Exploring views of pharmacists on antibacterial prescribing: a Maltese perspective

Maresca Attard Pizzuto\(^a\), Liberato Camilleri\(^b\), Lilian M. Azzopardi\(^a\) and Anthony Serracino-Inglott\(^a\)

\(^a\)Department of Pharmacy, and \(^b\)Department of Statistics and Operations Research, University of Malta, Msida, Malta

Abstract

Objectives To investigate the perception of Maltese pharmacists to prescribe a selected number of antibiotics.

Methods A self-administered questionnaire entitled ‘Antibiotic Prescribing by Pharmacists’ was developed to study pharmacist perception to prescribing a selected number of antibacterial agents. The questionnaire was validated by a two-round Delphi technique and disseminated to all practising pharmacists \((N = 930)\) during a 3-month period.

Key findings Two hundred and nine pharmacists answered the questionnaire. The majority of pharmacists (77%) were in agreement with pharmacists prescribing a selected number of antibacterials. Reasons given are that pharmacist prescribing would increase recognition of the participation of pharmacists within patient care and as members of the healthcare team. Protocol-based prescribing was the preferred model for prescribing by 60% of pharmacists. Half of the respondents (50%) feel competent to prescribe, 34% have no opinion and 16% do not feel competent at all. Co-amoxiclav for an uncomplicated upper respiratory tract infection was the antibacterial that most pharmacists (51%) feel confident prescribing. When pharmacists were asked whether they feel comfortable prescribing other medications rather than antibacterials, 93% answered positively, with 83% feeling mostly comfortable prescribing lactulose solution.

Conclusion Pharmacists in Malta are in agreement with prescribing selected antibiotics for minor ailments. A collaborative approach between medical practitioners and pharmacists should be evaluated as a possible national structure towards achieving better antibiotic prescribing whilst giving patient access to the use of antibacterials as necessary.

Introduction

The discovery of antibiotics more than 80 years ago started a new era of drug modernisation.\(^1\) However in the interim, the risks involved in prescribing systemic and topical antibiotics have become apparent. One of the most obvious is antimicrobial resistance which is a major patient-safety and public-health issue.\(^2,3\) The number of infections due to antibiotic-resistant bacteria is growing,\(^4\) and infections caused by multidrug-resistance bacteria when compared to those caused by susceptible bacteria are associated with higher incidences of mortality and prolonged hospital stays.\(^5\) New classes of antibiotics that are not affected by mechanisms of resistance are necessary yet the pipeline of new classes of antibiotics is very limited.\(^2\)

Antimicrobial resistance is on the increase due to sub-optimal and inappropriate prescribing,\(^6\) and there is strong evidence linking antibiotic prescribing to the development of resistance.\(^7\) A study by Grossman \textit{et al.},\(^8\) reported that 43% of respondents overestimate the potential benefit of antibiotics leading to a higher prescription rate of antibiotics. Apart from increasing resistance, over-prescribing is associated with other risks, such as the increasing risk of adverse effects, complications and severity of diseases.\(^9\) Optimising antibacterial use through appropriate selection, dosing and duration can be seen as a method to improve patient safety by achieving a desired clinical outcome, reducing harm to patients and decreasing the potential for selection of resistant strains.\(^10\)
In 2016 in Malta the consumption of antibacterials for systemic use in the community expressed in defined daily dose per 1000 inhabitants per day was 15.86 compared to the population-weighted mean consumption at a European Union (EU)/European Economic Area (EEA) level of 21.9.\textsuperscript{[11,12]} About 25% of the total isolates of \textit{Escherichia coli} in Malta are resistant to at least one antimicrobial group under regular surveillance, compared to 59% at a EU/EEA level.\textsuperscript{[13]} These figures suggest that despite the problems being less severe than in many European countries, the overuse of antibiotics and development of resistance are still a cause of concern.

