

Use of a reference text by pharmacists, intern pharmacists and pharmacy students: a national cross-sectional survey

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Abstract

Background Reference texts assist pharmacists by addressing knowledge gaps and enabling evidence-based decisions when providing patient care. It is unknown whether reference text utilisation patterns differ between pharmacists, intern pharmacists and pharmacy students. To describe and compare the self-reported use and perceptions of a reference text, namely the national formulary, by pharmacists, intern pharmacists and pharmacy students.

Methods Registered pharmacists, intern pharmacists and pharmacy students living in Australia were surveyed in July 2020. The survey was electronic and self-administered. Questions considered self-reported use of a specific reference text in the preceding 12 months.

Key findings There were 554 eligible responses out of 774 who commenced the survey: 430 (78%) pharmacists, 45 (8%) intern pharmacists and 79 (14%) pharmacy students. Most participants (529/554, 96%) reported historical use of the text, though pharmacists were significantly less likely than intern pharmacists and students to use it frequently (52/422, 12% versus 16/43, 37% versus 23/76, 30%, $P < 0.001$). Pharmacists (44%, 177/404) reported using the text as a tool to resolve a situation when providing a service or patient care (177/404, 44%) or as a teaching resource (150/404, 38%). In contrast, intern pharmacists and students most commonly use these to familiarise themselves with the contents (30/43, 70%; 46/76, 61%) or update their knowledge (34/43, 79%; 53/76, 70%).

Conclusions Access and use patterns varied significantly across career stages. A broader understanding of the use of reference texts may help develop interventions to optimise the content and usability. Varying usage patterns across the groups may inform the tailoring of texts for future use.

Keywords: pharmacists; pharmacies; pharmaceutical services; practice guidelines; best practice; pharmacy education

Introduction

The ability to seek, find and utilise information is a crucial element of evidence-based healthcare practice, including pharmacy practice.^[1] Reference sources are essential to help fill knowledge gaps and for ensuring evidence-based decisions are being made when providing patient care. For example, a pharmacist may access a reference text when dispensing or counselling on an unfamiliar medicine or when they are compounding a product. Pharmacy reference texts sought while providing patient care may cover topics including drug information, therapeutic information, counselling advice for medicines, information regarding dosing in certain populations (such as children or those with renal impairment), drug interactions, immunisation recommendations, as well as covering legislation, regulation and professional practice guidelines.

Understanding the utilisation patterns of these reference texts across the profession is the first step in tailoring their content and delivery mediums. The importance of access and availability of diverse information sources has been

demonstrated.^[2] Most existing research has focussed on community pharmacists’ access and utilisation of drug information sources.^[2–7] These studies have found a marked preference for tertiary reference texts compared to primary literature, and a preference for easily accessible information. Most of the work has emphasised that a single source of information is insufficient to answer the broad range of questions encountered during daily practice. Previous work has demonstrated that pharmacists, nurses and medical practitioners differ in their utilisation patterns of reference texts, with pharmacists appearing to utilise a wider range of references.^[8]

An understanding of reference texts usage patterns in practice can help ensure reference texts meet contemporary practice needs. However, it is currently unknown whether usage patterns and reasons for use vary across career stages from pharmacists compared to intern pharmacists and students. Thus, the present study aimed to describe and compare the self-reported use and perceptions of a reference text, namely the national formulary, by pharmacists, intern pharmacists and pharmacy students.

Methods

Ethical approval

The Human Research Ethics Committee (HREC) at The University of Western Australia (UWA) approved this study in June 2020 (RA/4/20/6014). A detailed description of the methods has been reported elsewhere.^[9]

Reference text of interest

To answer the research question, we selected an individual Australian reference text. The Australian pharmacy regulator, the Pharmacy Board of Australia, mandates that specific reference texts must be readily available and accessible during clinical assessment, reviewing, dispensing and counselling in either an electronic or hard copy format. For some mandatory texts (e.g. an evidence-based reference for complementary and alternative medicines), the Pharmacy Board of Australia lists options to select whereas other texts are specified by name as mandatory. We decided to focus on a single mandatory reference book as a case study.

This reference text was the Australian Pharmaceutical Formulary and Handbook (APF), which is the Australian national formulary.^[10] As the national formulary, it is equivalent to international texts such as the UK's British Pharmacopoeia and British National Formulary, or the USA's United States Pharmacopoeia/National Formulary (USP/NF). It includes a national formulary to consistently identify, prescribe and compound extemporaneous formulation. The APF contains content unique to the Australian pharmacy practice context, and best practice guidance not readily accessible from other texts. It details information on medicines safety, Cautionary Advisory Labels information and recommendations and guidance on non-prescription medications. The current version at the time of the survey was the 24th edition, although the 25th edition has since been published.^[10, 11] All students have access to an electronic version of the APF (most likely electronically) through their university library and can purchase an individual hard copy or electronic subscription if desired. All intern and registered pharmacists should have ready access to a shared electronic or hard copy at the pharmacy premises where they work (as mandated by the Pharmacy Board of Australia), and can purchase an individual copy if desired.

