

Technology-Enhanced Prescribing: What Do Community Pharmacists Need?

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Abstract

As the most accessible health professionals, community pharmacists' clinical knowledge and medicine expertise make them well placed to undertake professional services such as prescribing. All models of pharmacist prescribing can be supported by health information communication technology (ICT). However, no published research has explored pharmacists' technological needs when undertaking prescribing and other clinical services. In this paper we explore community pharmacists' ICT needs when undertaking prescribing and related services. We conducted semi-structured interviews with practicing Australian community pharmacists, using an interview guide informed by a systematic scoping review. Interviews were audio-recorded, transcribed, and analyzed thematically using descriptive classification. Interviews were conducted with 24 Australian community pharmacists from diverse locations, practice backgrounds and settings. Their identified technological needs for prescribing were classified as support for 'clinical decision making', 'communication', 'documentation', 'referral', and 'monitoring'. Pharmacists reported lack of interoperability between systems as the most significant ICT shortfall for prescribing. There is room to improve the functionality and integration of ICT systems to ensure Australian pharmacists are technologically supported to undertake all roles within the prescribing process. Software developers and vendors should ensure existing and future ICT is contemporaneous with the needs of users.

Keywords: Digital health, community pharmacists, prescribing, information communication technology, clinical practice

1. Introduction

Prescribing has been traditionally the domain of medical practitioners, advancement in healthcare policy and the need for professionals to practice to full scope have led to successful expansion of prescribing rights in numerous developed countries [1]. A Cochrane review identified appropriately trained and supported non-medical prescribers, practicing either collaboratively with other healthcare providers or

autonomously, delivered comparable outcomes to doctors in the management of high blood pressure, high cholesterol, diabetes, medication adherence, and in preventative healthcare, patient satisfaction and quality of life [2]. Pharmacist prescribers may address increasing needs in chronic disease or where doctor shortages or insufficient health resources exist [2]. Various jurisdictions have trialed independent prescribing of antimicrobials by pharmacists for urinary tract infections, oral contraception, and antihypertensive medicines [3].

Prescribing is best described as a process involving “information gathering, clinical decision making, communication and evaluation which results in the initiation, continuation or cessation of a medicine” [4]. Each stage of this process can be supported by health information communication technology (ICT) to strengthen the prescriber's integration in the healthcare system [5] and, arguably, enhance quality and safety in health care. Examples of health ICT – electronic patient health records, secure messaging, telehealth and artificial intelligence – support clinical decision making, facilitate interprofessional collaboration, and improve safe, timely access to care [5]. These platforms are in various stages of development and accessibility for pharmacists.

Despite the development and trial of pharmacist prescribing models, little is known about pharmacists' ICT needs for this type of advanced practice [1]. Focus groups conducted in 2021 with non-medical prescribers in the United Kingdom (physiotherapists and pharmacists), identified a lack of access to IT as a barrier to prescribing; however, authors did not elaborate on technological changes or needs required to enable prescribing [6]. A mixed-method systematic review of barriers and enablers to non-medical prescribing highlighted technology as a logistical barrier to implementation, citing a lack of access to patient notes in primary care [7]. An umbrella review of factors facilitating the implementation success of non-medical prescribing [8] cited several studies reporting electronic prescribing and access to electronic health records as a key facilitator [7], [9], [10], [11], [12]. Regardless of the patient's medical conditions and the pharmacist's legislated authority in prescribing for these conditions, prescribing could benefit from functional and effective ICT

infrastructure, including reliable electronic documentation of patient records, telehealth for communication and secure messaging between providers and patients [5], [13].

2. Aim

This research aimed to qualitatively explore community pharmacists' ICT needs to facilitate cognitive and procedural processes of prescribing.

3. Methods

This study involved exploratory semi-structured interviews with community pharmacists in Australia, following a grounded theoretical approach. Ethical approval was granted by the Curtin University Human Research Ethics Office (HRE2022-0249).

3.1. Study design

The methods were developed in accordance with the 32-item CONSOLIDATED criteria for Reporting Qualitative research (COREQ) checklist [14]. Development of the interview guide (available on request) was guided by a systematic scoping review [1]. Questions explored community pharmacists' ICT utilization, how ICT enables their clinical practice, and perceived ICT needs for prescribing. For the purposes of this study, 'prescribing' was defined as clinical assessment and therapeutic decision making about a therapy or management plan [4], regardless of the model of prescribing.

