Primary care pharmacists' knowledge and their perception of primary healthcare professionals' role in managing inflammatory bowel disease: a cross-sectional study in Australia

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Abstract

Purpose: Inflammatory bowel disease (IBD) management is complex and challenging, requiring a multidisciplinary approach. While pharmacists may play a key role as the first point of contact for patients with initial symptoms or disease relapse, there is scant literature on pharmacists' knowledge in IBD management. We conducted a survey exploring pharmacists' knowledge, potential educational needs and their perception of pharmacists and other healthcare professionals' roles in managing patients with IBD.

Design and Methodology: An online survey was distributed to pharmacists through professional organisations. The survey included questions about demographic information, concepts related to IBD management, and the roles of pharmacists and healthcare professionals in managing patients with IBD.

Findings: Fifty-two respondents completed the survey (response rate could not be determined). The overall knowledge score for the majority of respondents was categorised as 'low' to 'average'. Pharmacists demonstrated the highest level of accuracy in their knowledge scores regarding their understanding of the role and importance of vaccination in IBD (94.2%; n = 49). Pharmacists who had exposure to patients with IBD demonstrated better knowledge scores than those without exposure to IBD patients in their practice (p = 0.005). Further, general practitioners (GPs) were perceived as the key care providers to IBD patients, while pharmacists considered themselves as equally important in providing medication-related information to patients.

Conclusion: This study indicated that pharmacists' knowledge of IBD and its management was suboptimal; however, with education and training, there are opportunities for pharmacists to play a more active role in managing patients with IBD.

Keywords: inflammatory bowel disease (IBD), pharmacist, healthcare professionals, knowledge, perception

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INTRODUCTION

Inflammatory bowel disease (IBD) is a chronic disease affecting the gastrointestinal tract. It usually presents as one of two common forms: ulcerative colitis and Crohn's disease (Gastroenterological Society of Australia 2018; Karimi et al. 2020). Symptoms include chronic abdominal pain, diarrhoea, anaemia, loss of appetite, fatigue, weight loss and extraintestinal complications. IBD is also characterised by cycles of remission and relapse (Gastroenterological Society of Australia 2018; PricewaterhouseCoopers Australia 2013). There is a poor quality of life with a mental health burden affecting patients' personal, social and professional life (Mikocka-Walus et al. 2020). Inflammatory bowel disease is most common among those aged between 15 and 40 years. Although mortality rates are considered low, IBD is incurable and lifelong, further contributing to the economic burden of the disease (Gastroenterological Society of Australia 2018; Karimi et al. 2020).

In developed nations, IBD has a disproportionately high economic burden. For example, in Australia, IBD is responsible for an estimated annual cost of approximately AU$2.7 billion, with hospital costs nationally in excess of AU$100 million (Deloitte Access Economics Pty Limited 2007; PricewaterhouseCoopers Australia 2013). Optimal management of patients with IBD requires prevention of disease relapse, maintenance of remission and avoidance of adverse effects along with better quality of life (Georgy, Negm & El-Matary 2019; Massuger et al. 2019). Medication management is the keystone for treating patients with IBD (Gastroenterological Society of Australia 2018; Georgy, Negm & El-Matary 2019). The treatment of IBD has advanced in recent years, making medical therapy more effective; however, it has also become more complex with the use of corticosteroids, immunosuppressants and biological therapies that have risk-benefit profiles that require careful monitoring (Blackburn et al. 2019; Zezos & Panisko 2018).

In a recent systematic review, the authors highlighted the potential opportunities in the management of IBD through proven pharmacist interventions in other chronic diseases, leading to improved patient outcomes, including quality of life, disease management and self-management (Prasad, Duncanson et al. 2020). Understanding such factors will likely lead to better IBD management that maximises therapeutic efficacy and minimises the potential for adverse effects (Massuger et al. 2019). Pharmacists often act as intermediaries between doctors and patients by providing easily accessible clinical advice and medicines without needing a pre-booked appointment (International Pharmaceutical Federation 2019; Manolakis & Skelton 2010). They are generally the initial source of contact for patients with minor gastrointestinal ailments because of the over-the-counter (OTC) medications that can play a critical role in their care (Blackburn et al. 2019). Therefore, engagement of pharmacists provides an opportunity for improving clinical outcomes in a primary care setting (Blackburn et al. 2019; Manolakis & Skelton 2010).

