weaknesses, opportunities and threats that influence their dispensing practices and obtain a complete picture of the current situation.

The feedback obtained through discussions and deviation reporting suggested that SOPs related to dispensing which were commonly non-adhered to required review. The SOPs were reviewed and an updated copy of these SOPs was submitted to the pharmacy's quality assurance section. Recommendations for an improved, safer and more user-friendly system were put forward.

Results

All pharmacists (n=5) and pharmacy technicians (n=6) working at the out-patient pharmacy participated in the study. Feedback was collected over an 8-month period. Nine different dispensing processes were identified at the out-patient pharmacy, as outlined in Table 1.

SWOT analysis showed that both internal and external factors to the pharmacy environment influence the dispensing process. Internal factors could be classified as either strengths or weaknesses. Strengths include: availability of Information Technology (IT) systems for record keeping and stock control; access to latest medical and clinical information; access to online medicine approval databases; requirement of a new prescription every 3 months which promotes review of therapy; promotion of a no blame, fair incident report culture which acknowledges human unreliability but importantly seeks to establish clear expectations of responsibility and does not unfairly or routinely blame or penalise those who make errors; modern, large, organised premises which promote safety and efficiency, and adoption of SOPs for all activities carried out at the pharmacy to obtain uniformity across the service and ensure standards are adhered to.

Weaknesses within the dispensing process include; an environment where patient-pharmacist relationship and patient confidentiality are not supported due to large workloads, low staff levels and overcrowding of patients. Dispensers engage in multi-tasking to meet demands from patients. This is likely to have a negative impact on pharmacists, pharmacy technicians, and possibly the services they provide. It also emerged that whilst trying to encourage rational and safe use of medicines, the current system has an overload of bureaucratic procedures to the extent that these were perceived to limit pharmacists' professional discretion.

External factors which could influence the dispensing system were classified as either opportunities or threats. The use of IT systems was classified as an opportunity for the development of the service.

Threats to the current dispensing process at MDH Pharmacy could be mainly attributed to the use of a manual prescription system. Threats range from illegible prescriptions, poor prescriber identification, no patient contact details and non-availability of prescribed medicine on the NHS. Low staff levels make the involvement of more than one person during the dispensing process unpractical, thus reducing efficiency of the dispensing process when it is known thatcounterchecking by a second dispenser improves detection and correction of an error before it reaches the patient.[2]

Patients' attitude may also be a threat to the dispensing process. At MDH pharmacy, due to the large number of patients attending for service at the pharmacy, patients frequently demand immediate attention and anxiously crowd near dispensing cubicles adding stress on the dispenser and increasing risk for dispensing errors. At that point in time the responsibility for the well-being of the patient is in the hands of the dispenser and consequently, accuracy during the dispensing process is more important than speed. Queuing systems should be enforced, so that patients are kept waiting in the waiting room and order maintained.

As a result of this study, 5 dispensing SOPs were reviewed namely; 'General Dispensing', 'Dispensing specific items', 'Entitlement and accuracy checking before dispensing', 'Charge and registration (Sales Section)', Dispensing medicines approved on a named-patient basis'.

Item Category	Description
Formulary Items	Items listed on the latest government formulary
Protocol Regulated Items	Items which are listed on the latest government formulary but in addition to an entitlement card, a permit issued by the 'Medicine Approval Section' is required for dispensing
Named Patient Items	Medicines which are not on the government formulary, however stock is purchased for specific patients
Unlicensed Medicines	Medicines which have no Marketing Authorisations to be placed on the local market. However under Article 5 (1) of Directive 2001/83, EU Member States are permitted to implement national arrangements to allow an authorised healthcare professional to order the importation of an unlicensed medicinal product to meet the special needs of an individual patient under her/ his direct personal responsibility
Fridge items	Items requiring cold storage between 2 and 8ºC
Ostomy/CAPD Items	Patients having a stoma or are on Continuous Ambulatory Peritoneal Dialysis are dispensed medicine from a designated area of the pharmacy called the 'Support Room'
Extemporaneous preparations	Formulations which have been prepared at the pharmacy following rigid preparation processes, outside the normal manufacturing places and are specially prepared to suit a patient's particular needs
DDAs	Drugs of Dependence and Abuse
Sales	Sale of medicines which are not available from community pharmacies to departments and private entities, health care professionals and patients (for personal use)

Table 1: Categories of medicinal products requiring different dispensing procedures

Discussion

The SWOT analysis identified strengths within the system that included a culture of attention to possibility of human errors and responsibility whilst at the same time not seeking to penalise the staff.[3] At the same time the workload and pressure that is being faced by the staff is a major threat to a safe and effective dispensing process. This is of concern since and it indicates that skilled support staff, supportive management and appropriate resources are required to maintain high quality services when facing increasing pharmacy workloads.[4]

The introduction of IT systems is a key trend in pharmacy practice providing an opportunity to manage electronic ordering processes for improved stock management and to integrate dispensing software programs. These databases when used in conjunction with pharmacists' expertise can improve safety and accuracy of the dispensing process. Barcoding is another opportunity in pharmacy, where when combined with an appropriate IT system, enables real-time accuracy checking. The recent introduction within the local NHS of myHealth, an online portal for access to health records by patients and doctors can be further developed to introduce electronic prescribing. Electronic prescribing leads to the improvement in the overall quality of care provided, through the elimination of illegible hand-written prescriptions, warning and alert systems at the point of prescribing, reduction of phone calls to prescribers, better formulary adherence and increased patient convenience.[5,6]

Benefits from this analysis include the pharmacy identifying and making use of its strengths to take advantage of the opportunities that arise, while at the same time using its resources to avoid threats. This would ensure that a high quality service is provided to patients.

Conclusion

Pharmacists have the responsibility to ensure that good dispensing practices are always adhered to. Pharmacists are recognised as experts in medicine management and use and their role in the supply of medicine has moved away from being product centred toward being patient oriented. Their expertise and potential contribution to public health care has yet to be maximised by allowing flexibility of protocols to permit pharmacist discretion during the dispensing process.

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COST ANALYSIS OF STANDARD OPERATING PROCEDURES IN COMMUNITY PHARMACIES

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Abstract

Objective The objectives were to compile Standard Operating Procedures (SOPs) for processes undertaken in community pharmacies and to assess and compare the financial implications of implementing these SOPs.

Method Two community pharmacies of different sizes were identified using purposive sampling. Eighty hours of non-participant and participant observation were conducted in both pharmacies and 5 SOPs were compiled. The 5 SOPs compiled were: Temperature Monitoring and Control, Inward Order: Specified Drugs for Dangerous Drugs (DDA), Inward Order: Cold Chain Product, Housekeeping and Pest Control. The SOPs were psychometrically evaluated for content validity by a focus group. Readability of the SOPs was tested by means of the Gunning Fog Index. The capital, recurrent and total expenditure involved for implementing each SOP in the two pharmacies were calculated and compared.

Key findings The average Gunning Fog Index was 14.73 years. This index gives an indication of number of years of education that a person needs to be able to understand the text easily on the first reading. Total expenditure for implementing the SOPs was expected to be higher in the larger pharmacy (pharmacy B) than in the smaller pharmacy (pharmacy A). This was confirmed for 3 of the 5 SOPs compiled.

Conclusion The cost for implementing the majority of the SOPs for both pharmacies was negligible and most probably their implementation would have a minimal financial impact on the profit of pharmacy.

Keywords Standard Operating Procedures, community pharmacy, financial impact.

Introduction

Standard Operating Procedures

Standard Operating Procedures (SOPs) are authorised, written procedures giving instructions for performing particular operations. They are not necessarily specific to a given product but are of a more general nature (e.g. equipment operation, maintenance and cleaning, validation, cleaning of premises and environmental control, sampling and inspection).[1]

Within the hospital and community practice, an example of the implementation of SOPs in is taken from the UK. In the United Kingdom, the Royal Pharmaceutical Society of Great Britain required that as from January 2005, hospital and community pharmacists develop and implement SOPs covering the dispensing process for each individual pharmacy. This was done to assure clinical governance compliance within the pharmacy setting.[2]

In Malta, the Licensing Authority does not yet impose a requirement on community pharmacies to develop and implement SOPs, although the development of SOPs may be fruitful to community pharmacies to ensure standard processes particularly when locums are engaged.

Benefits of SOPs

There are a number of benefits for the development of SOPs in community pharmacies.[2] SOPs guide pharmacy personnel on how and when to carry out a specific procedure systematically whilst defining persons responsible and accountable for the procedure. They enable the pharmacist to delegate tasks, freeing up time for the development of other services. SOPs provide an opportunity to fully utilise the expertise of all members of staff and improve team work within the pharmacy. SOPs assure quality and consistency of service between current staff, locums and part timers and provide a useful tool in training students and new personnel. SOPs ensure that Good Pharmacy Practice is consistently achieved and maintained, ensure ethical and legal compliance and continual improvement of standards of service. SOPs provide evidence of commitment towards patient's safety and contribute to audit processes. SOPs provide a contribution to the audit process. The basic components of an SOP are depicted in Table 1.

SOPs assure quality and consistency of service between current staff, locums and part timers and provide a useful tool in training students and new personnel.