The draft interview guide was face and content validated by two academic pharmacists, then field tested with two potential participants to confirm the flow, relevance, and coverage of questions [15]. No amendments were required following field testing, and the pilot interviews were included in the final data.

3.2. Data collection

The target population was community pharmacists registered with the Australian Health Practitioner Regulation Agency and "currently practicing" ("Currently practicing" community pharmacists have worked a minimum of 150 hours in the last 12 months) in community pharmacy in Australia [16]. Recruitment involved professional organizations' social media accounts, snowballing [17] and word of mouth to collate expressions of interest. Sampling from these expressions of interest was purposive [18], aiming for diversity in years of experience, gender, ethnicity and practice location (state/territory, rurality). Recruitment ceased once the interviewer perceived data saturation.

Recruitment and interviews occurred in June-July 2022. Depending on participants' preference and location, interviews were conducted face-to-face or online via Microsoft Teams®. Interviews were audio-recorded with verbal consent and took 30-45 minutes each. After the interview, participants were offered a gift voucher for their professional time. Author [AO] (a community pharmacist and researcher) conducted all interviews, and documented reflections. Although data saturation was perceived after 18 interviews, additional interviews were conducted to enhance robustness of the data.

3.3. Data analysis

All recordings were transcribed verbatim, and participants were allowed to review their transcript, which was then de-identified before importing into NVivo™ (Version 20). Braun and Clarke's six-step reflective thematic analysis approach, using a grounded theoretical approach to identify theories in the data [19]. Inductive coding was conducted by author [AO] and iteratively revised via discussion with the other authors until consensus was reached. Field notes provided context and aided data interpretation and analysis.

4. Results

Interviews were conducted with 24 community pharmacists across all states and territories of Australia. Most participants were from metropolitan areas, consistent with Australia's population density but with representation across most rural and remote geographical classifications (see Table 1) [20].

All participants described their pharmacy as providing contemporary professional services. Whilst participants reported mixed perspectives about more extensive prescribing rights, they associated current prescribing with provision of over-the-counter medicines (in Australia, known as Pharmacy (Schedule 2) Medicines and Pharmacist Only (Schedule 3) Medicines), Continued Dispensing (a legislative provision allowing pharmacists to repeat the supply of certain Prescription Medicines), Emergency Supply (a legislative provision allowing pharmacists to issue a Prescription Medicine without a prescription in an emergency), immunization services (using vaccines that are Prescription Medicines), and participation in pharmacist prescribing trials.

Views differed regarding professional development to undertake prescribing. However, all participants described ICT as integral to medication counseling, information provision, medication supply and other professional services (see Table 1), and were optimistic about future prescribing roles,

Table 1. Demographic Characteristics of Participants

Pharmacist	Years as a Registered Pharmacist	Gender	Role Description	Location	State or Territory	Pharmacy Type	Self- Described Model of Practice	Professional Services
P1	19	F	Professional Services Pharmacist	MM1	WA	Independent	Professional services oriented	DAA (aged care, special needs), sleep apnea management, immunization, Staged Supply
P2	11	M	Pharmacist in Charge	MM1	NSW	Independent	Professional services oriented	Immunization, BP monitoring, MedsCheck, HMR referral service, glucose monitoring, simple compounding
P3	3	M	Pharmacist in Charge/ Locum	MM1	NSW	Banner Group	Discount /volume driven	DAA, Staged Supply, health promotion, medication supply programs (e.g. Saxenda®)
P4	20	M	Owner	MM1	VIC	Independent	Professional services oriented	Asthma and COPD education (+ digital spirometry), smoking cessation, myDNA, Impromy™, MedsCheck
P5	10	F	Accredited Pharmacist/ Professional Services Manager	MM1	WA	Banner Group	Professional services oriented	Sleep apnea management, Impromy™ (weight loss), immunization, compounding, HMR, RMMR

P6	2	M	Professional Services Pharmacist	MM1	WA	Banner Group	Professional services oriented	Immunization, sleep apnea management, health check, weight loss management, DAA, compounding
P7	25	F	Owner	MM1	WA	Independent	Professional services oriented	Immunization, BP monitoring, HbA1c testing, hemoglobin testing, wound care, DAA
P8	10	F	Locum Pharmacist/ Pharmacist in charge	MM1	WA	Independent	Professional services oriented	Immunization, MedsCheck, basic compounding, DAA
P9	12	F	Locum Pharmacist	MM5	WA	Independent	Professional services oriented/ Forward-dispensing model	DAA, CPOP, immunization
P10	7	F	Locum Pharmacist	MM1	NSW	Independent	Professional services oriented	Minor ailment consultation, Staged Supply, CPOP, immunization, sleep apnea management, RUM, naloxone program
P11	18	F	Locum Pharmacist	MM1	WA	Banner Group	Discount /volume driven	Disease state management screening and risk assessment, BP monitoring, cholesterol screening, glucose monitoring, MedsCheck, Staged Supply