Antibiotic prescribing can be improved by a multidisciplinary team concept with pharmacists being moved away from their traditional ‘antibiotic policing’ role to one where they are ‘co-therapists’.\textsuperscript{[14]} Pharmacists can act as ‘co-therapists’ through prescribing within a collaborative practice framework (ASHF).\textsuperscript{[15]}

Carmichael \textit{et al.}\textsuperscript{[16]} have emphasised the importance of moving away from a fragmented prescribing model to a collaborative model to maximise patient outcomes. The U.S. Surgeon General, Dr Regina Benjamin stated\textsuperscript{[17]} that extended pharmacy practice models in collaboration with physicians or as part of a healthcare team improve patient outcomes and optimise primary care delivery and access. Abramowitz \textit{et al.}\textsuperscript{[18]} stated that the significant evidence supporting the pharmacist’s role in intercepting prescribing errors, reducing adverse drug events and improving treatment outcomes should be used to support pharmacist prescribing. Pharmacists in Malta do not currently have prescribing authority, and legal reform in the Maltese healthcare system is required to implement pharmacist prescribing locally. The National Health System in Malta is a fully non-contributory service funded and supported by the government. Patients entitled to the service do not pay for hospitalisation and for medicines available on the Government Formulary List (GFL) for chronic conditions listed in the Social Security Act. Consultant physicians prescribe medicines for patients under their care and apply for a medication entitlement card. Usually, this takes place during a hospitalisation or in an ambulatory clinic visit. Most of the ambulatory care clinics incorporate a multidisciplinary approach, where patients are attended to by physicians and other healthcare professionals, including clinical pharmacists. Patients present the medication entitlement card at the community pharmacy of their choice together with a prescription to collect their free entitled medicines. Only medicines which are available on the GFL may be prescribed to be obtained free-of-charge.\textsuperscript{[19]}

The aim of the study was to investigate the perception of Maltese pharmacists to prescribe a selected number of antibiotics. Antibiotics suitable for patient self-care for minor ailments were chosen as a case study since awareness about antibiotic misuse is being given importance also in Malta by different stakeholders.

**Methods**

**Study design and participants**

A descriptive study involving a cross-sectional questionnaire for pharmacists practising in Malta was developed.

**Questionnaire development**

A questionnaire entitled ‘Antibiotic Prescribing by Pharmacists Questionnaire’ (‘APQPharm’) was developed by the authors and based on a previous questionnaire\textsuperscript{[20]} also developed by the authors. APQPharm was intended to evaluate pharmacist’s perception of potential antibiotic prescribing by pharmacists. ‘APQPharm’ is a 35-item questionnaire consisting of three sections, namely ‘Demographic Data’ (Section I), ‘Pharmacist’s familiarisation and perception of the antibiotic prescribing process’ (Section II) and ‘Antibiotic prescribing rights by pharmacists’ (Section III) (Questionnaire attached as supplemental material).

**Questionnaire validation**

The APQPharm was face and content validated using a two-round Delphi process, which is an extensively used and accepted method for collecting feedback from respondents within their field of expertise.\textsuperscript{[21]} Individuals of different competencies were invited to form part of an expert panel for the Delphi-based validation exercise. The selection of members for the Delphi study was made through personal contacts of the investigator and members nominated by others. A heterogeneous group of five members was made up of three community pharmacists, one doctor and one lay person.

Each participant was approached by the investigator and the aims of the study were clearly outlined. The first round of the Delphi study consisted of a structured 5-point Likert scale questionnaire. Round I assessed the degree of relevance of each item. Participants were also asked to comment on the accuracy of content, structure, clarity and presentation. Questions for Round I were divided into 36 questions under three main sections.

Round I questions were mailed to all invited members who agreed to participate and who were asked to rate their level of agreement with the statements given and the extent of relevance of the question to reach the aims of the APQPharm. Participants rated their opinions on a 5-point Likert scale anchored by 1 when there is least...
agreement and 5 when there is highest agreement. Participants could add other comments in the ‘Remarks’ section. The completed questionnaires after Round I were picked up by the investigator (MAP) for review. The questionnaires were reviewed by the investigator and after analysing feedback from Round I of the validation exercise, the questionnaire was amended and disseminated again for Round II.