Name, address and contact details of the pharmacy	Objective
Title	Scope
SOP number	Responsibility
Date of preparation, approval and authorisation	Equipment
Version number	Procedure
Page number	Revision history
Distribution areas	Appendices
Abbreviations	Name and signature of the persons who prepared, approved and authorised the SOP
Definitions	Review date

Table 1: Basic components of SOPs

Cost Analysis of SOPs in Community Pharmacies

Whilst SOPs are a fundamental aspect in achieving Good Pharmacy Practice in community pharmacies at the same time healthcare providers all around the world are faced with severe resource constraints. Resources need to be used as efficiently and effectively as possible and any new procedures introduced need to be also analysed in this light. The optimal use of resources requires clear and accurate information on resource flow and on the impact that resources have on the quality and performance of health services. Collection and analysis of data on costs required to implement the SOPs can provide considerable useful information to the health services provider.[3]

The aims of this study were to develop, validate and implement SOPs for two community pharmacies of different size and to assess and compare the financial implication involved in implementing these SOPs.

Method

Sampling

Two community pharmacies of different sizes were recruited through purposive sampling. The inclusion criteria for the pharmacies were that they had to operate using a regular rota of locum pharmacists and have similar ways of performing the procedures studied.

After permission was granted by pharmacy owners, the managing pharmacist of each pharmacy chosen was contacted, briefed about the aims of the study and asked permission to conduct the study in the pharmacy. Eighty hours were spent in each pharmacy conducting non-participant and participant observation, to observe how procedures were being performed in each pharmacy. The investigator interacted also with locum pharmacists, other pharmacy personnel including housekeeping personnel and personnel handling pest control procedures.

SOP Title	Sections
SOP TMP 001 **Temperature Monitoring and Control**	Digital Room and Refrigerator Thermometer set-up Temperature Monitoring Register Entry Temperature Control Thermometer Calibration Record Keeping
SOP DDA 002 **Inward Order: Specified Drugs (DDA)**	Delivery of Order Rejecting Order Accepting Order Storage Registry Entry Record Keeping
SOP CCP 003 **Inward Order: Cold Chain Product**	Delivery of Order Rejecting Order Accepting Order Power Failure
SOP HSC 004 **Housekeeping**	Cleaning of Shelves, Floors and Toilet Facilities Cleaning the Refrigerator Defrosting the Refrigerator Register Entry Record Keeping
SOP PSC 005 **Pest Control**	Appointment Treatment Report Record Keeping

Table 2: The different sections for the developed SOPs

SOPs Developed

Following an extensive literature review on SOPs and the non-participant and participant observation in the selected community pharmacies, 5 SOPs were developed. Due to variations in the work patterns of the community pharmacies included in the study, SOPs found in the literature could not be used and new SOPs had to be developed. The SOPs were developed using the 'Community Pharmacy SOP Template' by developed by Briffa.[4] Each SOP was assigned a unique SOP Number consisting of the term 'SOP' followed by three letters, three digits and a title. The SOPs compiled are listed in Table 2. The procedure of each SOP was composed of a number of sections (Table 2).

The SOPs were psychometrically evaluated for content validity by a focus group composed of the SOP expert, a managing pharmacist, a locum pharmacist and sales and cleaning personnel. The qualitative technique of semi-structured interviewing was adopted during the validation.

The readability of the SOPs was calculated by an online software tool, 'Readability Calculator'. For each section of the procedure the 'Gunning Fog Index', 'Coleman Liau Index', 'Flesch Kincaid Grade Level', 'Automated Readability Index' (ARI)' and 'Simple Measure of Gobbledygook' (SMOG) were calculated. Basic text statistics were also calculated including number of characters, words, sentences average number of characters per word, syllables per word and words per sentence.

SOPs Distribution

The final version of the SOPs was distributed to all the relevant pharmacy staff members. Subsequently the personnel were asked to review and familiarise themselves with the SOPs and then members of staff were observed carrying out the procedure according to the SOP and time taken was recorded.

SOP Title	PHARMACY A TOTAL EXPENDITURE (EURO)	PHARMACY B TOTAL EXPENDITURE (EURO)
SOP DDA 002 Inward Order: Specified Drugs	0.32	0.39
SOP CCP 003: Inward Order: Cold Chain Product	11.10	24.18

Table 4: Expenditure for inward orders procedures for pharmacy A and B

Data Collection

The capital and recurrent cost and total expenditure involved for implementing each SOP in the two pharmacies were calculated and compared. Total expenditure per pharmacy for 'SOP TMP 001 – Temperature Monitoring and Control', 'SOP HSC 004 – Housekeeping' and 'SOP PSC 005 – Pest Control' was calculated on a yearly basis.

The recurrent cost of pharmacist time per pharmacy for 'SOP DDA 002 - Inward Order: Specified Drugs (DDA)' and 'SOP CCP 003 - Inward Order: Cold Chain Product' was calculated per procedure.

Pharmacist time was calculated by timing pharmacists performing the procedure on three different occasions and calculating an average. The cost involved was estimated by multiplying the amount of time spent on the activity by the pharmacist's salary.

Results

The average 'Gunning Fox Index' was 14.73 years, indicating good readability. For the inward order SOPs, the cost of implementing the SOPs for each process was higher in Pharmacy B, which was a larger pharmacy (Table 4). The same difference was also noticed in the yearly costs required for the housekeeping SOP (Figure 1).

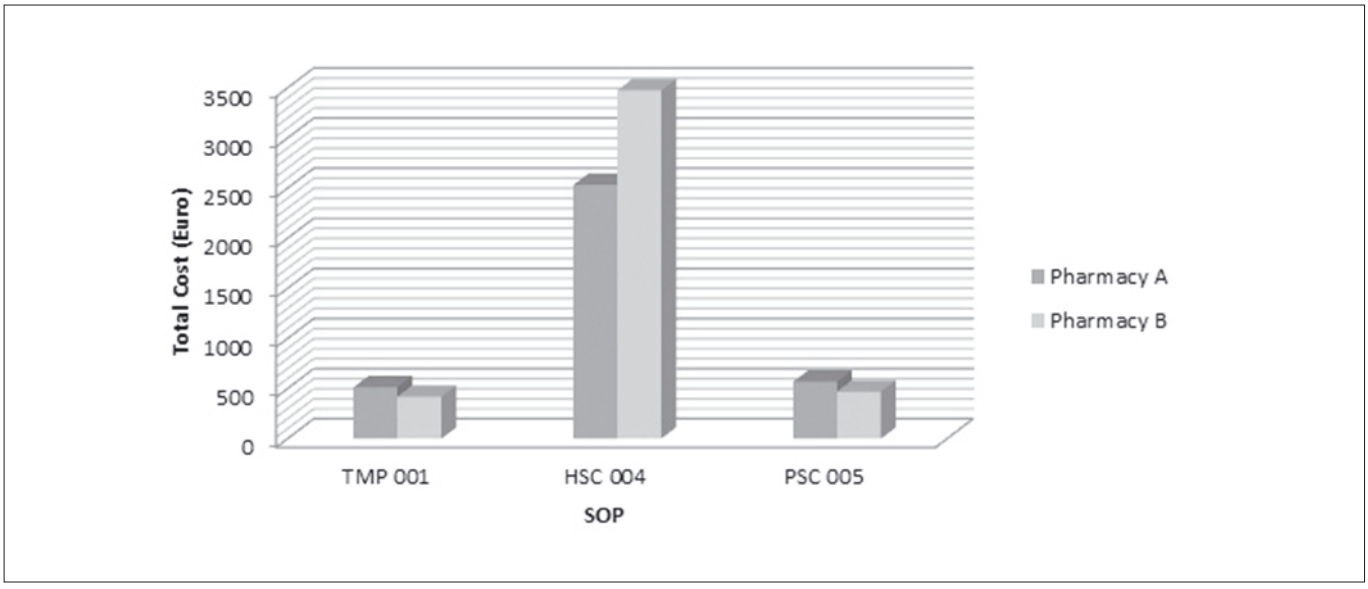

Figure 1: Total yearly expenditure for SOPs of temperature control, housekeeping and pest control

Discussion

The 'Gunning Fog Index' was found to be adequate as all the pharmacy personnel were over 20 years of age. The recurrent cost of pharmacist time was slightly higher for pharmacy B than for pharmacy A. This was expected since pharmacy B is a larger pharmacy and has the higher workload; therefore the pharmacist needs more time to complete the procedures.

The cost of housekeeping per procedure was the same for both pharmacies. However, the annual cost was different since in the smaller pharmacy, housekeeping procedures were carried out twice a week while in the larger pharmacy housekeeping procedures were carried out three times a week. The cost for pest control procedures were the same for both pharmacies. The difference in the total area of the pharmacy did not have an impact on the cost of the procedure.

Limitations of the study were the small sample size, and the non-probability sampling technique adopted which limits generalisability of the results beyond the population studied. The study period was short, and therefore costs for a one year period were extrapolated.

Conclusion

The cost for implementing the majority of the SOPs for both pharmacies was negligible and their implementation would have a minimal financial impact on the profit of pharmacy. The SOP that contributed to the highest yearly costs particularly in Pharmacy B was the Housekeeping SOP. SOPs for other procedures need to be developed particularly for processes related to the Pharmacy of Your Choice Scheme.

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PHARMACY OF YOUR CHOICE SCHEME AND MANAGEMENT OF HYPERTENSION

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Abstract

Objective The aim of this project was to assess pharmacist intervention in patients suffering from hypertension to improve management of their condition by identifying risk factors, evaluating side-effects, monitoring, assessing drug-drug interactions and providing advice to help control blood pressure.