Factors such as gender, pharmacist's age group and familiarity with IBD patients are important in understanding the association on knowledge and perception among healthcare professionals (Carvajal et al. 2013; Janzen et al. 2013). While there is published literature available on knowledge, attitudes and perceptions of healthcare professionals with regards to IBD, the focus is mainly on secondary or tertiary care with a small proportion addressing primary care relating to general practitioners (GPs) (Bennett, Munkholm & Andrews 2015; Crohn's & Colitis Australia 2017; Mikocka-Walus et al. 2014; Tan et al. 2012). No published literature has assessed pharmacists' knowledge and perception of IBD management. A recent study evaluated pharmacists' confidence levels in the care and management of IBD and reported that pharmacists lacked sufficient confidence in managing IBD (Prasad, Keely et al. 2020). To address

this gap, this study's primary aim was to ascertain pharmacists' existing knowledge and educational needs for managing IBD in the primary care setting. A second aim was to explore factors influencing perception(s) of pharmacists as healthcare professionals managing patients with IBD.

METHODS

STUDY PARTICIPANTS

Inclusion criteria for the study were: 1) pharmacists who had completed either a Bachelor or a Master of Pharmacy, 2) registered with the Australia Health Practitioner Regulation Agency (Ahpra), 3) were working in a primary care setting (i.e., a community pharmacy/general practice/clinic and/or accredited to conduct medication reviews) (The Department of Health 2013). Registered pharmacists work in various practice settings and must complete a minimum of 150 hours per year working within a primary or secondary care setting to maintain their registration as a practising pharmacist (Pharmaceutical Society of Australia 2019; Pharmacy Board of Australia AHPRA 2020). The survey was open from August 2019 to April 2020 (terminated due to COVID-19), during which there were approximately 31,503 pharmacists registered in Australia (Pharmacy Board of Australia AHPRA 2020). The data on the number of registered pharmacists working in a primary care setting was not available at the time of the study. Therefore, the sample size required was calculated using a confidence interval for a single proportion, factoring in an anticipated response rate of 15–30% (Charan & Biswas 2013; Phillips et al. 2017). The minimum required sample size was estimated at 49–80 pharmacists with a confidence level of 95% and a 5% margin of error. A response rate could not be calculated due to the lack of available data to determine the exact number of registered pharmacists working in a primary care setting at the time of the study.

Convenience sampling of pharmacists in the Hunter region was the primary recruitment strategy. This was supplemented by snowballing, where participants (pharmacists) who were already enrolled helped promote the study by informing friends and colleagues about the research and directing interested individuals to the researchers. In addition, pharmacists were recruited indirectly through professional organisations (i.e., the Pharmaceutical Society of Australia, Newcastle, the Hunter Valley Pharmacists Association, the Pharmacy Guild of Australia and the Australian Association of Consultant Pharmacy across the broader profession within Australia). The survey could only be accessed and completed via the link provided in the participant invitation information. Completion of the survey by pharmacists were deemed as consent for the study, specified in the participant information sheet included at the start of the survey.

STUDY DESIGN

This exploratory cross-sectional survey study used a questionnaire that was developed from a review of the literature and of systematic reviews relating to pharmacists' role in chronic disease and the management of IBD (Prasad, Duncanson et al. 2020; Prasad, Keely et al. 2020; Prasad, Potter et al. 2020). The questionnaire was piloted for content and faced validity among a sample of 10 healthcare professionals (two gastroenterologists, six pharmacists, one GP and a research physician in the field of IBD). Based on the results of the pilot, the final questionnaire was uploaded to Research Electronic Data Capture (REDCap), a secure web application designed for clinical and translational survey research.

The questionnaire was anonymous, self-administered, delivered electronically and consisted of three domains that took approximately 20 minutes to complete. It included demographic information (e.g., age, gender, previous practice, current practice including a secondary role, qualifications), questions seeking to elicit pharmacists' level of knowledge (20 questions about general concepts related to IBD and specific concepts of IBD management) and perceptions regarding the management of IBD (pharmacists' perception of themselves and of other healthcare professionals).

