


BRIEF REPORT

Who is asking? Requests for antimicrobial prescribing advice received by hospital pharmacists

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Abstract

Doctors are perceived as the primary decision makers in antimicrobial therapy, but prescribing decisions are influenced by the multi-disciplinary team. Antimicrobial stewardship (AMS) programs formalise interprofessional advice-giving. No studies capture the advice provided by pharmacists. This study aimed to describe the volume and nature of antimicrobial prescribing advice that healthcare professionals seek from hospital pharmacists. A prospective audit of antimicrobial-related advice requests received by pharmacists ($n = 18$) at an Australian public hospital was undertaken in July 2020. Antimicrobial advice was sought from 11 pharmacists on 300 occasions. Most requests (80%) were received by the AMS pharmacist. A mean (range) of 30 (17–40) requests per day was recorded and the AMS pharmacist received 24 (16–31) requests daily. Most requests came from the intensive care unit (22.1%), pharmacy (21.4%), and infectious diseases (17.1%). The AMS pharmacist was mostly contacted by consultants and pharmacists, and other pharmacists were contacted by registrars and junior medical officers. Despite COVID-19 adaptations, face-to-face interaction was most common. This audit demonstrates the value of an AMS pharmacist, and indicates the importance of face-to-face interactions and the formalisation of pharmacists' role in prescribing decision-making. Pharmacists provided antimicrobial advice daily to other healthcare professionals. Further research is required to provide insights into the barriers and enablers to effective advice-giving interactions.

Keywords: pharmacists, antimicrobials, prescribing, multidisciplinary team, antimicrobial stewardship, advice.

BACKGROUND

Doctors are perceived to be the primary decision makers in antimicrobial therapy¹ but it is recognised that prescribing decisions are influenced by contributions from the multidisciplinary team.^{2–4} Antimicrobial stewardship (AMS) programs formalise interprofessional contributions and are mandatory in Australian hospitals.⁵ AMS programs seek to promote evidence-based prescribing to optimise clinical outcomes and minimise unintended consequences, including toxicity, the selection of pathogenic organisms, and the emergence of resistance.⁵ Strategies

employed by AMS programs include prospective audit and feedback, education, and access to expert advice.

Pharmacists are core members of AMS teams, and studies report that they influence antimicrobial prescribing.^{2,6} However, other studies report that both doctors⁷ and pharmacists⁸ perceive that pharmacists' extensive antimicrobial knowledge is often under-utilised. This study aimed to capture the volume and nature of antimicrobial prescribing advice that healthcare professionals seek from hospital pharmacists.

METHOD

Setting

The study was conducted at a metropolitan Australian public hospital. The hospital has 158 medical, 122 surgical,

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20 intensive care, and 33 psychiatric beds. The hospital treats adult patients and has speciality units including heart and lung transplant, bone marrow transplant, and oncology. The pharmacy department has both inpatient and outpatient units. Ward-based clinical pharmacists hold general, rotational positions or are specialist pharmacists located permanently in specialist units (e.g. heart and lung transplant). At the time of the study, the AMS team comprised a pharmacist, an infectious diseases consultant and registrar, and two clinical microbiologists. AMS activities undertaken at the hospital included attendance at general and intensive care unit (ICU) ward rounds, and review and maintenance of the hospital antimicrobial approval system.

From March 2020, in response to COVID-19, the pharmacy department was divided into three teams and ward-based pharmacists relocated to satellite pharmacies on each level of the hospital. In-person interactions with patients and ward round attendance were minimised. Patient reviews and multidisciplinary team meetings were undertaken remotely using electronic patient records and virtual platforms. The AMS pharmacist was based in a satellite pharmacy but attended multidisciplinary team meetings, including daily, in-person ICU ward rounds.

Recruitment

The St Vincent's Hospital Human Research Ethics Committee (2020/ETH00538). All hospital pharmacists ($n = 39$) were invited to participate in a self-completed prospective audit of requests received for antimicrobial-related advice. Study participation was voluntary and written consent was obtained.

Data Collection

Data collection occurred simultaneously on 10 weekdays (0900–1700 hours, July 2020). Participants completed a demographic survey and were provided with hard-copy data collection forms to capture requests for advice (defined as guidance or recommendations) about antimicrobial prescribing. Data collected included position (including department) of the professional requesting advice, mode of communication, the antimicrobial drug advice was sought for, and the nature of advice sought (including drug selection, indication, dose, length of therapy). One response was excluded as the request was made on a weekend.

Analysis

Data were collated in REDCap (Research Electronic Data Capture [Vanderbilt]). Two clinical pharmacists were

consulted to confirm indications for drug use and categorisation of advice types. Statistical analysis was undertaken using SPSS Version 28 (IBM Corp, Armonk, NY, USA).