Eligibility

Pharmacists and intern pharmacists registered with the Pharmacy Board of Australia were eligible to participate in the survey. Pharmacy students enrolled in one of the 18 Australian Pharmacy Council accredited courses leading to a qualifying degree for initial registration were eligible to participate, too. Responses were included for this analysis where participants had completed the demographics section of the survey and responded to the first question ('Have you ever heard of or used the APF?'). Eligible responses included partial responses.

Sample size

The eligible population was 32 777 registered pharmacists, 1850 intern pharmacists and 6500 pharmacy students in Australia when the survey was administered.^[12] No sample size calculation could be performed due to the absence of existing research and outcomes. A pragmatic 1% quota for the target sample size was set *a priori*; we had a recruitment target of 328 registered pharmacists, 19 intern pharmacists

and 65 pharmacy students. The target of 1% of the population was to be practical and attainable given the lack of prior research to determine suitable outcomes for determining an appropriate sample size. Additionally, there was no efficient way for the researchers to reach out to all registered pharmacists in Australia for the purpose of assembling a systematic or randomised sample.

Participant recruitment and consent

The survey was widely distributed through social media advertisements, pharmacy-specific professional organisations electronic newsletters, direct contact and distribution with pharmacy and intern training program providers and direct emails to pharmacy franchises with a request to distribute to their employees. The participant information outlined the aim of the study, the duration of the study, the storage of data, the funding source and the researchers. Participants were asked to give their informed consent before beginning the survey after reviewing the participant information.

Survey design

The research team developed the survey questions in conjunction with an expert advisory group, which were subsequently reviewed by the projects team at the Pharmaceutical Society of Australia. The survey comprised participant demographics and a total of 10 items using branching logic were administered as multiple-answer checkbox and free text response questions that considered the participants' use of the reference resource and any suggested improvements. The final questions are presented in [Supplementary File 1](#). Briefly, the questions included a binary question asking if the participant had heard of the APF, and a multiple choice question about how they accessed it (personal or shared copy, online or hard copy). Multiple choice questions were included about the frequency and purpose of using the APF, with follow-up questions to explore which chapters had been used and why. Free text questions were included to ask for suggestions for improvement and any other comments.

Survey pilot

The survey questions were piloted on Qualtrics platform to evaluate the understandability, relevance and usability of the questions. A sample of pharmacists ($n = 12$), intern pharmacists ($n = 4$) and pharmacy students ($n = 6$) were selected as a convenience sample and invited through the research team's professional network. Based on the feedback received from the pilot test, slight modifications were made to the response options, survey layout and typographical errors were corrected.

Survey administration

The cross-sectional electronic survey was administered via Qualtrics throughout July 2020. The survey required participants to answer all questions, except for those that were free text response or multiple-answer checkbox. In those cases, not selecting a response implied that none of the options applied. Some questions also included an option for 'I don't know' or 'I can't remember' if it was deemed appropriate. Participants were prompted to complete all mandatory questions before being able to submit the page. Participants had the ability to review and make changes to their responses before submitting the final survey.

Data management

Data were exported into Microsoft Excel from Qualtrics. Responses were reviewed for atypical time stamps, such as those completed in under 3 min as it had been estimated that it would take at least 5 min to get to the first content question. Data were then imported into Stata v17 for analysis.

Data analysis

The data were descriptively analysed with counts and proportions reported. Chi-square tests were undertaken in Stata v17 to compare categorical responses across pharmacists, intern pharmacists and pharmacy students. Chi-square tests were chosen as they allow for testing between categorical variables. We considered *P* values <0.05 to be significant. Free text responses were inductively coded to identify and summarise common themes. This process was undertaken independently by a pharmacy practice researcher (D.M.) and a practicing pharmacist (L.C.).

Results

A total of 554 out of 774 (72%) respondents who commenced the survey were eligible for inclusion in the current paper having responded to the initial question. Of these, 77.6% (430/554) were registered pharmacists, 8.1% (45/554) were intern pharmacists and 14.3% (79/554) were pharmacy students (Table 1). This sample represents 1.3% (430/32 777) pharmacists, 2.4% (45/1850) intern pharmacists and 1.2% (79/6500) pharmacy students in Australia so we met our target recruitment of 1% of the population.