Pharmacists were assessed for their knowledge about concepts of IBD that ranged from general concepts (i.e., prevalence, age of diagnosis, causes of IBD, inflammation associated with IBD, symptoms and food triggers) to more advanced IBD management concepts (i.e., complications associated with IBD, impact of smoking in IBD, medication usage in IBD that related to contradiction, opioid use, pregnancy, biologics, immunosuppressive agents and types of vaccination in IBD). Individual scores for the participants' level of knowledge were expressed as an average percentage of the maximum possible score (100%). The overall knowledge score was categorised as: 0% deemed not knowledgeable, <25% very low knowledge, 25–50% low knowledge, 51–75% average knowledge and >75% adequate knowledge.

To determine pharmacists' perceived level of confidence relating to IBD, respondents were asked to complete a pre- and post-self-evaluation of five components related to IBD management included in the knowledge domain of the questionnaire. This self-evaluation is based on experiential learning, a holistic educational philosophy by David Kobased on the individual's experiences influencing their education, learning and understanding of new knowledge (Chamane, Kuupiel & Mashamba-Thompson 2019). Questions were largely formatted as binary (yes/no), multiple choice, 5-point Likert scale responses, ranking and open-ended text. The questionnaire is available on request from the authors. A current practice setting was recorded to differentiate between the principal role (where the pharmacist spent most of their working week) and the secondary role, as some pharmacists are employed at more than one site or in more than one sector. For rigour, strengthening the reporting of observational studies in epidemiology (STROBE) statement was used (von Elm et al. 2007).

STATISTICAL ANALYSIS

Descriptive data were analysed using median with an interquartile range and frequency (%) to describe the demographics of the participants and knowledge concepts in IBD. Free text responses were categorised into correct or incorrect responses to be included in the analysis. Descriptive statistics and non-parametric tests (Mann Whitney U Test/Wilcoxon Rank Sum Test and Kruskal-Wallis) were used to explore difference in scores of pharmacists' perception of their role managing IBD before and after completing the knowledge section. The overall knowledge scores were analysed using frequencies (%). Possible relationships between pharmacists' knowledge of IBD and demographic characteristics were evaluated with Mann-Whitney-Wilcoxon test for two groups and Kruskal-Wallis test for more than two groups. Statistically significant differences were declared at a p-value of less than 0.05. Analysis of the data was performed using Stata version 14 statistical software (StataCorp. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP. 2015).

RESULTS

PARTICIPANT INFORMATION

A total of 52 responses were received between August 2019 and April 2020. The demographic information of respondents is shown in Table 1. The majority of respondents were aged 25–44 years (65.4%, n = 34), and more than half were female (n = 32, 61.5%). Approximately 71% of respondents had completed a Bachelor's qualification, and 32.7% (n = 17) had additional postgraduate qualifications. Regarding the years of experience, having more than 10 years of experience was most common (n = 23, 44%). Hours of work had a similar distribution in all three groups.

Table 1: Background characteristics of the study participants (n=52)

Variables	Frequency (n)	Percent (%)
Age groups (years)		
18–24	6	11.5
25–34	17	32.7
35–44	17	32.7
45+	12	23.1
Gender		
Male	20	38.5
Female	32	61.5
Qualification		
Bachelor of Pharmacy	37	71.1
Master of Pharmacy	15	28.9
Attended postgraduate		
Yes	17	32.7
No	35	67.3
Length of experience (years)		
≤5	15	28.9

Variables	Frequency (n)	Percent (%)
6–10	14	26.9
10+	23	44.2
Length of working hours per week (hours)		
≤29	18	34.6
30–39	17	32.7
40+	17	32.7

There was a variety of reported practice settings. In their principal role, 64% (n = 32) of respondents were employed in a community pharmacy setting, 22.7% (n = 5) in a hospital pharmacy setting, 8.7% (n = 2) in academia, 8.3% (n = 2) as consultant pharmacists, 5% (n = 1) in industry pharmacy and 0% (n = 0) in a general practice setting (Figure 1). As a secondary role, 30% (n = 15) worked in a community pharmacy setting, 20.9% (n = 5) as consultant pharmacists, 17.3% (n = 4) in academia, 13.5% (n = 3) in a hospital pharmacy setting, 4.8% (n = 1) in a general practice setting and 0% (n = 0) in industry pharmacy.