Method Two questionnaires were used in the study; the first questionnaire intended to identify drug-related problems and risk factors and a second questionnaire was developed as a shorter version of the first questionnaire. The questionnaires were used on 3 occasions when the patients came to collect their Pharmacy of Your Choice (POYC) medications from a local community pharmacy. The first questionnaire was used at time=0 (visit 1) and the second questionnaire was used twice, at t=2 months (visit 2) and t=4 months (visit 3). Blood pressure and pulse readings were recorded each time and patients were referred in cases of abnormal readings and in cases of interactions or side-effects. Advice was given to the patients on all the 3 occasions and any care issues were addressed.

Key findings Out of the 35 patients who participated, initially 22 patients were hypertensive. This number decreased to 20 patients at t=2 months and 16 patients at t=4 months. Abnormal pulse readings were initially found in 7 patients that in the subsequent visits decreased to 4 patients with 2 patients being investigated. The need for patient referral decreased from 24 patients at t= 0, to 21 patients at t= 2 months and 17 at t= 4 months.

Conclusion Pharmacist intervention in patient monitoring of chronic conditions supported patients in managing their blood pressure. Several comorbidities and mortalities can be reduced when the patient is regularly monitored by a pharmacist and any drug-related problems identified, addressed and patient is referred as necessary.

Keywords Community pharmacist intervention, hypertension, POYC, patient monitoring, care issues.

Introduction

Hypertension remains one of the major and most common health conditions in the world leaving a large and direct impact on the patient and on each country's health system. Hypertension accounts for "more than 5.8% of total deaths, 1.9% of years of life lost and 1.4% disability adjusted life years all over the world and less than 20% of patients have their blood pressure under control".[1] It is estimated that there are more than 1 billion people suffering from hypertension worldwide.[2]

Recently, new target blood pressure readings have been introduced causing an increase in the reported number of untreated patients or mismanaged patients.[3] It is estimated that the number of patients with poor blood pressure control has increased to 72%.[4] This strongly emphasises the importance of the intervention of the pharmacist who, through for example the Pharmacy of Your Choice (POYC) scheme, will be in a better position to support patients in chronic disease management. The pharmacist in primary care is in an ideal position to ensure that the patient is well managed and correctly taking medications as prescribed. Pharmacists can regularly monitor patients' blood pressure when they visit the community pharmacy or clinic, helping them to improve management of their blood pressure and identify any drug-related problems. Patients who are not being appropriately managed can be referred and any mismanagement issues and errors, including dosing errors and irrationalised treatment can be identified and addressed immediately.

In these scenarios, patients are monitored regularly through the continuous direct intervention of pharmacists who are the most accessible healthcare professionals in the community.

The aim of this study was to assess pharmacist intervention in patients suffering from hypertension to improve management of their condition by identifying risk factors, evaluating side-effects, monitoring, assessing drug-drug interactions and providing advice to help control blood pressure.

Method

Approval from the University of Malta Research Ethics Committee, POYC management and from the owner of the community pharmacy selected for the study was sought. Patients who came to collect their POYC medication from the pharmacy were approached and asked whether they were willing to participate. Patients were given a letter prior to study initiation where the aims of the study were explained and those accepting to participate were requested to sign a consent form.

Thirty five patients participated in the study by completing the first questionnaire. In this questionnaire completed at time 0, risk factors for hypertension were identified, Body Mass Index (BMI) was calculated, blood pressure and pulse readings were taken twice and an average was calculated and recorded, treatment was noted and side-effects were identified. Any drug interactions were also noted after a thorough drug history was taken for each patient. Blood pressure was taken after the patient had been at rest for at least ten minutes and the arm with the highest reading was used at throughout.

Patients repeated the second questionnaire 2 and 4 months later when their POYC medication was due to be collected again. This questionnaire was a shorter version of the first one and was used to obtain BMI, blood pressure and pulse readings and any changes in the pharmacological treatment since the previous meeting. Any problems and drug interactions were noted once again. Blood pressure, pulse readings and BMI were documented on a patient card to maintain a record and for easy follow-up by another healthcare professional in the future.

Patients who had abnormal blood pressure readings or pulse readings or who experienced severe side-effects were referred to their physician. Verbal advice was also given to patients especially during the first meeting where risk factors were being assessed and when directions about treatment were required. The data was evaluated after all the patients completed the questionnaires during the 3 visits.

Results

Thirty five patients participated in the study out of which 16 were male and 19 were female. The average age of the patients was 60.5 years (range 45 to 76 years).

Patients' BMI showed that most patients were obese (n=25), 8 patients were overweight and only 2 patients had a normal weight. Patients' weight range was recorded as 55 to 140kg at time 0 and 52 to 140 kg at time 4 months.

When risk factors were assessed, it was found that obesity was the highest risk factor with 33 patients, followed by a family history of cardiovascular disease in 25 patients and high blood cholesterol levels in 24 patients. Smoking was found to be a risk factor in only 3 patients while alcohol intake was a risk factor in 2 patients. Seventeen patients reported that they were not exercising, not even for half an hour once a week. Thirteen patients admitted to have a diet with a high salt intake (Figure 1).

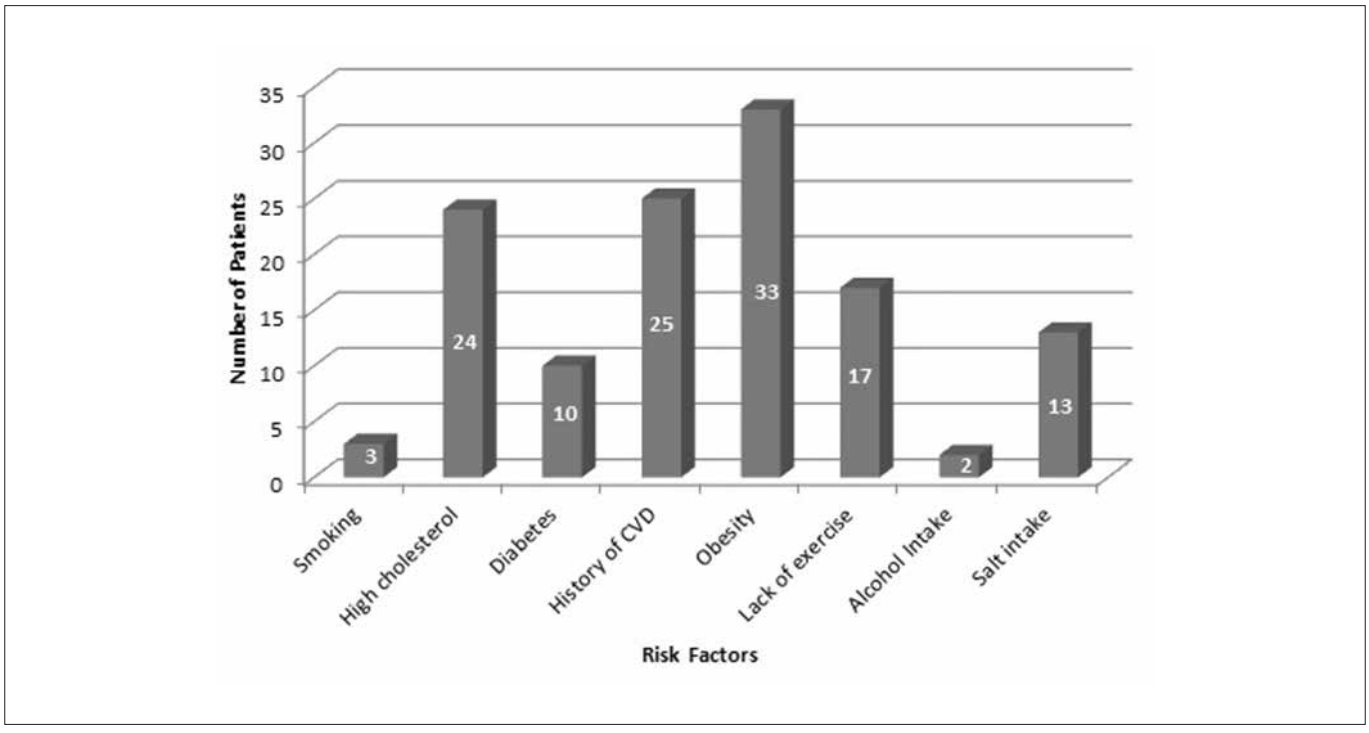

Figure 1: Risk factors identified amongst patients (n=35)