Use and knowledge of the reference text

Participants' responses to questions on their reported use and perceptions are outlined in Table 2. Overall, 96% (529/554) of participants reported that they had used the APF before, with students significantly less likely to be familiar with it (Table 2). Despite this, intern pharmacists and students reported using the APF much more frequently than pharmacists (Table 2). A larger proportion of intern pharmacists and students used the APF more frequently (monthly or weekly) than registered pharmacists (once or twice a year). Almost all the intern pharmacists (91%, 39/43) and student participants (91%, 69/76) indicated that they own a hard copy text.

The primary reason for use was significantly different between the three groups (Table 2), with 44% of pharmacists reporting the use of the APF to resolve a situation when providing a service/patient care and 37.7% reporting use as a teaching resource (Table 2). In comparison, intern pharmacists and students used it to familiarise themselves with the contents (70 and 61%) or update their knowledge (79 and 70%) (Table 2). The main reason stated across all groups for not using selected chapters was that it was not relevant to their practice (36%, 169/468) (Table 2). When asked reasons they had not used particular chapters, there were 7.4% (*n* = 16) pharmacists who stated that they preferred other sources of information on this topic area (Table 2). Of the 44 pharmacists who indicated they had not used the APF in the last 12 months, 41% (*n* = 18) stated it was because they preferred other sources for this information (Table 2).

Registered pharmacists' responses to questions on reported use and perceptions are outlined in Table 3 by practice setting (community, hospital and other). There were 8.1% (19/236)

pharmacists in community settings who reported that their workplace had neither an online nor hard copy version of the APF, while 16.9% (40/236) reported that their workplace had both. Similarly, 5.1% (5/98) of pharmacists in hospital settings reported that their workplace had neither an online nor hard copy version while 16.3% (16/98) had both. In contrast, 42% (33/78) pharmacists in other settings reported that their workplace had access to neither the online nor hard copy version while only 5.1% (4/78) had access to both versions.

Suggestions for improvements

The free text responses for the suggested improvements to the APF with identified themes and example quotes are displayed in Table 4. Themes identified included enabling easier online access, improving awareness of changes and updates, cost associated with subscription and expanding content for the inclusion of more specific information such as medicines crushing, dose administration aid packing and inclusion of validated decision support tools.

Discussion

Almost all participants reported that they were familiar with the APF and had previously used it, though pharmacists reported significantly different usage patterns and reasons for use compared to intern pharmacists and students. Registered pharmacists reported they used the text significantly less often than intern pharmacists and students. Registered pharmacists reported primarily using the APF to assist in resolving a situation when providing service/patient care and as a teaching resource using the text. Intern pharmacists and students used the APF more frequently and for learning purposes such as familiarising themselves with its contents and updating their knowledge. Non-use was reportedly due to a perceived lack of relevance to the participants' role and scope of practice.

Strengths and limitations

Many of this study's strengths and limitations are common to survey methodology. This study captured a large cohort comprising registered pharmacists, intern pharmacists and pharmacy students across practice settings, including community, hospital, consultant, academia and industry pharmacists. We did not capture what stage of the course students were in, so it may be possible that students had not yet progressed to undertaking subjects where the APF is introduced. A low participation rate of 72% needs to be considered when reading the results. While it is possible that respondent bias may have affected the results of the study, the large sample size indicates that our results are likely to be representative.^[9] The participant demographics are reasonably similar to that seen across all Australian pharmacists. Our sample had roughly similar proportions of female pharmacists (71% versus 61% in the general pharmacist population), aged under 35 (48% versus 44%) and working in hospital (24% versus 22%) or community pharmacy (56% versus 64%), which is further indicative that the results may be broadly representative.^[12] However, our sample had disproportionate pharmacists in academia (5% versus 1%), who may be different in their usage to those in patient-facing roles if it is used in their teaching. It is possible that recall bias could have affected the responses, however, participants were given the option to select 'I cannot remember'. This study was conducted during Australia's second wave of the Covid-19