Figure 1. Proportion of time spent in various workplace settings of pharmacists who completed the survey on inflammatory bowel disease (IBD) perceptions and knowledge.
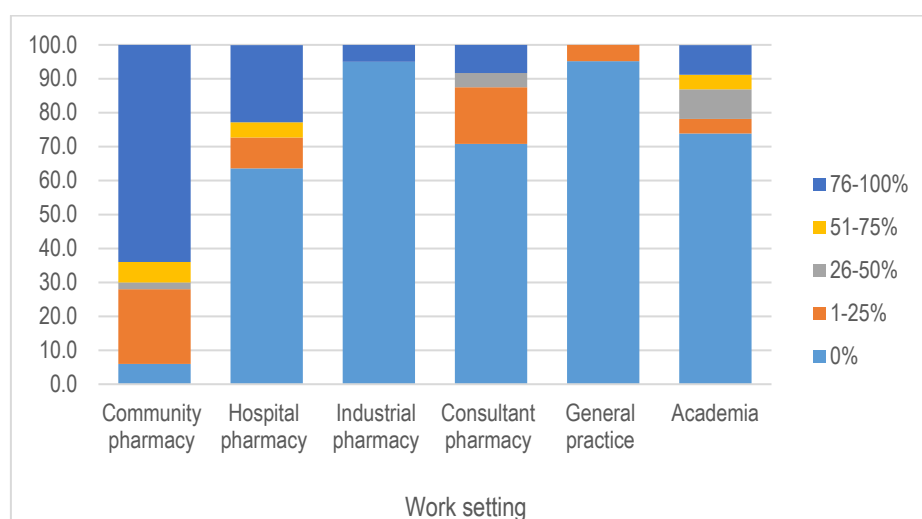
PHARMACISTS' LEVEL OF IBD KNOWLEDGE

Variables such as age, gender, educational levels, length of experience and exposure to patients with IBD were analysed to determine their association with pharmacists' knowledge. Pharmacists had low (median score range: 26–50) to average (median

score range: 51–75) levels of knowledge (Table 2). A statistically significant difference in the overall knowledge score was observed based on the pharmacists' exposure to patients with IBD (p = 0.005) in their practice, with no other statistically significant associations identified (Table 2).

Table 2. The association between background characteristics and pharmacists' knowledge of IBD (*n*=52)

Variables	Overall knowledge score* Median (IQR)	P-value
Age group (years)		
18–24	50.6 (38.1, 52.4)	0.05
25–34	63.1 (58.3, 72.6)	
35–44	70.2 (53.6, 78.6)	
45+	63.1 (51.2, 75.6)	
Gender*		
Male	58.3 (49.4, 73.2)	0.37
Female	63 (53.6, 77.4)	
Qualification*		
Bachelor of Pharmacy	63.1 (42.8, 77.3)	0.86
Master of Pharmacy	63.1 (52.4, 72.6)	
Attended postgraduate*		
Yes	67.8 (54.7, 73.8)	0.31
No	59.5 (48.8, 78.6)	
Length of experience (years)		
≤5	59.5 (47.6, 72.6)	0.48
6–10	63.1 (57.1, 78.6)	
11+	70.2 (53.6, 77.4)	

Variables	Overall knowledge score* Median (IQR)	P-value
Length of working hours per week (hours)**		
≤29	64.9 (50.0, 82.1)	0.62
30–39	63.1 (54.8, 77.4)	
40+	59.5 (52.4, 71.4)	
Exposure to IBD patients***		
Yes	64.3 (53.6, 77.4)	0.005
No	36.9 (25, 42.8)	

Medians with an interquartile range were used to present the overall knowledge score by pharmacists' characteristics. Comparison between categorical variables were made by using the Kruskal-Wallis Test (**) or the Mann-Whitney-Wilcoxon Test (***); IBD = Inflammatory Bowel Disease.

Pharmacists who had exposure to IBD patients in their practice scored higher for IBD knowledge (overall score median 64.3) than those without any exposure or experience with IBD patients (overall score median 36.9). There was a statistically significant trend associated with knowledge and the pharmacists' age (p = 0.05). Those aged 35–44 years had higher overall scores for knowledge of IBD compared to other age groups (18–24 years, 25–34 years and 45+ years).

Of the 20 knowledge questions, 11 questions (55%) were answered correctly, and one question reported equal responses (n = 26; 50%) of correct and incorrect by the respondents (Table 3).