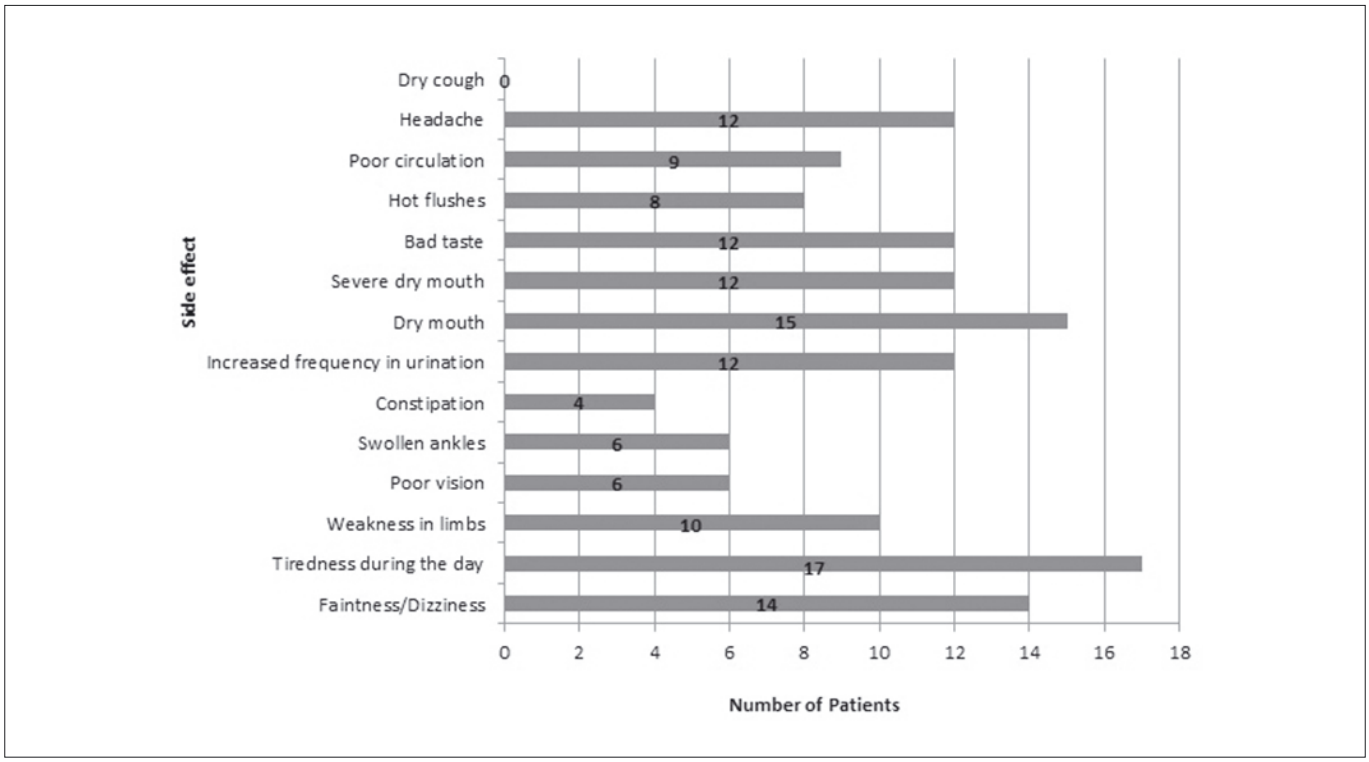

Figure 2: Side effects reported by patients (n=35)

The most common treatment option (28 patients) was an angiotensin-converting enzyme (ACE) inhibitor or angiotensin-II receptor antagonist (ARB) with most patients also taking another drug in (20 patients). The most common combination was with diuretics (7 patients). As a result of the pharmacist interventions and the subsequent referrals there were 8 patients who had their treatment plan modified. In 4 patients, an increase in dose between t=0 and t=2 months was implemented, 3 patients had an increase in dose between the t=2 and t=4 months and 1 patient had a treatment modification from an ACE inhibitor to an ARB due to development of side-effects between t=2 and t=4 months.

Side effects reported by patients included daytime fatigue (17 patients), followed by dry mouth (15 patients) and faintness and dizziness (14 patients) (Figure 2).

Despite receiving treatment, 22 patients presented with high blood pressure values during the first visit, 20 patients during the second visit and 16 patients during the third visit. Seven patients also had abnormal pulse readings on the first visit while 4 patients had abnormal pulse readings on the second and third visit. Two of these patients were being investigated because of their high pulse readings. Following patient monitoring, the need for patient referral decreased throughout the 3 visits; from 24 patients at t=0, to 21 at t=2 and 17 at t=4 months.

Despite receiving treatment, 22 patients presented with high blood pressure values during the first visit, 20 patients during the second visit and 16 patients during the third visit.

Discussion

Similar to published studies, results show that pharmacist intervention helped patients in the normalisation of blood pressure and pulse results.[5] This study demonstrates how pharmacist intervention and extended professional services could be included in the POYC scheme to impact on rationale management of hypertension. The pharmacist helped in monitoring patients over a period of four months, ensuring that the patients are taking their medication correctly as prescribed and referring patients in cases of irrational treatment, in cases where the condition is not being successfully managed and in cases where other drug-related problems were identified. Despite the fact that patients had been on long-term treatment, a number of them were still uncontrolled whilst the majority were not having their blood pressure regularly monitored. This reflects the need for frequent pharmacist interventions when patients are collecting their POYC medication every two months. Using such a scheme ensures that there is a constant, regular contact with patients, on-site monitoring, immediate referral when required and increased compliance.

There are numerous benefits of involving a pharmacist in the management of hypertension including reduction in co-morbidities and mortality and avoidance of complications, requiring prolonged hospital admissions and additional treatment. Thus, it would be more cost-effective to involve pharmacists in the management of patients with hypertension to decrease or avoid emergencies and hospitalisations. Locally, the pharmacist is very accessible and patients can easily consult their pharmacist to monitor their blood pressure. In so doing, they would avoid having to be referred to a physician or having to wait long hours at the health centre to check their blood pressure. The pharmacist can spend more time with the patient in cases of problems and queries leading to better communication and ultimately improved compliance. Patients with chronic conditions have more contact with the community pharmacists than any other healthcare professional.[6]

Limitations of the study were the time framework since monitoring could be extended over a longer period of time and a small sample size since the number of patients willing to complete the study over the four months was limited.

Conclusion

Hypertension management by pharmacists improves outcomes in blood pressure control and in communication with the patient. Considering all the recent updates in guidelines, the number of patients suffering from hypertension may rise, thus, increasing the need for awareness and for more pharmacist-led patient monitoring. This will provide a cost-effective scenario since by rigorous monitoring, hospital admissions, morbidity and mortality are reduced, thus decreasing both direct and indirect costs.

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PHARMACIST-LED DIABETIC PATIENT MONITORING

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Abstract

Objective To assess pharmacist intervention in diabetic patients on patient compliance to medication and blood glucose self-monitoring and to evaluate patient therapeutic plans through monitoring of glycated haemoglobin (HbA1c) levels.

Method Thirty type 2 diabetic patients receiving their medication through the Pharmacy of Your Choice (POYC) scheme were assessed. Patient compliance to medication and to self-blood glucose monitoring was reported before (t=0) and following pharmacist intervention (t=1). The pharmacist intervention included an educational session and distribution of a 'Diabetes Patient Information Leaflet'. HbA1c testing was performed and patients with out-of-range values were referred.

Key findings Patient compliance to medication improved following pharmacist intervention, with 24 patients claiming to 'rarely miss a dose' of medication prior to the intervention (t=0), decreasing to 8 patients at t=1. At t=0, 1 patient reported to 'never miss a dose' of medication which increased to 22 patients at t=1. Fifteen patients reported to monitor glucose levels less than once a month at t=0, while 23 patients claimed to monitor their glucose levels on a weekly basis at t=1. The mean value for HbA1c was 6.5%. Two patients obtained HbA1c values of 7.0 and 7.1% and were referred.

Conclusion Pharmacist-led medication reviews, through monitoring of blood glucose and HbA1c levels and suggesting optimal pharmacological treatment, can help diabetic patients use their medications more effectively to achieve maximal treatment benefits. Point-of-care HbA1c testing may be an accessible means of assessing glucose control and may motivate patients who seek to monitor glycaemia more closely.

Keywords Pharmacist intervention, blood glucose monitoring, HbA1c testing, diabetes, medication compliance.

Introduction

Diabetes poses one of the most significant health problems in primary and secondary care sectors in each country.[1] Locally, diabetes affects around 10% of the general population.[2] Patients with diabetes commonly receive more than one type of medication daily. Complex therapeutic plans and possibly a lack of understanding of the patient's pharmacological therapy may lead to lack of compliance.

Patients registered with the POYC scheme may renew their prescriptions every two months at government clinics where a thorough patient assessment is not always undertaken due to time constraints and other factors. This situation may lead to over-prescribing. Some patients visit different doctors leading to a lack of continuity of treatment since their drug history may not always be readily available.

Another aspect of diabetes management is self-monitoring of blood glucose (SMBG). Although blood glucose levels should be monitored frequently, patients may find themselves monitoring glycaemia only when required or when advised to do so by a health care provider.

Glycated haemoglobin (HbA1c) testing is measured primarily to identify the average blood glucose concentration over a period of time (weeks or months). Values higher than the average HbA1c concentration indicate poor blood glucose level control. HbA1c monitoring may improve glycaemic control and thus treatment outcomes in patients with diabetes.[3]

Locally, HbA1c testing is only performed in one private clinic and is recently being carried out free-of-charge at Mater Dei hospital laboratory, against private general practitioners' referral. Introduction of point-of-care HbA1c testing in community pharmacies or clinics may lead to reduced hospital waiting times and support the pharmacist in monitoring drug therapy plans. Pharmacist intervention plays a key role in educating patients about the management of their condition. Close monitoring may lead to better control of the condition, both through lifestyle changes and pharmacological treatment adjustments if necessary. By monitoring blood glucose control in relation to patient medication and general patient health, pharmacists are in an ideal position to detect medication misuse or inappropriateness and discuss such issues with prescribers to improve treatment.