P12	15	F	Owner/ Accredited Pharmacist	MM4	VIC	Banner Group	Professional services oriented	CPOP, immunization, DAA, BP monitoring, weight loss program, MedsCheck, HMR, RMMR, QUM for RACFs
P13	13	M	Manager	MM1	WA	Banner Group	Professional services oriented	Sleep apnea management, immunization, health check, MedsCheck, diabetes management program, weight loss program, personal leave requests
P14	13	F	Locum Pharmacist	MM5	NSW	Banner Group	Professional services oriented	Sleep apnea management, wound care, immunization, diabetes education, DAA, Telehealth
P15	5	M	Manager	MM1	WA	Independent	Professional services oriented	MedsCheck, immunization, BP monitoring, health check, simple compounding, in- pharmacy lactation consultant, DAA
P16	8	M	Pharmacist in Charge	MM2	NT	Independent	Professional services oriented	Ad hoc screening, BP monitoring, glucose monitoring, DAA, medical certificates, immunization

P17	7	M	Locum Pharmacist	MM1	QLD	Independent	Professional services oriented	Immunization, MedsCheck, DAA, Staged Supply, CPOP
P18	4	M	Manager	MM5	QLD	Banner Group	Professional services oriented	Ear check, DAA, BP monitoring, supervised RAT, immunization, Project STOP
P19	4	F	Pharmacist in Charge	MM1	SA	Banner Group	Professional services oriented	Immunization, health check, BP monitoring, MedsCheck, CPOP, DAA
P20	14	M	Dispensary Pharmacist	MM1	VIC	Banner Group	Professional services oriented/ Forward-dispensing model	CPOP, sleep apnea management, in-house nurse practitioner, compounding, DAA, immunization
P21	6	F	Manager	MM5	TAS	Independent	Dispensing with some professional services provided	Immunization, DAA
P22	7	F	Sole pharmacist/ Accredited Pharmacist	MM4	SA	Banner Group	Forward-dispensing model	Immunization, MedsCheck, DAA, HMR, RMMR
P23	12	F	Owner	MM1	ACT	Banner Group	Professional services oriented	Immunization, MedsCheck, leave certificates, sleep apnea management, diabetes education, asthma education,

								HbA1c testing, lipid profile testing, iron screening, in-house nurse practitioner, wound care, DAA
P23	12	F	Owner	MM1	ACT	Banner Group	Professional services oriented	Immunization, MedsCheck, leave certificates, sleep apnea management, diabetes education, asthma education, HbA1c testing, lipid profile testing, iron screening, in-house nurse practitioner, wound care, DAA
P24	7	M	Owner	MM1	NSW	Banner Group	Professional services oriented	Immunization, sleep apnea management, compounding, wound care, CPOP, DAA

Abbreviations/Definitions

ACT = Australian Capital Territory

BP monitoring = Blood Pressure monitoring COPD = Chronic Obstructive Pulmonary Disease

CPOP = Community Pharmacotherapy Program DAA = Dose Administration Aid

Gender = Female (F) or Male (M) (Assumed by interviewer) HMR = Home Medicines Review

Impromy™ = Weight loss program that improves health through weight loss and good nutrition. Comprised of meal replacements along high protein meals and ongoing support through trained pharmacy staff[27]

Medication supply program = IT-based support for pharmacists, doctors and pharmaceutical industry in Australia to facilitate optimal medication usage, adherence and health outcomes[28]

MedsCheck = provision of an in-pharmacy medication review by a pharmacist[29]

myDNA™ = Pathology test that analyses an individual patients DNA and pharmacogenomics[30]

MM = Modified Monash (Model) – see classifications below

NSW = New South Wales NT = Northern Territory

Project STOP = A decision making tool for pharmacists aimed to document use of pseudoephedrine-based products[31] QLD = Queensland

QUM = Quality Use of Medicines[32] RACFs = Residential Aged Care Facilities[33] RAT

= Rapid Antigen Test[34]