Table 3. Participants' responses to the knowledge questions of the survey (n=52)

Topic concepts in IBD	Correct (percentage)
Cause(s) of IBD*	48 (92.3%)
Source of inflammation in IBD	43 (82.7%)
Possibility of a cure in IBD	38 (73.1%)
GI complications	38 (73.1%)
Associated risk of smoking in IBD	18 (34.6%)

Topic concepts in IBD	Correct (percentage)
Food triggers associated with IBD	47 (90.4%)
IBD prevalence	18 (34.6%)
Age of diagnosis in IBD	48 (92.3%)
IBD symptoms	47 (90.4%)
Issues related to extraintestinal complications	18 (34.6%)
OTC medication use related to toxic megacolon	19 (36.5%)
Use of immunosuppressive medications	39 (75.0%)
Contraindicated medications in IBD	21 (40.4%)
Importance of iron supplementation	26 (50.0%)
Drugs in pregnancy**	44 (84.6%)
Opioid use in IBD	43 (82.7%)
Role of biologics in therapy	20 (38.5%)
Colon cancer screening	8 (15.4%)
Vitamin deficiencies	23 (44.2%)
Importance of vaccinations in IBD	49 (94.2%)

*Frequency (%) was used to present the level of knowledge of pharmacists; responses were scored as correctly answered = 100% and incorrectly answered = 0%. * Responses were categorised as: 4 correct = 100%, 3 correct = 75%, 2 correct = 50%, 1 correct = 25% and incorrect = 0%. ** Responses were categorised as: 8 correct answers = 100%, 5–7 correct = 75%, 4 correct = 50%, 1–3 correct = 25% and incorrect = 0%; IBD = inflammatory bowel disease; GI = gastrointestinal; OTC = over-the-counter.*

The overall knowledge score for the respondents showed that one pharmacist (1.9%) was categorised as has having very low knowledge (score 1–25%); 21 pharmacists (40.4%) were categorised equally as having low (score 26–50%) and average knowledge (score 51–75%); and nine pharmacists (17.3%) were deemed as having adequate knowledge (score >75%). Inflammatory bowel disease concepts that showed the highest level of pharmacists' knowledge included importance of vaccinations in IBD (n = 49; 94.2% correct responses), cause of IBD and age of diagnosis (n = 48; 92.3% correct responses), food triggers and IBD symptoms (n = 47; 90.4%

correct responses), drugs in pregnancy (n = 44; 84.6% correct responses) and source of inflammation and opioid use (n = 43; 82.7% correct responses). Concepts where pharmacists had lower knowledge included colon cancer screenings (n = 8; 15.4% correct responses), risks associated with smoking, prevalence and extraintestinal complications in IBD (n = 18; 34.6% correct responses), OTC medicines associated with toxic megacolon (n = 19; 36.5% correct responses) and place in therapy for biologics (n = 20; 38.5% correct responses).

PHARMACISTS' IBD KNOWLEDGE: PERCEPTIONS AND SELF-REFLECTIONS

A pre- and post-evaluation of changes in perceptions and the related association with demographics was undertaken. Overall, the median sum score for each of the five components showed that pharmacists perceived themselves to be better in four out of the five components (understanding IBD, providing information, providing additional support and addressing patient needs) before taking the knowledge section of the questionnaire when compared to the median sum score of their perception after the knowledge section. As shown in Table 4, educational level (initial or postgraduate qualifications), length of experience and length of working hours per week were not significantly associated with any change in pharmacists' perception regarding their current knowledge. However, there were statistically significant associations between change in pharmacists' perception and age, gender and exposure to patients with IBD (all $p<0.05$). Pharmacists aged 35–44 years, females and those who had experience with IBD patients perceived themselves as having better knowledge (higher mean scores) prior to completion of the knowledge section when compared to their scores (lower mean scores) after completing the knowledge section.

Table 4. The association between background characteristics and change in pharmacists' perception pre- and post-completion of knowledge section (n=52)

Variables	Overall perception pre-completion of the knowledge section*	Overall perception post-completion of the knowledge section*	P-value
Age group (years)**			
18–24	50 (50, 50)	50 (50, 75)	0.054
25–34	50 (50, 75)	50 (50, 75)	
35–44	75 (75, 75)	50 (50, 75)	
45+	50 (50, 62.5)	50 (50, 75)	
Gender***			