Table 1 Demographics of survey participants

Characteristic	Registered pharmacist N = 430 <i>n</i> (%)	Pharmacy intern N = 45 <i>n</i> (%)	Pharmacy student N = 79 <i>n</i> (%)	Total participants N = 554 <i>n</i> (%)
Gender ¹				
Male	124 (29)	10 (22)	22 (28)	156 (28)
Female	304 (71)	35 (78)	56 (71)	395 (71)
Age (in years) ¹				
18–24	18 (4)	34 (76)	61 (77)	113 (20)
25–34	198 (46)	9 (20)	12 (15)	219 (40)
35–44	96 (22)	1 (2)	4 (5)	101 (18)
45–54	54 (13)	1 (2)	1 (1)	56 (10)
55–64	45 (11)	–	–	45 (8)
65+	17 (4)	–	–	17 (3)
State of workplace/study ¹				
New South Wales	79 (18)	5 (11)	12 (15)	96 (17)
Victoria	11 (3)	3 (7)	3 (3.8)	17 (3)
Queensland	105 (24)	7 (16)	18 (23)	130 (24)
South Australia	54 (13)	11 (24)	15 (19)	80 (14)
Western Australia	43 (10)	9 (20)	12 (15)	64 (12)
Northern Territory	117 (27)	6 (13)	16 (20)	139 (25)
Australian Capital Territory	12 (3)	2 (4)	2 (3)	16 (3)
Tasmania	5 (1)	2 (4)	–	7 (1)
Current practice location ¹				
Metro	299 (70)	29 (64)	–	–
Regional	40 (9)	4 (9)	–	–
Rural	72 (17)	9 (20)	–	–
Remote	15 (4)	3 (7)	–	–
Currently a member of any pharmacy organisations				
Pharmaceutical Society of Australia	218 (51)	30 (67)	71 (90)	319 (58)
Society of Hospital Pharmacists Australia	119 (28)	13 (29)	49 (62)	181 (33)
Pharmacy Guild of Australia	85 (20)	9 (20)	25 (32)	119 (22)
Professional Pharmacists Australia	46 (11)	5 (11)	4 (5)	55 (10)
National Australian Pharmacy Student Association (NAPSA)	11 (3)	8 (18)	39 (49)	58 (11)
International Pharmaceutical Federation (FIP)	12 (3)	2 (4)	2 (3)	14 (3)
None of the above [#]	79 (18)	6 (13)	4 (5)	89 (16)
Pharmacist principal role/place of practice ¹				
Community pharmacy	241 (56)	27 (60)	–	–
Hospital pharmacy	103 (24)	16 (36)	–	–
Academia	22 (5)	–	–	–
Consultant	32 (8)	–	–	–
Industry	6 (1)	0 (0)	–	–
Other	23 (5)	2 (4)	–	–
Pharmacist years registered				
0–2	51 (12)	–	–	–
3–5	73 (17)	–	–	–
6–10	106 (25)	–	–	–
11–20	101 (24)	–	–	–
21–30	36 (8)	–	–	–
>31	63 (15)	–	–	–

N = total responses for that question and population, *n* = total responses for that answer, % = $n/N \times 100\%$.

– Indicates question was not asked of that respondent group.

[#]Indicates an exclusive multiple answer question, percentages will not add up to 100.

¹Answers not presented for participants who replied 'Prefer not to answer' so will not add up to 100.

Table 2 Participant's knowledge, access and use of the text in the previous 12 months