RMMR = Residential Medication Management Review[32] RUM = Return of Unwanted Medicines[35]

SA = South Australia

Staged Supply = Aims to assist people at risk of drug dependency or who are otherwise unable to safely manage their medicines[36] TAS = Tasmania

UTI prescribing trial = Urinary Tract Infection prescribing trial is a pharmacy pilot program in Queensland Australia to improve treatment access for women with uncomplicated urinary tract infections[37]

VIC = Victoria

WA = Western Australia

Modified Monash Model

Classification for metropolitan, regional, rural and remote areas in Australia according to geographical remoteness as defined by the Australian Bureau of Statistics [20]

- MM1 = Metropolitan areas
- MM2 = Regional centers
- MM3 = Large rural towns
- MM4 = Medium rural towns
- MM5 = Small rural towns
- MM6 = Remote communities
- MM7 = Very remote communities

recognizing the potential impact in improving access to medicines for patients and reducing the burden on general practice and hospitals.

Thematic analysis revealed five areas in which current and future prescribing roles would benefit from enhanced ICT.

4.1. Clinical decision making

The presentation of clinical information in technology systems could be optimized to enable reading and interpretation. Participants highlighted the role of ICT in supporting timely access to clinically relevant patient information and information to support clinical decision making. Several participants noted the need for greater interoperability with national systems, including linking each pharmacy's dispensing records with My Health Record to facilitate clinical decisions:

"There is no significant integrated system that every person uses, and even if there is, the reason there's no uptake is because not every person uses it." P17

"We just need that consistent information sharing between all parts of the health system that would allow us to have a clearer picture of ... pathology information." P23

4.2. Communication

The implementation of technology to support pharmacists' prescribing roles could be improved to streamline communication between pharmacists and other health professionals through technologies such as secure messaging and telehealth. Participants described several mechanisms by which communication is facilitated via ICT: telephone, email and facsimile. However, participants described these systems as "clunky", noting the administrative burden of sending and receiving facsimile transmissions and following up email communication. Participants stated that this process could be improved in transitions of care, particularly for patients discharged from hospital:

"...secure messaging is a great way forward... phone calls are so inconvenient." P22

4.3. Documentation

Participants described the need for more user-centered mechanisms to document patient encounters and professional services, and to contribute this documentation to national ICT systems. This could be improved via dispensing platforms and allowing pharmacists to contribute to dispensing and service notes in My Health Record. Participants noted that

interoperability between technology systems could improve the integration of local dispensing or professional software with national systems and shared health records to allow pharmacists to document clinical interactions with patients:

"If you're doing the prescribing and [the medical practitioner has] done the overall management of their [patient's] overall health, you want to be able to communicate back and forth about that. Now, that can occur via My Health Record, [but only] with contemporary notes and event summaries." P4

"I think [record keeping] improves safety ... so then I can pull [patients] back if there's an incident ... or if I want to go and actually look at the amount of data that I've collected on a patient to then be predictive of negative health." P16

4.4. Referral

Pharmacists indicated the need to utilize technology to formalize referral pathways with other health professionals to enhance collaboration. With referrals traditionally made verbally, by letter or by email, participants described the need for a secure messaging platform or functionality within My Health Record to facilitate referral:

"What's most critical is ensuring that collaborative nature of care is in place, so whatever protocols or technology or whatever it is in place, that it is agreed between health providers." P11

"We don't have established referral pathways in the same way that many general practitioners do." P20

4.5. Monitoring and review

Participants discussed the need for technology to be optimized to facilitate patient monitoring and review, using documented clinical interactions, professional services and medicine dispensing records. Participants described their dispensing or professional service documentation platforms as potentially useful for patient review and follow-up:

"[Dispensing data review] has helped to highlight cases of overuse in some people ... to say, 'Yes, they need to have a review of their asthma' ... putting it into [My Health Record] would be a lot better to get a picture of what someone has used, rather than it just being through verbal means." P6

"[I use medication data to say] 'Oh, hang on. They're actually getting a lot. Let's make a flag to have a

discussion. ' That improved patient safety – and that's not using new IT, it's just using existing IT.' P16

5. Discussion

This is the first-known study to explore community pharmacists' ICT needs to facilitate prescribing. As expected through our recruitment approach, our participants supported an expanded prescribing role for pharmacists. These findings align with those of Jebara et al. [10], acknowledging prescribing as a logical evolution of pharmacists' expertise, given their knowledge of medicines and expansion in clinical roles. Pharmacists acknowledged that ICT could enhance and support their work in clinical decision making, communication, referral, documentation and monitoring and review of patients. The Medication Management Pathway [21] was not used to guide the discussion; however, the processes described by pharmacists demonstrated close alignment.