Variables	Overall perception pre-completion of the knowledge section*	Overall perception post-completion of the knowledge section*	P-value
Male	50 (50, 75)	62.5 (50, 75)	0.008
Female	75 (50, 75)	50 (50, 75)	
Qualification*			
Bachelor of Pharmacy	50 (50,75)	50 (50, 75)	0.84
Master of Pharmacy	75 (50,75)	50 (50, 75)	
Attended postgraduate*			
Yes	50 (50, 75)	50 (50, 50)	0.27
No	75 (50, 75)	50 (50, 75)	
Length of experience (years)			
≤5	50 (50, 75)	50 (50, 75)	0.19
6–10	62.5 (50, 75)	50 (50, 75)	
11+	75 (50, 75)	50 (50, 75)	
Length of working hours per week (hours)			
≤29	75 (50, 75)	50 (50, 75)	0.09
30–39	50 (50, 75)	50 (50, 75)	
40+	50 (50, 75)	50 (50, 75)	
Exposure to IBD patients*			
Yes	75 (50, 75)	50 (50, 75)	0.044
No	25 (0, 50)	50 (25, 50)	

Medians with an interquartile range were used to present the overall knowledge score by pharmacists' characteristics. Comparisons between categorical variables were made using Kruskal-Wallis Test (**) or Mann-Whitney-Wilcoxon Test (***); IBD = inflammatory bowel disease.

PHARMACISTS' PERCEPTIONS ON THE ROLE OF HEALTHCARE PROFESSIONALS MANAGING IBD

The section of the questionnaire that related to pharmacists' perceptions on the roles of healthcare professionals in primary care assessed which healthcare professional they thought patients would consult on key aspects of managing IBD; namely, information on IBD management, information on medication use, additional information on IBD and uncontrolled symptoms associated with IBD (Table 5).

Table 5. Pharmacists' responses regarding the healthcare professional best-suited for managing patients with IBD (n = 52)

Variable	Frequency (%)
To whom would the patient go for information about managing their IBD?	
General practitioner	39 (75.0)
Nursing support	1 (1.9)
Dietitian	10 (19.2)
Pharmacist	2 (3.9)
To whom would the patient go to for information about medications for their IBD?	
General practitioner	4 (7.7)
Dietitian	1 (1.9)
Pharmacist	47 (90.4)
To whom would the patient go to for additional/supportive information about their IBD?	
General practitioner	14 (26.9)
Nursing support	8 (15.5)
Dietitian	11 (21.1)
Pharmacist	17 (32.7)
Psychologist	2 (3.8)
Who would the patient see when their IBD symptoms are not well controlled?	

Variable	Frequency (%)
General practitioner	47 (90.4)
Nursing support	1 (1.9)
Dietitian	3 (5.8)
Pharmacist	1 (1.92)

IBD = Inflammatory Bowel Disease.

Pharmacists perceived GPs as the most important and psychologists as the least important healthcare professionals in managing patients with IBD. For providing information to patients about managing their IBD, GPs were considered to be the most important (75%), followed by dietitians (19.2%), pharmacists (3.9%), nursing support (1.9%) and then psychologists (0%). Pharmacists were considered most important (90.4%) for patients seeking medication information. When providing additional or supportive information, all five healthcare professionals were perceived to have some importance (32.7% for pharmacists, 26.0% for GPs, 21.1% for dietitians, 15.5% for nursing support and 3.8% for psychologists). For uncontrolled symptoms of IBD, GPs were the most important healthcare professional group (90.4%), and psychologists (0%) were the least important. Overall, pharmacists ranked GPs as the most important healthcare professional in managing patients with IBD, followed by pharmacists, dietitians, nursing support and psychologists (Figure 2).

Figure 2. Ranking of pharmacists' perception on the healthcare professional best-suited in managing patients with IBD.
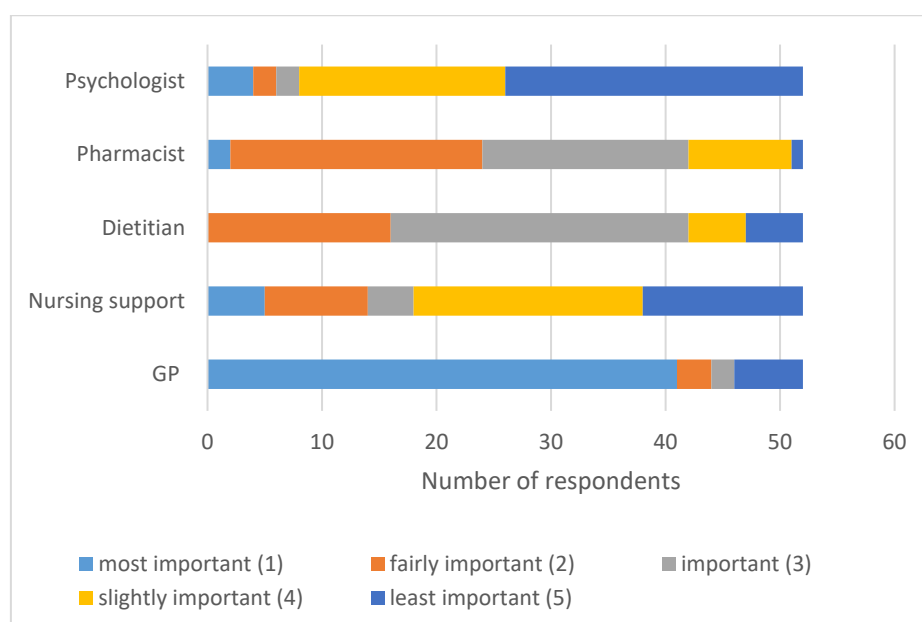
DISCUSSION