	Registered pharmacist		Pharmacy intern		Pharmacy student		Chi ²	Degrees of freedom	Test statistic	P-value
	n	%	n	%	n	%				
	Have you ever heard of or used the APF? ¹	N = 430		N = 45		N = 79		4	10.1643	0.038
I have never heard of or used it	8	(2)	2	(4)	3	(4)				
I have heard of it but never used it	7	(2)	0	(0)	5	(6)				
I have used it before	415	(97)	43	(96)	71	(90)				
On average how often would you use the APF? ¹	N = 422		N = 43		N = 76		10	61.0542	<0.001	
Never used it	17	(4)	0	(0)	0	(0)				
Use it rarely (at least once a year)	94	(22)	1	(2)	5	(7)				
Use it occasionally (two or more times a year)	155	(37)	11	(26)	15	(20)				
Use it regularly (monthly)	97	(23)	15	(35)	32	(42)				
Use it frequently (weekly)	52	(12)	16	(37)	23	(30)				
I can't remember	7	(2)	0	(0)	1	(1)				
How do/could you access the APF if you wanted to? ²	N = 422		N = 43		N = 76					
I own a hard copy APF	179	(42)	39	(91)	69	(91)	2	86.2047	<0.001	
My workplace owns a hardcopy APF	292	(69)	32	(74)	40	(53)	2	9.4709	0.009	
I have a personal APF online subscription	16	(4)	1	(2)	1	(1)	2	1.4048	0.495	
My workplace has an APF online subscription	126	(30)	9	(21)	5	(7)	2	1.4048	<0.001	
I can borrow a hard copy APF from the university library	6	(1)	4	(9)	23	(30)	2	19.1989	<0.001	
I have access to the university library's online subscription	19	(5)	1	(2)	13	(17)	2	93.9355	<0.001	
I don't know ³	8	(2)	0	(0)	1	(1)				
For what purpose do you use the APF? ²	N = 404		N = 43		N = 76					
To familiarise myself with the contents	87	(22)	30	(70)	46	(61)	2	83.5920	<0.001	
To update my knowledge	141	(35)	34	(79)	53	(70)	2	60.9727	<0.001	
To check that my practice is reflective of best practice	133	(33)	24	(56)	31	(41)	2	11.5825	0.003	
For continuing professional development	49	(12)	11	(27)	22	(29)	2	18.9982	<0.001	
As a teaching resource	150	(38)	16	(37)	27	(36)	2	0.0479	0.048	
To resolve a situation when providing a service/patient care	177	(44)	14	(33)	16	(21)	2	12.5414	0.002	
I don't really use it ³	66	(16)	3	(7)	4	(5)	2	7.6402	0.022	
Other ⁴	44	(11)	8	(19)	4	(5)	2	5.2793	0.071	
Which of the following APF chapters have you used in the past 12 months? ²	N = 402		N = 43		N = 75					
Dispensing medicines safely	57	(14)	12	(28)	18	(24)	2	8.5788	0.014	
Cautionary advisory labels	177	(44)	37	(86)	61	(81)	2	50.6675	<0.001	
Extemporaneous dispensing/formulary	253	(63)	37	(86)	52	(69)	2	7.6706	0.022	
Cold chain management	33	(8)	9	(21)	4	(5)	2	8.7660	0.012	
Biosimilar medicines	25	(6)	5	(12)	3	(4)	2	2.6201	0.270	
Dosing in children	129	(33)	13	(30)	28	(37)	2	0.7976	0.671	
Dosing in renal impairment	64	(16)	10	(23)	16	(21)	2	2.1199	0.346	
Medicines in breast milk	55	(14)	8	(19)	12	(16)	2	0.7688	0.681	
Medicines in older people	49	(12)	7	(16)	11	(15)	2	0.6745	0.714	
Medicines review	31	(8)	3	(7)	8	(11)	2	0.7556	0.685	
Opioid substitution therapy	42	(10)	7	(16)	11	(15)	2	1.8858	0.389	
Screening and risk assessment	15	(4)	2	(5)	3	(4)	2	0.0716	0.965	
Counselling guides for managing minor ailments	112	(28)	25	(58)	46	(61)	2	38.9478	<0.001	
Provision of Pharmacist Only medicines guidance documents	134	(33)	33	(77)	35	(47)	2	30.3579	<0.001	
I have not used my APF in the last 12 months ³	44	(11)	0	(0)	2	(3)	2	10.1864	0.006	
Reasons for using chapters of the APF in the last 12 months? ²	N=355		N=43		N=72					
To familiarise myself with the contents	95	(27)	28	(65)	52	(72)	2	69.4084	<0.001	
To update my knowledge	158	(45)	34	(79)	46	(64)	2	24.4063	<0.001	

Table 2. Continued

	Registered pharmacist		Pharmacy intern		Pharmacy student		Chi ²	Degrees of freedom	Test statistic	P-value
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%				
To check that my practice is reflective of best practice	161	(45)	20	(47)	34	(47)	2		0.2380	0.888
For continuing professional development	38	(11)	13	(30)	23	(32)	2		28.6724	<0.001
As a teaching resource for pharmacy students, intern pharmacists, pharmacy/dispensing assistants or colleagues	126	(36)	19	(44)	29	(40)	2		1.9399	0.379
To resolve a situation when providing a service/patient care	185	(52)	12	(28)	16	(22)	2		25.2587	<0.001
Other ⁴	10	(3)	3	(7)	3	(7)	2		2.4253	0.297
I can't remember ³	1	(0)	0	(0)	0	(0)	2		0.3108	0.856
Did you find the content of the chapters that you used useful? ¹	N = 355		N = 43		N = 72		6		7.3637	0.289
Yes – the information contained was exactly what I needed/expected	262	(4)	34	(79)	63	(88)				
Maybe – some of the information was what I needed/expected	3	(1)	0	(0)	0	(0)				
No – the information was not what I needed/expected	87	(25)	9	(21)	9	(13)				
I can't remember	3	(1)	0	(0)	0	(0)				
Reasons for NOT using chapters of the APF in the last 12 months? ²	N = 355		N = 41		N = 72					
I did not know they existed	29	(8)	8	(20)	4	(6)	2		7.0101	0.030
I do not need them in my area of practice	124	(35)	14	(34)	31	(43)	2		1.7884	0.409
The information provided is too in-depth for my needs	10	(3)	5	(12)	6	(8)	2		10.4796	0.005
The information provided is not in-depth enough for my needs	21	(6)	5	(12)	4	(6)	2		2.5195	0.284
I already know this information	57	(16)	0	(0)	3	(4)	2		14.1793	0.001
This information has not changed recently	21	(6)	4	(10)	1	(1)	2		3.8488	0.146
I have used the chapters in the past but not in the last 12 months	98	(28)	9	(22)	19	(26)	2		0.6096	0.737
I prefer other sources of information on this topic area ⁴	26	(7)	5	(12)	5	(7)	2		1.2953	0.523
You have indicated you have not used the APF in the last 12 months. Why? ²	N = 44		N = 0		N = 2					
The APF's content is not useful in my area of practice	22	(50)	0	(0)	0	(0)				-
I already know all of the information in the APF	2	(5)	0	(0)	0	(0)				-
I prefer other sources for this information	18	(41)	0	(0)	1	(50)				-
The online APF not user friendly	1	(2)	0	(0)	0	(0)				-
The APF hard copy not user friendly	4	(9)	0	(0)	1	(50)				-
Other ⁴	4	(9)	0	(0)	1	(50)				-