Method

Ethics approval was obtained from the University Research Ethics Committee. The study was undertaken at a local community pharmacy and 30 patients who were collecting their antidiabetic medications through the Pharmacy of Your Choice Scheme in the pharmacy were invited to participate. Participation in the study was entirely voluntary and informed consent was obtained from each patient prior the start of the study.

Three tools were used in this study; a previously validated 'Patient Questionnaire'[4], which was distributed to patients at baseline prior to pharmacist intervention (t=0) and after 2 months (t=1). This questionnaire, available both in English and Maltese language, consisted of multiple-choice close-ended questions and an open-ended question. In this questionnaire, compliance to medication and blood glucose self-monitoring was assessed by self-reporting. A 'Patient Profile Sheet', including demographic data and medications being received, was developed by the investigator (JV) and completed at baseline. A 'Diabetes Patient Information Leaflet', which was also developed by the investigator and distributed to patients at baseline, served as an adjunct to the pharmacist intervention. An educational session was held with the patient in the pharmacy at baseline.

HbA1c testing was carried out in the pharmacy at baseline on patients meeting the following inclusion criteria; receiving more than 2 medications, undergone recent hospital admissions or had treatment modification during the past year. Testing was undertaken using the Siemens/ Bayer DCA 2000+® analyser, which gave results within a few minutes. Results were discussed with the patients and any patients with out-of-range results were referred to a physician.

All data was entered into a spreadsheet and results were interpreted using SPSS® version 20.0. Statistical tests applied included the One-Way ANOVA, Pearson correlation test and the Chi-square test.

Results

Thirty patients participated in this study of which 17 were male and 13 were female, all were Maltese and the mean age was 67 years (range 57 to 83 years). Patients were taking an average of 6 medications, with each patient taking an average of 2 antihyperglyaecemic medications. The oral antidiabetic drug metformin was being taken by 20 patients.

Patient compliance to medication improved following pharmacist intervention, with 21 patients reporting that they rarely miss a dose of medication; this number decreased to 3 patients following pharmacist intervention. Post intervention patients claimed that they are compliant with treatment.

Frequency of glucose monitoring also improved following intervention; out of the 3 patients who claimed to check glucose levels daily at the end of the study, 2 patients reported to do so less than once a month at baseline. Eleven patients who checked their glucose levels on less than one occasion per month at t=0 reported to monitor their levels once a week at t=1. Patient compliance at time 0 was compared to frequency of self-blood glucose monitoring and there was a trend in less frequent self-monitoring with patients who had a higher risk of missing doses (Table 1).

Ten of the participating patients who met inclusion criteria were assessed for HbA1c levels. The mean HbA1c value obtained was 6.59%. HbA1c (range 5.8 to 7.1%). There was a trend in that patients taking a larger number of medications obtained higher values for HbA1c compared to those who took fewer medications (Figure 1). The two patients receiving the largest number of medications in this study (11 medications each) had HbA1c values of 6.8% and 7.1% respectively.

Participants who monitored glucose levels daily prior to pharmacist intervention were found to have HbA1c values of 6.5% or less; those who did so less frequently than once a week obtained HbA1c values of 6.65% or greater (Figure 2).

		Do you ever miss a dose of medication? (t=0)			
		No	**Rarely**	**> once a month**	**Total**
How often do you check your glucose level? (t=0)	**Once a day**	0	2	0	2
	Once a week	1	8	0	9
	Once a month	0	3	1	4
	<Once a month	0	11	4	15
Total		1	24	5	30

Table 1: Patient compliance to medication and frequency of glucose monitoring (n=30)

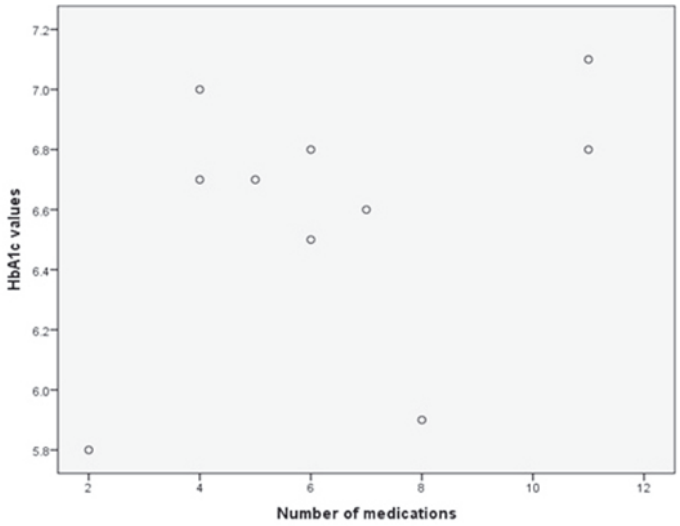

Figure 1: Percentage HbA1c and number of medications (n=10)

Discussion

Patient compliance to medication prior to pharmacist intervention is considerably low. This result is not surprising given the fact that Type 2 diabetes often requires complex therapeutic plans, polypharmacy as well as medication administration at different times during the day. Some patients, may need to split tablets to administer the correct dose or eat directly after medication administration, which, when performed on a daily basis can be rather demanding. The main reason for most patients missing a dose of medication on one or more occasions was forgetfulness.

Pharmacists and other health care professionals should continuously educate patients on the importance of medication adherence, especially in patients with complex treatment regimens for conditions such as diabetes. Patients should be made aware of the risks and long-term complications that can arise from non-compliance.

Following pharmacist intervention, most patients reported failure to miss a dose of medication and compliance to medication improved in the majority of participants. Patients need to be educated not only about medication regimens but also about the disease itself. They should be knowledgeable about the disease symptoms, pharmacological management and the correct administration of drugs. Incorporating patients in treatment discussions is imperative for them to have a sound knowledge and understanding of the disease and thereby facilitate treatment implementation.

Complex conditions such as diabetes require multifactorial interventions consisting of continuous patient education and motivation, together with developing realistic targets to improve disease outcome and prevent both micro- and macrovascular complications.[5]

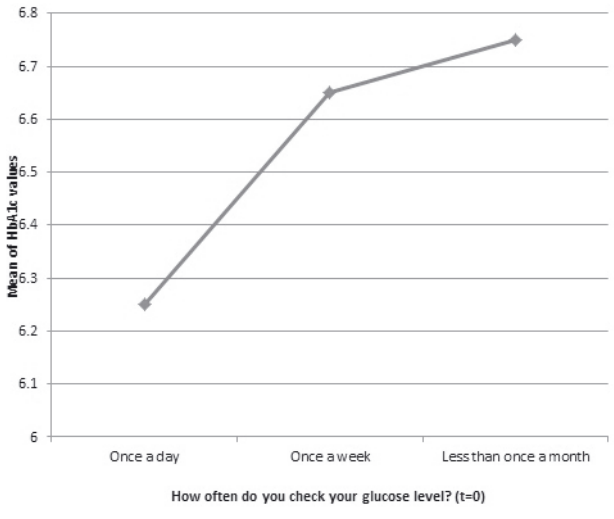

Figure 2: Percentage HbA1c and frequency of glucose monitoring (n=10)

Following pharmacist intervention, most patients reported failure to miss a dose of medication and compliance to medication improved in the majority of participants.

Frequency of glucose monitoring was also found to be unexpectedly low, with most participants admitting to checking their glucose levels less than once a month. Regular monitoring of glycaemia is indispensable in optimal diabetes management since this cannot be achieved simply by correct adherence to medication. Diabetic patients should be regularly reminded of the importance of close monitoring of glucose levels and advised on the availability of various glucose testing devices and their correct use.

Frequency of glucose monitoring increased following pharmacist intervention with most patients reporting weekly checking of their glucose levels. However, despite the educational session and pharmacist intervention, no patients reported checking their glucose levels daily. This reflects the tediousness such a task presents to these patients, who are additionally required to manage their disease daily in other ways. Patients who obtained lower values for HbA1c reported better compliance, both to medication administration and to glucose monitoring. Such results are comparable to those in a study conducted by Hansen *et al* (2009), which showed that lower HbA1c levels are associated with more frequent self-monitoring of blood glucose. Nonetheless, solely increasing the frequency of glucose monitoring does not automatically equate to improved HbA1c levels.[6]

Other factors need to be employed to ensure improvement and maintenance of glycaemia. These include dietary modifications, executing necessary lifestyle modifications, regular check-ups to assess treatment progression and continuous monitoring and adherence.

Conclusion

This study attempts to highlight the need of increased professional services such as pharmacist interventions, which are imperative in conditions such as diabetes. Patients who participated in the study showed an overall lack of compliance, which improved considerably following pharmacist intervention. This emphasises the need for improved patient education and closer monitoring to ensure improved treatment outcomes. Point-of-care HbA1c testing performed within the community pharmacy also proved to be important in identifying patients receiving sub-optimal treatment and consequently warranting referral. Such a service could be a beneficial means of monitoring patients' disease progression more closely, as the community pharmacist is one of the most accessible healthcare providers.

Increasing awareness of these care issues may improve patient perception of diabetes and instil motivation, such that patients gain confidence in managing their condition better. This will ultimately reflect on an improved disease outcome and quality of life of patients and carers.

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GUIDELINE COMPARISON AND ASSESSMENT OF PRESCRIBING TRENDS IN PARKINSON'S DISEASE

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Abstract

Objective To assess adherence to guidelines for the management of Parkinson's disease (PD) by healthcare professionals at the Rehabilitation Hospital Karin Grech (RHKG) in Malta.