Members who participated in Round I were again contacted to take part in the second and final round of the validation exercise using the Delphi technique. In this round, participants were required to review the feedback and revise their scripts if necessary. Participants were again asked to rate their opinions on a 5-point Likert scale and to suggest further improvements in the ‘Remarks’ section.

The validation process lasted for a period of 1 month. After addressing the suggestions and recommendations generated during the second round of the Delphi, the final version of the APQpharm was produced. Examples of recommendations included the addition of a question to evaluate which antibiotics would be potentially prescribed by pharmacists as first and second line agents for a number of conditions, and the addition of a question about the patient-related criteria prescribers should decide upon when starting an antibiotic treatment. The final version consisted of 36 close-ended questions; multiple choice and Likert-type statements and three main sections.

Questionnaire dissemination

The validated questionnaire was disseminated to pharmacists practising in Malta through personal visits in community pharmacies. An online version of the APQpharm was also developed using Google Docs for pharmacists who wished to access the questionnaire electronically and ensured to capture responses from pharmacists who do not work full-time in a community pharmacy, but locum for a few hours per week. Pharmacists were advised to ignore the online format if they had previously filled in the paper copy. Pharmacists had a 3-month timeframe to return the questionnaire, either by answering the questionnaire online or by returning the questionnaire to the researcher in a sealed box to ensure anonymity. Pharmacists were invited to participate voluntarily, and ethics approval was not required.

Statistical analysis

Data from completed questionnaires was coded and entered into the Statistical Package for the Social Sciences version 22 (IBM Corporation, New York, NY, USA) database. The percentage of pharmacists who gave the highest rating, anchored by ‘4’ on the Likert scale, or the lowest rating, anchored by ‘0’ was calculated to evaluate pharmacist’s prescribing practices. The Friedman test was used to statistically analyse the mean rating scores for the different factors. The null hypothesis specified that mean rating scores vary marginally between related statements whilst the alternative hypothesis specifies that mean rating scores vary significantly between statements. The null hypothesis was accepted if the P value exceeded the 0.05 level of significance.

Results

Demographic data

Two hundred and nine pharmacists answered the questionnaire, obtaining a response rate of 22% and a one-way margin of error of 6%, meaning that the statistic will be within six percentage points of the real population value 95% of the time. Ninety-five pharmacists had more than 10 years of professional experience. The majority of pharmacists (n = 87) were employed in community pharmacies, 34 were locum pharmacists and 28 worked in their own private pharmacy. Thirty-eight per cent of pharmacists spent between 21 and 40 hours a week clinically checking and dispensing antibiotic prescriptions. More than half of the respondents (72%) dispensed an antibiotic prescription more than once daily.

Pharmacist’s antibiotic knowledge and practice

Most pharmacists participating in the study (44%, n = 92) felt very confident about their knowledge of penicillins, followed by cephalosporins (32%, n = 67), metronidazole (27%, n = 57) and quinolones (27%, n = 57). The mean rating scores for the level of confidence about antibiotic knowledge differed significantly (P < 0.001) when using the Friedman test.

When pharmacists were asked to rate the importance of drug-related factors when prescribing antibiotics, 84% (n = 176) of respondents reported that the activity of antibiotic against the most likely pathogen present was the most important. This was followed by allergic reactions (73%, n = 153) and contra-indications (72%, n = 150) (Figure 1).

Non-drug-related factors which would influence the pharmacist’s choice of antibiotics included diagnosis at 82% (n = 172), familiarity with antibiotic guidelines (51%, n = 106) and source of infection (48%, n = 100). Factors that would influence pharmacists the least when potentially prescribing antibiotics were information and frequency of visits by medical representatives (8%, n = 17) and prescribing trends by colleagues (4%, n = 8) (Figure 2).
The risks, as perceived by participating pharmacists if drug-related and non-drug-related factors were not given importance when potentially prescribing antibiotics were misdiagnosis (57%, \(n = 120\)), development of antibiotic resistance (53%, \(n = 111\)) and possible therapeutic failure (50%, \(n = 105\)) (Figure 3).