To the best of our knowledge, this is the first survey of pharmacists' knowledge and perceptions of IBD management to be performed in Australia. It contributes to filling a gap in the literature by exploring pharmacists' role in managing IBD in a primary care setting. As IBD is a chronic disease associated with high levels of morbidity and mortality, ongoing long-term management is essential (Andrews et al. 2010). Therefore, pharmacists are responsible for taking a prominent and proactive role in caring for patients with IBD (Prasad, Duncanson et al. 2020). An adequate level of knowledge can help pharmacists to understand the needs of patients with IBD and be able to address them (Blackburn et al. 2019; Zezos & Panisko 2018), such as regular monitoring for adverse effects, management of complex medication regimens, ensuring appropriate use of medications and lifestyle education and support (Massuger et al. 2019; Strohl et al. 2018).

Our findings suggest that pharmacists had a low to moderate knowledge about managing patients with IBD. Pharmacists demonstrated a high knowledge of general concepts of IBD, but lower knowledge related to specific, advanced IBD management concepts. The latter included low knowledge in colon cancer screening, associated risk with smoking in IBD, the prevalence of IBD, extraintestinal complications associated with IBD and vitamin deficiencies. In addition, pharmacists also demonstrated a low level of knowledge about medication-related aspects of care, such as OTC medication use leading to toxic megacolon and place in therapy of biologics when treating IBD patients. This suggests that pharmacists' base their level of understanding of IBD management as limited and highlights a gap in knowledge where more comprehensive education is required (Prasad, Keely et al. 2020). While knowledge can indeed be improved through educational sessions, there are still potential barriers (such as limited available time, and access to resources and guidelines), that require consideration for applicability in practice (Blackburn et al. 2019; Tan et al. 2012; Zezos & Panisko 2018).

Compared with the national data, the distribution of gender and registration by age group for pharmacists in Australia are consistent with the statistics provided by the Pharmacy Board for the period ending June 2020. There were more female pharmacists compared to males and relatively a similar proportion of pharmacists among all age groups except those aged ≤24 years. The findings also indicate that pharmacists perceived themselves as having better knowledge about IBD prior to completing the knowledge section of the survey. As demonstrated by Carvajal and colleagues, in a sample of 1,000 pharmacists, the authors reported that gender and age group classification influenced patterns of knowledge and how pharmacists applied that knowledge in practice, such as the utilisation of drug information resources (Carvajal et al. 2013). While there is sufficient evidence in literature relating to professional education associated with improved quality in healthcare, many only focus on the educational approach and content (Love, Messman & Merritt 2019; The Health Foundation UK 2012). There is a lack of evidence assessing the effectiveness of such educational interventions regarding the impact of such education on patient health outcomes or the long-term outcomes for patients and healthcare professionals (The Health Foundation UK 2012).

Active learning strategies, such as experiential learning where experiences and observations are conceptualised into practice, have shown to be more effective as they allow for hands-on practice and reflection (Chamane, Kuupiel & Mashamba-Thompson 2019; Lavallee et al. 2021; The Health Foundation UK 2012). Pharmacists are responsible for their own self-directed learning and maintaining continuing professional development as part of their professional practice. In a more recent

study, Prasad, Keely et al. (2020) reported the confidence level of pharmacists before and after an educational session on IBD and found that while pharmacists were not confident managing patients with IBD, they expressed their willingness to learn more about the disease. These results support the findings of the current study and highlight that pharmacists' knowledge of IBD is suboptimal, therefore suggesting that there is a need to acquire and/or update IBD-specific knowledge through continued education to improve knowledge or enhance experience and management skills (Mikocka-Walus et al. 2014; Tan et al. 2012).