Method Retrospective and current data of inpatient medical records at RHKG was collected for 90 patients. Guidelines available at the hospital were reviewed and a comparison was compiled. Data collected and the compiled guidelines were used to assess the level of adherence of treatment decisions to guidelines. Analysis of data was carried out using Microsoft Office Excel® 2007 and SPSS® version 17.0.

Key findings Results show generally high adherence to published guidelines. Out of 22 patients started on co-careldopa therapy at the hospital, 16 had treatment decisions which adhered to guidelines. In the case of co-beneldopa, ropinirole and trihexyphenidyl (benzhexol) treatment, all patients had their treatment decisions implemented according to guidelines.

Conclusion Healthcare professionals at RHKG are aware of the presence of treatment guidelines. The adherence of their treatment decisions to guidelines indicates a good quality of care. Frequent assessment of the level of adherence to guidelines using similar studies will ensure optimisation of treatment.

Keywords Parkinson's disease, management guidelines, adherence, prescribing trends.

Introduction

Parkinson's disease (PD), historically known as 'the shaking palsy'[1] has become the second most common progressive neurodegenerative disorder after Alzheimer's disease.[2] A systematic review of the worldwide prevalence and incidence of PD, conducted by a thorough literature review of epidemiological studies from 1965 to 2010 concluded that PD prevalence and incidence increase with advancing age.[3] There are many reasons for a decreased quality of life in PD patients including decreased mobility, falls, sleep disturbances, social embarrassment, which consequently affects patient's communication, dyskinesia and fluctuation.[4]

Levodopa is considered the gold standard therapy and remains the most commonly used drug in PD since its first use 40 years ago.[5] Although levodopa is very effective in improving both bradykinesia and rigidity, its use is often delayed to avoid early development of motor fluctuations and dyskinesia, which will establish a source of disability. Other medications that are considered in the treatment of PD include dopamine receptor agonists, monoamine oxidase-B inhibitors, catechol-o-methyl transferase inhibitors and amantadine. Although recommendations for the use of such medications differ between guidelines, yet the consultation of such evidence-based guidelines in any healthcare setting is considered of paramount importance to help healthcare professionals optimise management of PD patients.

The aims of this study were to compile a comparison of guidelines for PD treatment, to assess prescribing patterns of antiparkinsonian medications at RHKG and to investigate whether PD treatment decisions adhere to the compiled guidelines.

Method

Patients suffering from PD were identified from pharmacy patient profiles in the case of inpatients and directly from clinical notes in the case of patients attending day clinics. Retrospective and current data obtained included age, gender, reason for referral, drug history, treatment changes, pharmaceutical care issues and discharge medication. The study was adapted from similar work undertaken by Schroder *et al* (2010).[6]

The study design involved two processes; a theoretical and a practical approach. In the theoretical approach, the guidelines generally referred to at RHKG were identified, namely the National Institute for Health and Clinical Excellence (NICE) guidelines[7] and the Scottish Intercollegiate Guidelines Network (SIGN) guidelines.[8] A review and comparison of the latest version of these guidelines for PD was compiled. The practical approach involved data collection and assessment of the level of adherence of prescribing trends to guidelines (Table 1). The criteria of assessment included a dosing parameter in which doses of prescribed antiparkinsonian medications were compared to the dosing parameters in the British National Formulary.[9]

Data collected was further classified according to whether patients were taking antiparkinsonian drugs prior to admission according to their drug history.

Results

Ninety patients were included in the study. The mean age of patients was 78 years. These patients were classified into two groups: the no drug history group, those patients who had no drug history of antiparkinsonian drugs on admission (n=26), and the drug history group, patients who were using antiparkinsonian drugs on admission (n=64).

For the 26 patients who had no drug history and were admitted to RHKG with symptoms of parkinsonism, 22 patients were started on co-careldopa, 1 patient was started on ropinirole as monotherapy and 3 patients were not started on any drug therapy. Adherence to guidelines was assessed by evaluating method of initiation of treatment and dose management. For the 22 patients started on co-careldopa, the introduction of co-careldopa treatment was according to guidelines for 16 patients whereas in the remaining 6 patients, patients were started on a low dose of 55 mg twice daily (Figure 1).

For patients admitted with a drug history of antiparkinsonian agents, 54 patients were taking co-careldopa, 9 patients were taking co-beneldopa of which 1 patient was taking also trihexyphenidyl (benzhexol), and 1 patient was taking ropinirole as monotherapy. Of the 54 patients taking co-careldopa, 8 were also taking ropinirole. Assessment of adherence to guidelines was evaluated by assessing dose management (Table 2).

Patient number	Age	Year	Reason for referral	Drug history	Treatment changes	Treatment on discharge
1	67	2010	increased stiffness + tremors	co-careldopa 110mg three times daily	increased to 110mg three times daily + 55mg at night → after 1 week increased to 110mg four times daily	co-careldopa 110mg four times daily
		2011	decreased mobility + decreased independence in activities of daily living and dizziness	co-careldopa 110mg four times daily	remained on co-careldopa four times daily	co-careldopa 110mg four times daily

Table 1: Sample of data collection tables

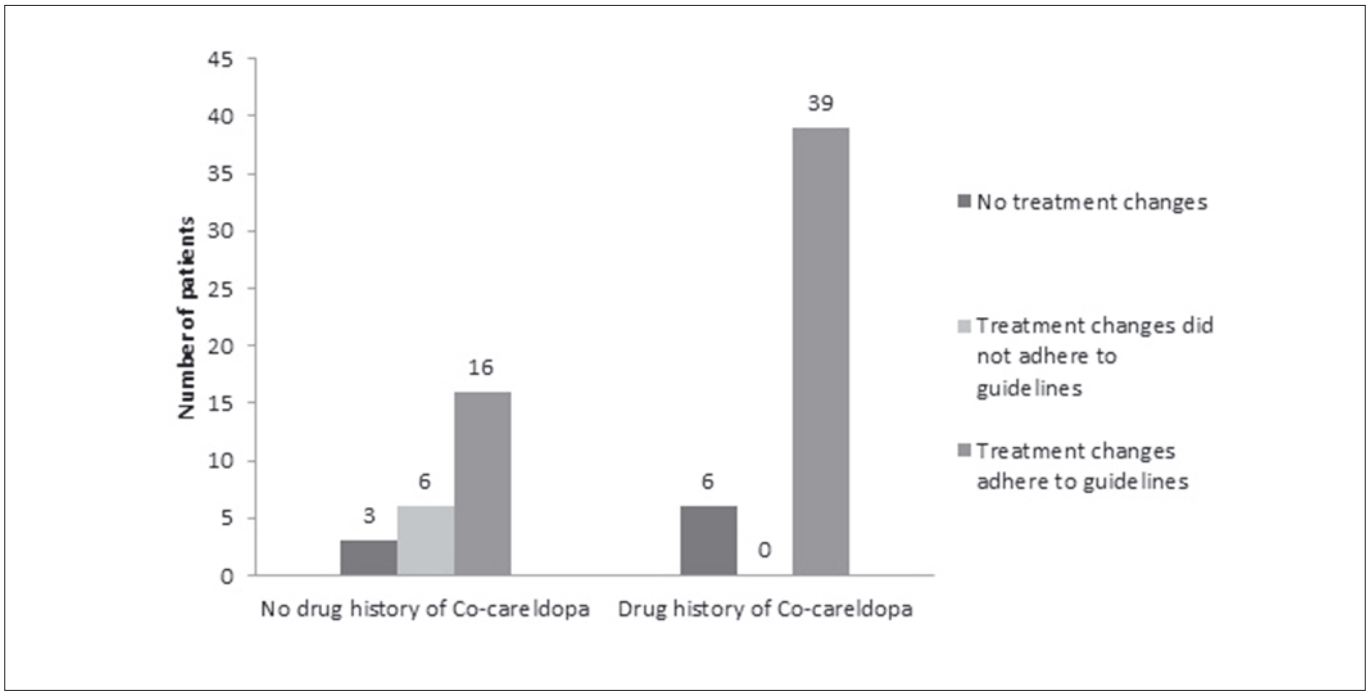

Figure 1: Adherence to guidelines for co-careldopa

Drug	Changes to treatment (number of patients)
Co-careldopa (n=54)	Dose changes according to guidelines (39) Stopped treatment (9) No change (6)
Co-beneldopa (n=9)	Dose changes according to guidelines (8) No change (1)
Ropinirole (n=9)	Dose changes according to guidelines (6) Stopped treatment (3)
Trihexyphenidyl (Benzhexol) (n=1)	Stopped teatment (1)

Table 2: Drug therapy amendments for patients admitted with antiparkinsonian drugs (n=64)

Co-careldopa was the drug that was most frequently included in the drug treatment for both groups. There was 100% adherence to guidelines for dose adjustments of patients who were already on the drug and 73% adherence was identified for patients who were started on the drug during hospitalisation (Figure 1). It is worth noting that the non-adherence was due to a lower dose being started and this could be explained due to cautionary aspects which the clinical team were considering when managing the individual patients.

Discussion

This study showed a high overall level of adherence to PD guidelines. Initial results show that PD treatment is dominated by levodopa, followed by the dopamine agonist ropinirole. The combination of levodopa and dopamine agonists was also observed in many patients. Patients in this study were not classified according to functional impairment grades, as it was not possible to use this indication as an assessment criterion.