When asked which patient-related criteria should prescribers decide upon when it comes to starting an antibiotic treatment, 158 of the responding pharmacists (76%) said that prescribers should look at specific signs indicating a bacterial infection, followed by the severity of symptoms (67%, \(n = 139\)), the clinical picture, presenting symptoms and swab results (55%, \(n = 114\)).

Pharmacists were asked what qualities prescribers should have to be able to adequately prescribe antibiotics. The majority of participating pharmacists (72%, \(n = 150\)) said that prescribers should be familiar with antibiotic guidelines and should have sound knowledge of the infection aetiology (69%, \(n = 144\)).

**Pharmacist’s agreement and competency to prescribe antibiotics**

One hundred and fifty-nine pharmacists participating in the study agreed that pharmacists should prescribe a limited number of antibiotics (77%). Reasons as to why pharmacists were in favour were that pharmacist prescribing would increase recognition of the role of pharmacists as members of the healthcare team (64%, \(n = 102\)), pharmacists are highly trained healthcare professionals (63%, \(n = 100\)), and pharmacists are experts in pharmacology and therapeutics (\(n = 95\)). Ninety-six pharmacists who agreed with pharmacist prescribing said they would like protocol-based prescribing to be introduced. From the 47 pharmacists who did not agree with pharmacist prescribing rights, 25 (53%) said they did not agree because of lack of access to electronic patient medical records, followed by 20 (43%) who said that local pharmacists are not qualified to clinically examine patients.

Pharmacists were asked to rate their level of competency to prescribe broad-spectrum antibiotics to treat common infections. Half of the respondents (50%, \(n = 105\)) felt competent, 34% (\(n = 70\)) had no opinion and 16% (\(n = 34\)) did not feel competent. Of the 34 respondents who did not feel confident, not having access to patient’s laboratory tests (56%, \(n = 19\)) and working in a setting which lacks privacy (38%, \(n = 13\)) were the main reasons.

Co-amoxiclav for an uncomplicated upper respiratory tract infection, originating from a bacterial infection, was
the antibiotic that most pharmacists feel confident prescribing (51%, n = 104) (Table 1). The reason for this finding could be that 44% of pharmacists claimed to feel very confident about their knowledge of penicillins. The majority of pharmacists (93%, n = 191) felt comfortable prescribing medicines other than antibiotics for minor ailments. Of these 191 pharmacists, 158 (83%) would feel mostly comfortable prescribing lactulose solution, followed by omeprazole capsules (58%, n = 111) and diclofenac tablets (54%, n = 103). Constipation (79%, n = 150), strains and sprains (76%, n = 146) and haemorrhoids (76%, n = 145) were amongst the minor ailments pharmacists would feel mostly comfortable prescribing medications for.

Pharmacists were asked to rate on a Likert scale, how important to the patient they considered collaboration between physicians and pharmacists to be. Of the 205 pharmacists who answered this question, 96% (n = 197) rated the statement as important. The majority of pharmacists (87%, n = 173) said they would refer patients without prolonging irrelevant treatment if patients claimed that the antibiotic prescribed did not treat the condition presented with. If pharmacists were to prescribe within a collaborative framework, 91% (n = 190) of pharmacists would be willing to start prescribing.

**Discussion**

**Main findings**

Pharmacists in Malta are in agreement with prescribing selected antibiotics for minor ailments. Pharmacists feel competent prescribing not only antibacterial drugs, but also other medications for other minor ailments. Protocol-based prescribing is the framework preferred by most pharmacists. Pharmacists consider collaboration with general practitioners as very beneficial for patients and state that if pharmacist prescribing is introduced within a collaborative framework, they would be more willing to prescribe.