n = total responses for that answer, *N* = total responses for that question and population, % = $n/N \times 100\%$.

– Indicates that we did not test significance due to there being few respondents in each group.

¹Indicates only one response could be selected.

²Indicates a multiple answer question, percentages will not add up to 100.

³Indicates an exclusive answer, that is, the participant could not select any other response if that answer was selected.

⁴Indicates text response was allowed.

pandemic; it is unknown if this environment affected the results as pharmacists, like everyone, were under considerable stress during this time.

Results in context

This work identified that intern pharmacists and students use the APF to learn and pharmacists use it to teach. Previous work has demonstrated that the National Competency

Standards Framework for Pharmacists in Australia can be used to support teaching and learning.^[13] This implies that texts developed for the profession may be applied as formative reference tools in professional socialisation and education, suggesting its use could further be enhanced in the teaching and learning context. Furthermore, this current study indicates that this reference text, the APF, may similarly be applicable as a teaching and learning aid.

Table 3 Generally registered pharmacists' knowledge, access and use of the text in the previous 12 months by community, hospital and other settings

	Community		Hospital		Other		Chi ²	Degrees of freedom	Test statistic	P-value
	n	(%)	n	(%)	n	(%)				
Have you ever heard of or used the APF? ¹	N = 241		N = 103		N = 83		4		5.8924	0.207
I have never heard of or used it	5	(2.1)	1	(1.0)	1	(1.2)				
I have heard of it but never used it	1	(0.4)	3	(2.9)	3	(3.6)				
I have used it before	235	(97.5)	99	(96.1)	83	(100)				
On average how often would you use the APF? ¹	N = 236		N = 102		N = 82		10		99.3354	<0.001
Never used it	1	(0.4)	11	(10.8)	5	(6.1)				
Use it rarely (at least once a year)	23	(9.7)	48	(47.1)	22	(26.8)				
Use it occasionally (two or more times a year)	103	(43.6)	26	(25.5)	25	(30.5)				
Use it regularly (monthly)	69	(29.2)	10	(9.8)	18	(22.0)				
Use it frequently (weekly)	39	(16.5)	4	(3.9)	9	(11.0)				
I can't remember	1	(0.4)	3	(2.9)	3	(3.7)				
How do/could you access the APF if you wanted to? ²	N = 236		N = 98		N = 78					
I own a hard copy APF	114	(48.3)	28	(28.6)	37	(47.4)	2		11.5979	0.003
My workplace owns a hardcopy APF	117	(49.6)	80	(81.6)	34	(43.6)	2		35.3855	<0.001
I have a personal APF online subscription	8	(3.4)	1	(1.0)	7	(9.0)	2		7.7220	0.021
My workplace has an APF online subscription	80	(33.9)	29	(29.6)	15	(19.2)	2		6.0104	0.050
I can borrow a hard copy APF from the university library	1	(0.4)	0	(0.0)	5	(6.4)	2		16.5404	<0.001
I have access to the university library's online subscription	7	(3.0)	3	(3.1)	9	(11.5)	2		10.4959	0.005
I don't know ³	0	(0.0)	0	(0.0)	0	(0.0)				
For what purpose do you use the APF? ²	N = 236		N = 102		N = 82					
To familiarise myself with the contents	70	(29.7)	5	(4.9)	11	(13.4)	2		29.9316	<0.001
To update my knowledge	102	(43.2)	12	(11.8)	26	(31.7)	2		31.8319	<0.001
To check that my practice is reflective of best practice	95	(40.3)	16	(15.7)	21	(25.6)	2		21.5473	<0.001
For continuing professional development	41	(17.4)	1	(1.0)	6	(7.3)	2		20.6076	<0.001
As a teaching resource	81	(34.3)	31	(30.4)	37	(45.1)	2		4.6220	0.099
To resolve a situation when providing a service/patient care	113	(47.9)	35	(34.3)	28	(34.1)	2		7.9045	0.019
I don't really use it ³	30	(12.7)	23	(22.5)	12	(14.6)	2		5.3238	0.070
Other ⁴	20	(8.5)	14	(13.7)	10	(12.2)	2		2.4148	0.299
Which of the following APF chapters have you used in the past 12 months? ²	N = 237		N = 92		N = 78					
Dispensing medicines safely	40	(16.9)	4	(4.3)	13	(16.7)	2		9.3678	0.009
Cautionary advisory labels	93	(39.2)	43	(46.7)	41	(52.6)	2		4.7499	0.093
Extemporaneous dispensing/formulary	173	(73.0)	38	(41.3)	41	(52.6)	2		31.8073	<0.001
Cold chain management	20	(8.4)	1	(1.1)	12	(15.4)	2		11.6648	0.003
Biosimilar medicines	10	(4.2)	3	(3.3)	12	(15.4)	2		14.4018	0.001
Dosing in children	101	(42.6)	10	(10.9)	18	(23.1)	2		34.1627	<0.001
Dosing in renal impairment	32	(13.5)	7	(7.6)	25	(32.1)	2		21.1455	<0.001
Medicines in breast milk	40	(16.9)	8	(8.7)	7	(9.0)	2		5.4972	0.064
Medicines in older people	27	(11.4)	4	(4.3)	18	(23.1)	2		14.2065	0.001
Medicines review	15	(6.3)	4	(4.3)	12	(15.4)	2		8.6442	0.013
Opioid substitution therapy	22	(9.3)	8	(8.7)	12	(15.4)	2		2.6997	0.259
Screening and risk assessment	8	(3.4)	1	(1.1)	6	(7.7)	2		5.3420	0.069
Counselling guides for managing minor ailments	80	(33.8)	7	(7.6)	24	(30.8)	2		23.4373	<0.001
Provision of Pharmacist Only medicines guidance documents	98	(41.4)	11	(12.0)	25	(32.1)	2		25.9613	<0.001
I have not used my APF in the last 12 months ³	12	(5.1)	21	(22.8)	13	(16.7)	2		28.6539	<0.001
Reasons for using chapters of the APF in the last 12 months ²	N = 218		N = 66		N = 66					
To familiarise myself with the contents	63	(28.9)	10	(15.2)	21	(31.8)	2		5.9414	0.051
To update my knowledge	110	(50.5)	15	(22.7)	32	(48.5)	2		15.5717	<0.001