In clinical practice, guidelines should be perceived as the standards of practice which are adopted within a culture of allowing professional judgement by the clinical team.

Another limitation to the study was that information was collected only from the pharmacy patient profiles with no involvement of the clinical team to justify non-adherence to guidelines. In clinical practice, guidelines should be perceived as the standards of practice which are adopted within a culture of allowing professional judgement by the clinical team. Such deviations from standards need to be justified and documented in the patient profile. The pharmacist intervention in the clinical team becomes especially valuable in managing and co-ordinating these deviations which are normally warranted due to co-morbidities and other drug therapies.

Conclusion

Studies that assess the level of adherence of treatment decisions to evidence-based guidelines are useful because they can be used to identify where pharmacist intervention is required to rationalise drug therapy and where pharmacist intervention is valuable so as to manage justified deviations from the guidelines.

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GUEST CONTRIBUTION

A NATURAL SOURCE OF POSSIBLE ANTI-AMYLOID AGENTS FOR ALZHEIMER'S DISEASE

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Abstract

Alzheimer's disease (AD) is an incurable, neurodegenerative and terminal disease that is generally prevalent in the elderly population. Recent research has provided evidence for a common mechanism of neurodegeneration whereby misfolding, aggregation and accumulation of otherwise normal proteins occurs in the brain. The protein frequently associated with AD is amyloid-beta (Aβ) which forms the core component of plaques found in the brain of these patients. Currently, no cure is available and the only approved treatment is that of pharmacotherapeutic agents that slow down the disease progression. Research studies currently underway include the use of small molecules that specifically and efficiently inhibit the formation of fibrillar Aβ assemblies *in vitro* and their associated neurotoxicity.

Keywords Alzheimer's disease, polyphenols, amyloid-beta, neurodegenerative diseases.

Introduction

AD is the most common form of dementia and accounts for major cognitive impairment in the elderly. It is a progressive neurodegenerative disorder characterised by significant neuronal cell death in areas of the brain controlling cognitive functions. Symptoms include memory loss, impairment in judgment and communication, language difficulties and personality changes. Cerebral damage in AD patients occurs mainly in the hippocampus, entorhinal cortex and neocortex. The neuropathological hallmarks, first described by Alois Alzheimer, are the formation of neuritic plaques made up of amyloid-beta protein, neurofibrillary tangles composed of abnormally-phosphorylated tau protein and significant synaptic loss.[1] Although there are obvious differences in clinical symptoms and disease progression between neurodegenerative disorders (as different brain regions are affected), most of them share some common features such as their occurrence later on in life and the characteristic brain cell loss.[2] Other common neurodegenerative disorders characterised by abnormal protein folding include Parkinson's disease, Prion disease, Huntington's chorea and Amyotrophic lateral sclerosis.

General protein misfolding, aggregation and accumulation

The function of a protein is dependent upon its three dimensional structure that is carefully supervised by chaperone proteins so that malfunctioning proteins are removed. However, protein misfolding and aggregation do occur and these may result in neurological and systemic diseases.[2]

Low-resolution structural studies have shown an intermediate secondary structural difference between the monomeric native protein and the aggregated material.[3,4] The native conformation is made of α-helices while the misfolded protein conformation is mainly composed of insoluble β-sheets. Tau protein aggregates appear to be an exception since they are composed mainly α-helices.[5]

Amyloid-beta protein and mechanism of formation

Amyloid-beta (Aβ) protein is one of the main neuronal proteins that have been indicated as playing a key role in the development of several neurodegenerative diseases including AD. Amyloid plaques are deposited extracellularly in the brain parenchyma and around the cerebral vessel walls, and their main component is a 40- or 42-amino acid residue peptide.[1]

A number of studies have been carried out to determine the conditions and protein sequence modifications required for conformational changes to occur resulting in protein aggregation. One such study indicated that Aβ assembly is partially driven by hydrophobic interactions.[6,7] Another study carried out by Soto *et al*[6] identified environmental factors that may possibly trigger protein misfolding. These include changes in metal ions, pathological chaperone proteins, pH or oxidative stress, macromolecular crowding and increase in the concentration of the misfolding protein. Consistent with the late onset of neurodegenerative diseases, many of these alterations are associated with ageing.[8]

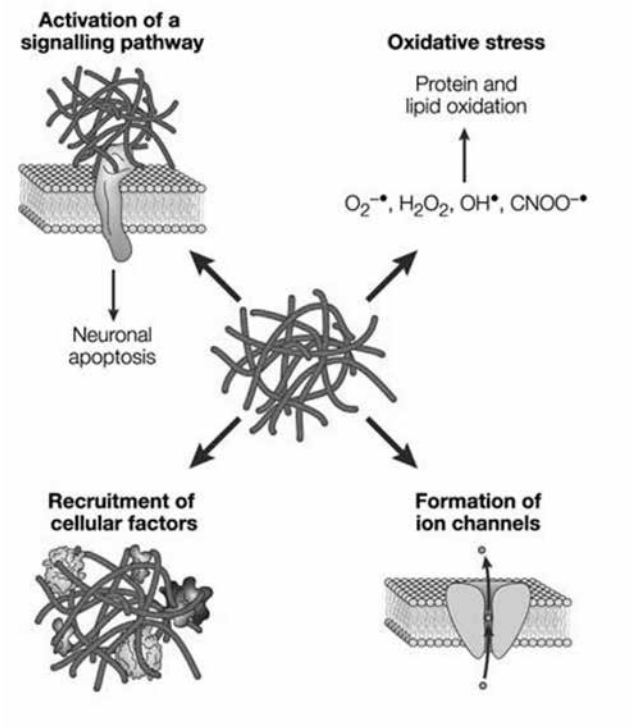

Figure 1: Possible neurotoxic effects of accumulated amyloid-beta
(adopted from Soto C. Unfolding the role of protein misfolding in neurodegenerative diseases. Nature Neurosci 2003; 4: 49-59.)

Studies based on Aβ show that there are at least two intermediates that occur in the pathway from the native monomeric protein to the fibrillar fully aggregated structure *in vivo*.[9] The first are soluble, low-molecular weight oligomers[10-13] with the second intermediates being short, flexible, rod-like structures termed protofibrils.[9,14] Kinetic studies have shown that the rate of coalescence and elongation is dependent upon Aβ concentration, temperature, ionic strength and pH.[15]

Suggested mechanisms of action on the neuronal cell

As indicated in Figure 1, there are several possible mechanisms for the observed neurotoxic effects that result from accumulation of amyloidogenic assemblies. One of the mechanisms that are being studied by a number of research groups, including one based at the University of Malta, focuses on cell-membrane destabilization leading to cell death. This occurs as a consequence of either the imbalance of ion homeostasis and transmembrane electrochemical gradients or the impairment of the various cell signaling pathways.[2]

Treatment possibilities – small molecule approach

Currently, the only approved symptomatic treatment available for Alzheimer's disease is the use of acetylcholinesterase inhibitors (donepezil, galantamine and rivastigmine) and the glutamatergic system modifier memantine.[16] Recent studies suggest that the use of small molecules that specifically and efficiently inhibit the formation of fibrillar assemblies *in vitro* and their associated cytotoxicity may play an important role in modifying the disease process.[17-19] Included in this class of molecules are the polyphenols which are a large group of natural and synthetic molecules that are composed of one or more aromatic phenolic rings. Polyphenols are known to reduce oxidative stress, acting as free radical scavengers and have shown beneficial health-promoting effects in chronic and degenerative diseases.[20,21] However, studies have shown little or no correlation between antioxidative properties of the polyphenols to Aβ oligomer inhibition.[18,22,23] The efficient polyphenol inhibitors were found to be composed of at least two phenolic rings with two to six linker atoms and a minimum of three hydroxyl groups on the aromatic rings. These structures are essential for the non-covalent interaction with the β-sheet.[18] Therefore the new mechanistic approach is based on structural similarities as opposed to antioxidative properties.

In a study carried out by Yang and coworkers[24], it was found that polyphenols interact with the oligomer conformation rather than the monomer indicating that inhibitor binding is not sequence-dependent but rather conformation-dependent.