RESULTS

Participants ($n = 18$) comprised general and specialist pharmacists, including AMS, transplant, and haematology pharmacists. The majority of participants were female (89%) and had been practicing for an average of 8 years (standard deviation = 6.1). Most worked permanently on a ward or unit (72%) and reported that they played an active role in antimicrobial therapy daily (83%).

Antimicrobial advice was sought from 11 pharmacists on 300 occasions (Table 1). Seven pharmacists recorded no requests for antimicrobial advice. The AMS pharmacist received 240 (80%) of the requests for advice. Of the other pharmacists ($n = 60$ requests), the haematology pharmacist received 26 requests and the transplant pharmacists received 14. A mean (range) of 30 (17–40) requests per day was recorded across the study period, with the AMS pharmacist receiving a daily average of 24 (16–31) requests. The most requests came from the ICU ($n = 66$, 22.1%), pharmacy ($n = 64$, 21.4%) and infectious diseases ($n = 51$, 17.1%). The AMS pharmacist received all requests for advice from the ICU.

There were significant differences between the AMS pharmacist and other pharmacists as to who requested their advice ($p \leq 0.001$; Table 1). The AMS pharmacist was contacted more often by consultants and pharmacists, while other pharmacists were contacted more often by registrars and junior medical officers. Only seven requests were received from nurses.

There were no significant differences between the AMS pharmacist and other pharmacists in the mode of communication used to make requests. Despite COVID-19 adaptations which sought to minimise contact between clinicians and patients, face-to-face interaction was the most common method of communication for both groups of pharmacists.

Advice was sought on 44 different antimicrobials. Most requests related to antibiotics ($n = 255$, 75%) and the AMS pharmacist received a significantly higher proportion of these requests ($p \leq 0.001$). In contrast, other pharmacists provided advice on a broader range of antimicrobial types. The most common requests for advice were related to dose decisions (35.7% of requests included this), choice of drug (34.7%), and frequency and length of therapy (27.3%; Table 2). Some requests contained more than one type of advice.

Table 1 Descriptors of advice requests received by antimicrobial stewardship (AMS) and other pharmacists

	AMS pharmacists (N = 1), n (%)	Other pharmacists (N = 10), n (%)	Total, n (%)	
Total requests	240 (80)	60 (20)	300 (100)	
Mean daily requests (range)	24 (16–31)	6 (1–10)	30 (17–40)	
Who made request ^a				p (χ^2)
Consultant	88 (37.1)	6 (10.7)	94 (32.1)	≤0.001 (45.3)
Registrar	54 (22.8)	23 (41.1)	77 (26.4)	
Junior medical officer	16 (6.8)	18 (32.1)	34 (11.6)	
Pharmacist	79 (33.3)	9 (16.1)	88 (30.0)	
Communication mode				
Face-to-face	130 (54.2)	28 (47.5)	158 (53.0)	0.170
Phone	57 (23.8)	21 (35.6)	78 (26.0)	(3.5)
Text/email/online	53 (22.1)	10 (16.9)	63 (21.0)	
Antimicrobial type				
Antibiotics	194 (80.8)	31 (51.7)	225 (75.0)	≤0.001
Antifungals	39 (16.3)	19 (31.7)	58 (19.3)	(27.4)
Antivirals	7 (2.9)	10 (16.7)	17 (5.7)	

Pearson χ^2 , zero cells have an expected value <5, significant results in bold at p < 0.05.

^aNurses excluded from statistical analysis due to small sample size (n = 7).

Table 2 Nature of advice sought from pharmacists

	Requests, n (%)
Dose decisions (including dose adjustment)	107 (35.7)
Drug choices (including drug selection, switches, indication, form, de-escalation)	104 (34.7)
Frequency and length of therapy	82 (27.3)
Administrative (including AMS approval)	59 (19.7)
Pharmacokinetics/TDM (including ordering drug concentrations, interpretation of drug concentrations, pharmacokinetics, TDM)	61 (20.3)
Adverse events (including adverse effect, drug interactions, allergies)	15 (5.0)
Supply, shortage, disposal	9 (3.0)
Microbiology (including ordering and interpreting microbiology tests)	3 (1.0)
Miscellaneous (including research, lock therapy, PBS prescribing, drug stability, usage data)	7 (2.3)

AMS = antimicrobial stewardship; PBS = pharmaceutical benefits scheme; TDM = therapeutic drug monitoring.

DISCUSSION

Antimicrobial prescribing involves a multidisciplinary team of healthcare professionals. As the medication experts within the team, pharmacists are a valuable resource when decisions are made about initiating and managing antimicrobial therapy. This prospective audit demonstrates that antimicrobial prescribing advice was sought daily from pharmacists in the core decision-making areas of dose decisions, drug choice, and the

frequency and length of therapy. The AMS pharmacist played a dominant role in the provision of advice, notably receiving most requests for advice from senior doctors (consultants) with most requests relating to antibiotics.