Although artificial intelligence was not explicitly covered in the interviews, participants highlighted the need for more 'intelligent' systems to expedite screening for clinical issues and enhance clinical decision making. Indeed, the emergence of artificial intelligence has generated commentary about its role in clinical decision making [5]. However, this should not be at the expense of discussion with the patient about their experiences and preferences. Patient consultation during the request, diagnosis and counseling relating to the prescribed or selected medicine may be more complicated for at-risk patients [22], typically those with co-morbidities and polypharmacy needs, including elderly consumers and those with limited health and digital health literacy [23]. Whilst interoperability was highlighted as an important area in which technology could be improved, pharmacists noted that increased patient adoption and utilization of technologies, such as electronic health records, could further support timely access to more accurate patient information. Pharmacists perceived timeliness and accuracy in ICT access to be integral in supporting clinical decision making and other prescribing activities. This has been identified as influencing pharmacist prescribing, specifically in accessing patient medical records [10]. Further research is warranted to understand community pharmacists' perceptions, attitudes and risks relating to the application of artificial intelligence in their practice.

Integration and interoperability of ICT are ideal for pharmacists to interact with national systems [5]. Pharmacists were eager for improved functionality in national electronic health systems, such as My Health Record, to facilitate information sharing with patients and healthcare providers. This is consistent with a qualitative study with community pharmacists practicing in Victoria, Australia, exploring ICT needs

to enable adverse drug reporting [24]. The quality of documentation in these types of platforms is user-dependent, with risks of inaccurate and incomplete or undisclosed data. Co-design with pharmacists in developing or refining technology implemented in practice could help ensure functionality and usability.

Furthermore, pharmacists described the need for ICT systems to have increased functionality to enable communication between health professionals. Pharmacists identified that secure messaging and telehealth could reduce the administrative burden of current communication modes. Telehealth is rapidly evolving, with uptake by Australian pharmacists during the COVID-19 pandemic for medicines information and counseling services [24]. Pharmacists described the need for funding and education to improve adoption of new technologies to support prescribing. Use of secure messaging systems remains limited by interoperability between systems and absence of a nationally consistent approach to secure messaging [25]. Secure messaging could facilitate transitions of care, for example, in ensuring accurate and complete information transfer from hospital to community pharmacists to support timely, ongoing patient care. United States Government health informaticians have proposed benefits of ICT in preventing complications in care transitions [26].

Electronic documentation ensures consultations are accurately recorded and accessible to healthcare professionals for patient review. ICT systems were identified in this research to operate in silos, again due to lack of interoperability and functionality, which could potentiate delays, inability to track uptake of referrals and miscommunication. Practice support and guidelines must reflect the ICT needs of community pharmacists to assist with adoption and incorporation of these systems into practice. Findings from this study may inform future research and development of practice support tools.

5.1. Strengths and limitations

The involvement of community pharmacists from across Australia revealed that despite jurisdictional differences in legislation, scope of practice and technology platforms for specific services, participants' experiences and ICT needs to facilitate prescribing were remarkably consistent. This may be largely due to the influence of federal funding or national implementation of initiatives such as My Health Record. Nevertheless, initiatives driven by jurisdictional departments of health, including real-time prescription monitoring, may lead to discrepancy in ICT needs across different parts of Australia. Until legislative harmonization occurs, pharmacy-based studies should endeavor to include participants from a broad geographical region.

Significant changes to practice including ICT could limit relevance of the study. This study

preceded recent developments in generative artificial intelligence, and future research is warranted to explore the advantages and disadvantages of pharmacists' utilization of such platforms. This study considered pharmacists' views regardless of their attitudes towards the extent or models of prescribing. Additionally, as this was a qualitative study, the findings are not generalizable, although they could be transferable to other countries looking to implement pharmacist prescribing.

6. Conclusion

The outcome of our findings will help software developers and professional bodies, when designing or implementing technology to facilitate prescribing, in understanding the requirements of community pharmacists. Systems must support community pharmacists, as key partners in multidisciplinary healthcare teams, to provide timely and appropriate patient-centered care. Regardless of the prescribing model, this study provides a compelling argument for community pharmacists' access to ICT to facilitate clinical decision making, communication, documentation, referral, and monitoring.

7. References

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