Over the years, a number of *in vitro* studies have been carried out that directly linked polyphenolic compounds with the inhibitory effect of amyloid fibril formation. Of particular importance are the results obtained with apomorphine, the latter found to inhibit Aβ(1-40). This is possibly due to an increase in the binding affinity of apomorphine (which has an increased hydrophobicity compared to naturally occurring catechols) with Aβ hydrophobic core structure.[25]

In vitro observation of the anti-amyloidogenic effect of wine-derived polyphenols was described by Ono *et al.*[21] Using thioflavin T assay and electron microscopy to study the effect of wine-related polyphenols on the formation, extension and destabilization of Aβ(1-40) and Aβ(1-42) it was observed that polyphenols dose-dependently inhibited the formation of fibrils, with an activity following the order: myricetin = morin = quercetin > kaempferol > catechin = epicatechin and IC_{50} values falling within the 0.1-1 μM range. These results indicated that scavenging of reactive oxygen species by polyphenols was not the only mechanism of protection but these compounds also inhibited directly the deposition of fibrillar Aβ in the brain[21]. Furthermore, Ono and co-workers[26] suggested that the compact and symmetric structure of curcumin (from the spice tumeric) and rosmarinic acid (commonly found in herbs such as lemon balm, rosemary, oregano, sage, thyme and peppermint) renders them suitable for specific binding of free Aβ and inhibition of its polymerization into the fibrillar form. Similar findings were reported by Yang *et al.* [24]

Throughout the ages, Chinese culture has always associated the use of green tea in slowing down the ageing process. More recently, epigallocatechin gallate (main component in green tea) was shown to be an effective inhibitor of various amyloidogenic proteins including Aβ.[27] Other polyphenols shown to inhibit Aβ oligomer and fibril formation with IC_{50} values in the low micromolar concentration range include catechin (cacao bean) and resveratrol (produced by many plants in response to pathogenic attack, found also in grape skin), purpurogallin (nutgalls), hypericin (*Hypericum* – commonly known as Saint John's wort), myricetin (red grapes, onions, walnuts) and gossypetin (flowers such as *Hibiscus sabdariffa*).[18] Further information on the effect of such compounds on AD pathology has been discussed.[28]

Conclusion

There has been marked progress in the understanding of the pathogenesis of neurodegenerative diseases; however none are currently successfully treated. Considering the increased prevalence rate of such diseases, research leading to significant therapeutic advancements would have major medical, social and economic implications. Current research points to two general assumptions regarding the inhibition mechanism of amyloid protein fibril formation by small polyphenolic compounds. These include the physical component in which β-sheet interaction and stabilization of the inhibition-protein complex is dependent upon specific structural conformations and the chemical component where aromatic interactions facilitate the interaction between the inhibitor and the amyloidogenic core. Understanding fully these mechanisms is instrumental in the design of small molecule inhibitors to be used as a treatment option for amyloidogenic diseases.

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THE INAUGURATION OF THE PHARMACY PRACTICE UNIT AT THE DEPARTMENT

The Pharmacy Practice Resource Unit (PPRU) at the Department of Pharmacy of the Faculty of Medicine and Surgery, University of Malta, was inaugurated during the last academic year. The Rector of the University of Malta, Professor Juanito Camilleri, Pro-Rector for Research and Innovation, Professor Richard Muscat and the Dean of the Faculty of Medicine and Surgery, Professor Godfrey Laferla presided over the ceremony.

The PPRU is a community pharmacy simulation providing pharmacy students with a location that allows research-informed and practice-based learning. The concept was developed by Professor Lilian M. Azzopardi, Head of the Department of Pharmacy, Professor Anthony Serracino-Inglott, immediate past head of department and Dr. Maurice Zarb-Adami, project supervisor. The project was started in 2004 and pharmacy students at the time Elisa Nicholl, Arlette Seychell and Simone Bartolo participated in studies related to its development and evaluation. It was lately updated and evaluated by Jaclyn Azzopardi, a Master of Pharmacy student. Setting up this unit was possible thanks to the contribution of a number of pharmaceutical companies who donated medicines, medical devices, product literature and books.

During the inauguration, Jaclyn Azzopardi presented an insight into the development of the PPRU and outlined the various sections present in the unit. The largest section is the medication display containing medicines which are currently available on the local market. Discontinued medicines, a wound care display, vitamins and health supplements and baby formulas are displayed in separate sections. Moreover, patients who present at a community pharmacy often request their medicine based on the appearance of the dosage form. This scenario may pose a difficulty for the pharmacist since many medicines are packaged in sealed blister packs. A tablet and capsule display exposing pharmacy students to the appearance of tablets and capsules is included in the PPRU. The results of the work by Jaclyn Azzopardi were presented at the Academic Section of the Centennial Congress of the International Pharmaceutical Federation (FIP) last October.

Research is carried out in the PPRU through books and journals, product literature, patient information leaflets, protocol booklets and electronic databases. Another section consists of various point-of-care testing medical devices which are used by pharmacy students during practical sessions and in their pharmacy practice project to gain skills in blood pressure measurement, blood glucose, HbA1c, cholesterol, haemoglobin and anticoagulation monitoring and other clinical analysis parameters.

A quality system is developed for all the laboratories of the Department of Pharmacy and in the PPRU each medical device is accompanied by a standard operating procedure and a logbook. A section dedicated to the PPRU can be accessed from the website of the Pharmacy Department: www.um.edu.mt/ms/pharmacy/ppru.

During the inauguration, pharmacist Lawrence Zerafa donated historical pharmacy books dating back to 1800. The collection includes books from different aspects in pharmacy; namely, The British Pharmaceutical Codex, Pharmaceutical Formulas, A text-book of Bacteriology and also several publications in Italian 'Trattato di Chimica'. This donation complements the collection of historical pharmacy items and books at the Department. During his presentation, Mr. Zerafa encouraged anyone who has other historical pharmacy books to donate them to the Department of Pharmacy.

The occasion was attended by Department of Pharmacy staff, students, pharmacists, department collaborators and Hon Dr Owen Bonnici, Opposition Spokesperson for Higher Education, University, Research and Culture.

MALTA PHARMACEUTICAL STUDENTS ASSOCIATION CONTRIBUTION

FROM STUDENT TO PHARMACIST: BECOMING TOMORROW'S PROFESSIONALS

Marie Claire Bonanno

The transition from student to a working professional is not easy. This is especially true for students involved in healthcare, who are entrusted with caring for patients and attending to their medical needs. Errors can put lives at risk, so transitioning from student to pharmacist results in increased responsibility which students must be well trained to accept. The 'Malta Pharmaceutical Students' Association' (MPSA) strives to ensure as smooth a transition as possible.

Pharmacists are trained in a variety of soft skills enabling them to deal with daily situations which may be encountered when practicing in a community pharmacy or in the clinical scenario. MPSA organises a variety of health campaigns and seminars helping students master these skills from the early years of the pharmacy programme whilst encouraging them to apply their knowledge from theory into practice.

During the summer months, MPSA collaborated with 'Celebrities for Kids' in a campaign called 'Attenti mix-Xemx'. The aim of this campaign was to increase public awareness about the sun's harmful rays. Pharmacy students, together with professional footballer Michael Mifsud, distributed sunscreen with the highest sun protection factor to people on the beach. The harm done by excessively exposing the skin to the sun's UV rays was thoroughly explained. Through providing advice to the general public, students applied theoretical knowledge into practice.

Members of MPSA and Celebrities for Kids after distributing sunscreen on the beach

For the second consecutive year, MPSA organised the 'Fresh Blood Campaign', where pharmacy students and other students on campus were encouraged to give the gift of life by donating blood.

MPSA also commemorated 'World Diabetes Day' by collaborating with the Malta Chamber of Pharmacists in a campaign entitled 'Naqqas ir-riskju tad-Dijabete'.

Pharmacy students were invited to attend two workshops; the first addressing general information about diabetes and the other giving pharmacists and students a detailed insight about managing a diabetic patient. Subsequently, students were assigned to a community pharmacy where they helped the pharmacist carry out blood glucose testing. This gave students the opportunity to enhance their knowledge about the condition whilst also allowing them to practice their interpersonal and practical skills.

Continued professional development is of paramount importance due to continuous advances in healthcare. Networking with colleagues around the world and discussing current affairs related to pharmaceutical issues facilitates transfer of information pertaining to recent discoveries. For this reason, MPSA encourages students to attend conferences and seminars organised by the European and International counterparts, such as the European Pharmaceutical Students' Association (EPSA) and the International Pharmaceutical Students' Federation (IPSF).

In addition to meeting and interacting with pharmacy students from other countries, these conferences and seminars provide students with a wealth of knowledge that cannot be found in textbooks. Students involved in organisations develop skills that contribute to a holistic approach in education.

Pharmacy students from Turkey, Lithuania and Croatia at 'Quattrino', a Twinnet project facilitated by EPSA, organised last summer in Malta

The Maltese delegation at EPSA Summer University 2012

MPSA believes that by bridging students with academic staff and other stakeholders in pharmacy, the pharmacy profession will continue to grow and develop, providing an even more valuable service to society.

AUTHOR GUIDELINES

Manuscript Preparation

All contributing authors should include their full name, affiliation at time of running the study, postal address, telephone and fax numbers and email address on the title page of the manuscript. One author should be identified as the corresponding author.

Manuscripts should include title page, abstract, text, references, tables and figures. The pages of the manuscript must be numbered.

Manuscripts should not exceed 2000 words (including abstract and references, excluding title page, tables and figures).

Abstract

The format for the abstract is structured and should include objectives, method, key findings and conclusion.

Keywords

Three to five keywords should be provided.

Introduction

The introduction should provide a background to the study and should clearly state the aims of the study. Provide a definition for any abbreviations and symbols that are used.

Methods

This section should describe the subjects, setting and methods in sufficient detail to allow possibility of replication of the study. Include details of ethical approval, if applicable, in this section.

Results

This section should present the salient results of the study. Epidemiological description of sample population, where relevant, and details of response rates should be provided. Data should not be repeated in figures and tables. Describe statistical analysis undertaken.

Discussion

In the discussion a summary of the main findings of the study is to be presented and these are to be discussed in the context of international published literature and contributions to the field. Limitations and strengths of the study should be highlighted.

Conclusion

A brief conclusion section should summarize the prominent findings of the study. It is advisable to emphasize the contribution to the field of study by the current findings.

Acknowledgements and funding

Any funding received for the study should be declared in this section.

References

References should be listed in numerical order as they appear in the text. All citations in the text must have an entry in the reference list and vice versa. All the reference numbers in the text should be in superscript.

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