The communication between pharmacists and doctors evident in this study is encouraging given that other studies have reported that AMS pharmacists' advice was not well-received by doctors.⁹ Senior doctors made the largest volume of advice requests. This contrasts with published reports that senior doctors rarely seek prescribing advice from others.^{6,10} The prescribing hierarchy, where senior team members drive prescribing decisions, influences the antimicrobial prescribing decisions of junior team members.¹ The engagement of senior doctors at the study site appears to have been mirrored by junior doctors seeking advice from other pharmacists. Further qualitative research is needed to explain these trends.

The high frequency of interactions between the AMS pharmacist and senior doctors suggests that the role of the AMS pharmacist is accepted by these staff and likely leads to beneficial outcomes for the AMS program. Previous work has shown, for example, that uptake of AMS interventions in ICUs influences antimicrobial prescribing decisions.¹¹ The interactions in this study were likely facilitated by the presence of the AMS pharmacist at ward rounds and at team meetings, especially in the ICU (personal communication, AMS pharmacist). The accessibility of pharmacists strongly influences communication and collaboration with other healthcare

professionals.^{3,12} The importance of pharmacists being present at the bedside is further highlighted by the dominance of face-to-face interactions in this study. The reason and circumstance of continued face-to-face interactions, despite COVID-19 adaptations, are beyond the scope of the study. However, the findings underscore the importance of familiarity with, and access to, individual pharmacists for doctor–pharmacist collaboration, ensuring pharmacists play an active role in the prescribing process.⁸

Notably, only seven nurses requested advice from pharmacists about antimicrobials. Given their involvement across the course of the patient journey, nurses have the potential to make valuable contributions to AMS programs. Their lack of participation in the current work perhaps reflects previously cited concerns that their role in AMS may be hampered by their hesitation to speak up when they have concerns or questions about antimicrobial therapy.¹³ While the outcomes of this study suggest a positive relationship between doctors and pharmacists, understanding how the whole team of health professionals interacts could help in understanding the role of each individual in the prescribing process and thus inform site-specific interventions to improve the use of antimicrobials.

The dominant role of the AMS pharmacist in fielding requests is not surprising given that advising on antimicrobial prescribing to optimise therapy for individual patients is one of the key functions of an AMS pharmacist.⁵ That said, the high volume of requests fielded daily by the AMS pharmacist has implications for their workload. Regular requests for advice across a shift suggest interruptions to workflow. Interruptions in clinical workflow are associated with increases in clinical errors¹⁴ and delay other important tasks. A recent survey reported 'lack of time' as a barrier to Australian pharmacists participating in the AMS program,⁹ while understaffing is reported as preventing pharmacists from effectively performing their role.¹⁵ Regular interruptions to respond to requests for advice may hinder effective AMS if not properly accounted for in pharmacists' workload and workflow.

This study had limitations. It underestimates the input of pharmacists as only advice requested was recorded. This decision was made to reduce participant burden and ensure that all pharmacists working on wards at the time of the study were willing to participate. Future studies could capture pharmacists' role in providing unsolicited advice, for example in querying a prescriber decision recorded in a medication chart. Additional work determining if pharmacist recommendations were accepted is also warranted. These studies may reveal doctors' resistance to pharmacists' advice in line with

current literature. The data collection period was brief (two weeks) and not all participants collected advice for the duration of the study due to scheduled leave periods. However, requests recorded were stable across the study period, suggesting results were not biased. A limitation of the self-report methodology was the reliance on participants remembering to record all the interactions. Finally, although data collection was undertaken during the early period of COVID-19, Australia had low-case numbers. Thus, it is likely that data remains representative of usual care.

CONCLUSION

This audit is the first to describe the volume and nature of the antimicrobial prescribing advice that healthcare professionals seek from hospital pharmacists. It demonstrates the value of AMS pharmacists, and indicates the importance of face-to-face interactions and the formalisation of the pharmacist's role in prescribing decision making. Pharmacists provided advice daily to other healthcare professionals on the use of antimicrobials. Observational studies of pharmacists in the workplace are required to provide insights into the barriers and enablers to effective advice-giving interactions, as well as to capture the provision of both solicited and unsolicited advice.

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CONFLICTS OF INTEREST STATEMENT

Professor Day is an Editorial Advisory Board member of the *Journal of Pharmacy Practice and Research* and a co-author of this article. To minimise bias, they were excluded from all editorial decision-making related to the acceptance of this article for publication. Other authors have no conflicts of interest to declare.

AUTHORSHIP STATEMENT

All listed authors comply with the *Journal's* authorship policy.

ETHICS STATEMENT

The study was approved by the St Vincent's Hospital Human Research Ethics Committee (2020/ETH00538).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request

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