**Limitations**

Some of the findings reported may be the result of selection bias. The length of the questionnaire could have been a major limiting factor as to why the response rate was low. Pharmacists who disagree with pharmacist prescribing may have been reluctant to fill in the questionnaire, thus contributing to a lower response rate. The questionnaire was distributed to all pharmacists practising in Malta, so those pharmacists not working in the community, thus not affected by pharmacist prescribing could have been reluctant to participate. Pharmacists who would like pharmacist prescribing to be implemented in Malta might have been more willing to participate, resulting in a high percentage of pharmacists who claimed to agree with pharmacist prescribing rights. Whilst pharmacists were encouraged to only use one method of participation, there were no formal systems to guarantee this. A longer time frame for pharmacists to return the questionnaire, a more pro-active method of reminding participants or revisiting pharmacies more often to collect paper responses could have resulted in a better response rate.

**Wider context**

Community pharmacists have a strategic role in managing antibiotic resistance by managing patient expectations to be prescribed antibiotics.[22]

The activity of antibiotics against the most likely pathogen present was the most important drug-related factor that pharmacists would consider if prescribing antibiotics. This finding is in line with another study undertaken by the authors which assessed antibiotic prescribing practices amongst local general practitioners.[23] The most important non-drug-related factor which influenced the pharmacist’s choice is diagnosis, based on a thorough physical examination and patient’s history-taking. This finding is in agreement with a previous study intended for medical practitioners to assess their prescribing habits.[23] Eighteen per cent of pharmacists claimed that they would not decide which antibiotic to prescribe based on physical
Table 1 Antibiotics perceived by pharmacists as being very appropriate to be prescribed by pharmacists

<table>
<thead>
<tr>
<th>Clinical scenarios</th>
<th>Treatment prescribed</th>
<th>Total number of respondents N</th>
<th>% (n) of pharmacists who perceive antibiotic to be very appropriate (score of 4) to be prescribed by pharmacists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial skin infections (topical treatment)</td>
<td>Fusidic acid cream/ointment</td>
<td>202</td>
<td>40 (n = 80)</td>
</tr>
<tr>
<td></td>
<td>Mupirocin cream/oointment</td>
<td>206</td>
<td>42 (n = 87)</td>
</tr>
<tr>
<td>Bacterial conjunctivitis (ophthalmic drops)</td>
<td>Gentamicin</td>
<td>201</td>
<td>29 (n = 58)</td>
</tr>
<tr>
<td></td>
<td>Fusidic acid</td>
<td>202</td>
<td>34 (n = 68)</td>
</tr>
<tr>
<td></td>
<td>Tobramycin</td>
<td>204</td>
<td>50 (n = 102)</td>
</tr>
<tr>
<td></td>
<td>Chloramphenicol</td>
<td>199</td>
<td>27 (n = 54)</td>
</tr>
<tr>
<td>Uncomplicated urinary tract infections in women (excluding pregnancy) (oral therapy)</td>
<td>Ciprofloxacin 250 mg</td>
<td>200</td>
<td>37 (n = 73)</td>
</tr>
<tr>
<td></td>
<td>Ciprofloxacin 500 mg</td>
<td>200</td>
<td>36 (n = 72)</td>
</tr>
<tr>
<td></td>
<td>Norfloxacin</td>
<td>196</td>
<td>32 (n = 62)</td>
</tr>
<tr>
<td></td>
<td>Co-trimoxazole 800/160 mg</td>
<td>196</td>
<td>44 (n = 88)</td>
</tr>
<tr>
<td></td>
<td>Amoxicillin</td>
<td>196</td>
<td>14 (n = 27)</td>
</tr>
<tr>
<td></td>
<td>Oral cephalosporin</td>
<td>196</td>
<td>26 (n = 50)</td>
</tr>
<tr>
<td>Dermatology – mild-moderate acne (topical treatment)</td>
<td>Clindamycin phosphate/benzoyl peroxide</td>
<td>202</td>
<td>32 (n = 64)</td>
</tr>
<tr>
<td></td>
<td>Erythromycin/zinc acetate solution</td>
<td>204</td>
<td>31 (n = 64)</td>
</tr>
<tr>
<td>Uncomplicated upper respiratory tract infection</td>
<td>Co-amoxiclav</td>
<td>204</td>
<td>51 (n = 104)</td>
</tr>
<tr>
<td></td>
<td>Clarithromycin (in case of allergies)</td>
<td>205</td>
<td>42 (n = 85)</td>
</tr>
<tr>
<td>Chlamydia (oral treatment)</td>
<td>Azithromycin</td>
<td>206</td>
<td>29 (n = 59)</td>
</tr>
<tr>
<td></td>
<td>Doxycycline</td>
<td>204</td>
<td>14 (n = 29)</td>
</tr>
</tbody>
</table>