Table 3. Continued

	Community		Hospital		Other		Chi ²	Degrees of freedom	Test statistic	P-value
	n	(%)	n	(%)	n	(%)				
To check that my practice is reflective of best practice	110	(50.5)	23	(34.8)	27	(40.9)	2		5.9150	0.052
For continuing professional development	29	(13.3)	3	(4.5)	5	(7.6)	2		4.8162	0.090
As a teaching resource for pharmacy students, intern pharmacists, pharmacy/dispensing assistants or colleagues	71	(32.6)	24	(36.4)	31	(47.0)	2		4.4675	0.107
To resolve a situation when providing a service/patient care	120	(55.0)	36	(54.5)	28	(42.4)	2		2.6703	0.263
Other ⁴	4	(1.8)	3	(4.5)	3	(4.5)	2		2.2253	0.329
I can't remember ³	0	(0.0)	1	(1.5)	0	(0.0)	2		4.3048	0.116
Did you find the content of the chapters that you used useful? ¹	N = 218		N = 69		N = 67					
Yes – the information contained was exactly what I needed/expected	174	(79.8)	41	(59.4)	47	(70.1)			19.3528	0.004
Maybe – some of the information was what I needed/expected	43	(19.7)	25	(36.2)	18	(26.9)				
No – the information was not what I needed/expected	1	(0.5)	2	(2.9)	0	(0.0)				
I can't remember	0	(0.0)	1	(1.4)	2	(3.0)				
Reasons for NOT using chapters of the APF in the last 12 months? ²	N = 217		N = 70		N = 67					
I did not know they existed	20	(9.2)	5	(7.1)	4	(6.0)	2		0.8451	0.655
I do not need them in my area of practice	58	(26.7)	34	(48.6)	32	(47.8)	2		16.9833	<0.001
The information provided is too in-depth for my needs	8	(3.7)	0	(0.0)	2	(3.0)	2		2.6282	0.269
The information provided is not in-depth enough for my needs	10	(4.6)	5	(7.1)	6	(9.0)	2		1.9627	0.375
I already know this information	46	(21.2)	6	(8.6)	5	(7.5)	2		10.8121	0.004
This information has not changed recently	11	(5.1)	6	(8.6)	4	(6.0)	2		1.1636	0.559
I have used the chapters in the past but not in the last 12 months	67	(30.9)	13	(18.6)	17	(25.4)	2		4.1988	0.123
I prefer other sources of information on this topic area ⁴	16	(7.4)	7	(10.0)	3	(4.5)	2		1.5348	0.464
You have indicated you have not used the APF in the last 12 months. Why? ²	N = 236		N = 102		N = 82					
The APF's content is not useful in my area of practice	2	(84.7)	12	(11.8)	17	(20.7)	2		20.5532	<0.001
I already know all of the information in the APF	1	(42.4)	1	(1.0)	0	(0.0)	–			
I prefer other sources for this information.	6	(254.2)	9	(8.8)	3	(3.7)	–			
The online APF not user friendly	1	(42.4)	0	(0.0)	0	(0.0)	–			
The APF hard copy not user friendly	1	(42.4)	3	(2.9)	0	(0.0)	–			
Other ⁴	4	(169.5)	0	(0.0)	0	(0.0)	–			