examination and patient’s history-taking, whilst another 52% claimed not to use the source of infection to guide antibiotic treatment. A possible postulation for these findings could be that pharmacists tend to rely on point-of-care tests and treatment algorithms to guide their decisions. Nonetheless, pharmacists should continuously be reminded that performing a physical examination and taking a patient’s history are important to guide decision-making.

Pharmacists in this study said that a collection of specific signs indicating a bacterial infection, and the severity of symptoms are the most important patient-related criteria to be taken into account by prescribers when deciding whether or not to start an antibiotic treatment. Hersh et al.[24] put forward three principles of prudent antibiotic use, the first one of which is to determine the likelihood of a bacterial infection.

Pharmacists in this study are in favour of pharmacists prescribing rights. They claim that this practice would increase recognition of their role as part of the healthcare team. In a study by Hoti et al. in Australia,[25] community pharmacists were also in favour of assuming an expanded pharmacist prescribing practice since they would be taking up a more important role in healthcare. Reasons as to why some pharmacists in this study are against prescribing include the lack of access to electronic patient medical records and the inability of the pharmacist to clinically examine patients, which tallies with the main reasons given by community pharmacists in the study by Hoti et al. being inadequate training in disease diagnosis and patient assessment and monitoring.[25] One must ensure that pharmacists’ potential to promote patient safety through rational medication use is fully exhausted to support prescribing, provided adequate training is given to strengthen the current competences whilst empowering pharmacists with the appropriate skills and resources. One such example is the Competency Framework for Prescribers published by the Royal Pharmaceutical Society.[26]

Co-amoxiclav for an uncomplicated upper respiratory tract infection of bacterial origin is the antibiotic that pharmacists felt confident prescribing. This may be attributed to the fact that pharmacists in this study felt mostly confident about their knowledge of the penicillin class of antibiotics.

Implications for practice

Analysing the outcomes of pharmacist prescribing in the United Kingdom has led to the realisation of the benefits that this practice brings along. Thornley et al.[27] have shown that a community pharmacy-based screening and treatment service, run by trained pharmacy staff, using point-of-care testing has the potential to reduce antibiotic pressure from patients and help in the effort to reduce the emergence of antibiotic resistance. Having pharmacists as non-medical prescribers allows general practitioners to concentrate more on diagnosis and procedures, helps reduce drug expenditure and wastage, helps improve adherence to guidelines whilst reducing the risks of
prescribing and communication errors, helps improve patient care through easier medication access and reduce waiting times for patient review.\textsuperscript{[28,29]}

**Conclusion**

Pharmacists in Malta are in agreement with prescribing selected antibiotics for minor ailments. Pharmacist prescribing promotes seamless care and enhances patient safety, whilst allowing medical practitioners to concentrate on more complex cases. The problem of a lack of medical practitioners can be overcome by the recruitment of pharmacists as non-medical prescribers, thus helping to reduce waiting times and improving medication access. The study is the first of its sort in Malta and gives an indication of the views of pharmacists with respect to prescribing a selected number of antibiotics. The study can be used as a platform for similar studies in the future and can serve as a framework for the development of a possible national structure towards achieving better antibiotic prescribing.

**References**


**Declarations**

**Conflict of interest**

The Author(s) declare(s) that they have no conflicts of interest to disclose.

**Funding**

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

**Authors’ contributions**

MAP involved in fieldwork, data handling, analysis and manuscript write-up; LC involved in statistical analysis; ASI and LMA involved in methodology development and write up. All authors have approved the submitted manuscript and had complete access to the study data that support the publication.