n = total responses for that answer, *N* = total responses for that question and population, % = $n/N \times 100$.

– Indicates that we did not test significance due to there being few respondents in each group.

¹Indicates only one response could be selected.

²Indicates a multiple answer question, percentages will not add up to 100.

³Indicates an exclusive answer, that is, the participant could not select any other response if that answer was selected.

⁴Indicates text response was allowed.

Limited existing work has explored the use and perceptions of reference texts at different stages of the pharmacy career. However, some work has explored the use of references for drug information. A survey of English community pharmacists revealed that more than half could not answer all enquiries within the last month using just the reference texts available in their pharmacy, although all had access to both the British National Formulary and the Martindale, which are similar to the reference text in this study.^[2] One mixed methods study

described how healthcare professionals accessed a drug information website that participants reported was a valuable resource for educational and clinical use.^[1] Of students who responded, 89% reported daily website use and retrieved the information they sought.^[1] Another study found that most (89%) of community pharmacists reported accessing a national formulary equivalent to the one assessed in our study, whereas only 18% referred to original literature for their drug information.^[14] While the scope of these studies

Table 4 Participant suggestions for improvement to APF

Themes	Example descriptive quote
Enabling access	'Better online access with a search function'
More specific information/decision support tools	'Online subscription when a hard copy is purchased'
Cost	'Access via an app'
Awareness	'More information on when medicines can be crushed, vaccination and DAA packing'
	'Section on validated tools to support practice eg Mrs Grace'
	'More complementary medicines summaries'
	'Reduce price to make it more accessible'
	'More frequent updates'
	'Make it easier to access. I wasn't aware'
	'Greater awareness of what is in the resource'
	'Consult with the pharmacy profession about proposed changes that affect everyone'

differs to the study reported here, they identified similarities to our results, highlighting a preference for tertiary information sources that are easy to access.

Participant suggestions for improvements to the APF included recommendations to include decision support aids, and naming specific tools for medicines use for older people. This finding was consistent with other work recently undertaken that found Australian pharmacists are increasingly utilising such tools in their practice.^[15] Incorporating these validated tools and mnemonics into the APF could support its application as a learning and teaching aid, particularly as previous work has identified these resources are useful teaching aids.^[16] This suggested integration of validated tools into the APF or other similar texts could facilitate access and uptake of these to support evidence-based practice [e.g. deprescribing algorithm, medication appropriateness tool for comorbid health conditions during dementia and clinical mnemonics (e.g. ERASE, BEGIN, CEASE and Mrs Grace)].^[17–21]

Policy, practice and research implications

Future work could investigate enablers and barriers to the use of reference texts. It could also be ascertained if similar usage patterns are reported with other reference texts or guidance documents. Understanding the behaviour of reference text use of pharmacy intern pharmacists and students compared to pharmacists would interest those looking to influence the use of guidelines and use of evidence-based information in practice in the future. This information would allow publishers and regulators to further consider the relevance of content to contemporary pharmacy practice and ensure their own guidelines on the use of reference text are informed and up to date.

Conclusions

It appears the APF is applied as a tool for teaching and learning. We found that the use of the APF varied significantly among career stages, with intern pharmacists and students reporting using the text for content familiarisation and knowledge acquisition, while registered pharmacists used it while providing a service or patient care and as a teaching resource. While the results were unsurprising, they contribute to a broader understanding of the use of the APF and other reference texts, and may assist in developing interventions to optimise the content and usability of these resources. Varying usage patterns across the groups may inform the tailoring of the APF for future use.

Supplementary Material

Supplementary data are available at *International journal of Pharmacy Practice* online.

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Conflict of Interest

D.M. was appointed as a Board Director for the Pharmaceutical Society of Australia at the time of writing the manuscript.

Data availability

The data collected and analysed in this research study are available from the corresponding author upon reasonable request.

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