The deficit in their knowledge can be understood through the concept of 'you don't know what you don't know', which is an important consideration in the context of any pre-/post-evaluation, and the application is relevant to a range of diseases (McGregor 2004). For instance, the recent issue surrounding the current COVID-19 pandemic, where little was known and still unknown regarding managing the virus. To better our understanding, more research and self-directed learning are needed to equip all healthcare professionals supporting the community and the healthcare system. In managing IBD, it is only through an accurate self-assessment that pharmacists can identify and explore areas in which they require additional learning. This difference between their perceptions of what they know and the level of their IBD knowledge could be due to a degree of overconfidence (Karpen 2018; Kovacs, Lagarde & Cairns 2020), limited experience with IBD patients or misconception of IBD management (Prasad, Keely et al. 2020; Tan et al. 2012). In addition, it is notable that the study also demonstrated a statistically significant difference in knowledge scores between pharmacists with exposure to IBD patients and those without. This suggests that pharmacists require adequate exposure and familiarity with IBD in their day-to-day practice to establish or enhance and maintain a strong core knowledge and skills related to IBD management (Mikocka-Walus et al. 2014; Tan et al. 2012). This is not surprising, as evidence literature acknowledges that educational interventions alone are not likely to generate improved quality of care in practice (The Health Foundation UK 2012). Therefore, it is more likely that regular interactions with people living with IBD would drive self-directed learning among pharmacists, contributing to their professional development and practices. Due to a relatively smaller prevalence of 0.4% for IBD (Deloitte Access Economics Pty Limited 2007; PricewaterhouseCoopers Australia 2013) when compared to other chronic diseases such asthma and diabetes (Australian Bureau of Statistics 2018; Australian Institute of Health and Welfare 2018), pharmacists may provide advice to only a few IBD patients as part of their everyday practice. This may reduce the clinical exposure necessary for adequate knowledge and experience that is essential for optimal IBD management (Tan et al. 2012).

Our study also explored pharmasists' perceptions of the role of healthcare professionals in primary care managing patients with IBD. Our findings indicate that pharmacists consider GPs the key care provider for patients with IBD in primary care. This supports current literature that suggests that in Australia, most of out-of-hospital care for IBD patients is delivered by GPs (Crohn's & Colitis Australia 2017; Louis et al. 2015). However, pharmacists perceived themselves as the key healthcare professionals when providing information about medications to IBD patients. This is highlighted extensively in published literature and supports the role of pharmacists within a multidisciplinary care providing tailored information to patients in chronic disease management (George et al. 2010; International Pharmaceutical Federation 2019; Pharmaceutical Society of Australia 2019). While dietitians and nursing support were considered to have a role in managing patients, pharmacists perceived psychologists as having no role in the management of IBD. This discovery was notable, given the high burden of mental illness in IBD patients (Mikocka-Walus et al. 2020). While it would be noteworthy to explore why psychologists were considered least

important by pharmacists, this was not possible within the scope of the study. As outlined in the current Australian IBD Standards, an ideal IBD team should involve gastroenterologists, surgeons, nurses, dietitians, psychologists, pathologists, radiologists and pharmacists (Crohn's & Colitis Australia 2016); however, GPs were not considered an equally integral part of an ideal team (Crohn's & Colitis Australia 2016; Prasad, Potter et al. 2020).

Multidisciplinary care is considered essential to IBD management but is rarely implemented in practice (Koltun 2017; Lee & Melmed 2017; Ricci, Lanzarotto & Lanzini 2008). The need for healthcare professionals managing patients with IBD extends beyond the initial diagnosis stage to a lifelong requirement (Louis et al. 2015). The addition of new therapies, the approach of treat-to-target (shift from symptom control to mucosal healing) and a change to a more patient-centred approach has all led to a more challenging and involved role for healthcare professionals in the management of IBD (Colombel et al. 2020). Pharmacists are trained and qualified to provide the required care around medication management in a primary care setting (International Pharmaceutical Federation 2019; Pharmaceutical Society of Australia 2019) and have clearly demonstrated their ability in other chronic diseases such as asthma and diabetes (Prasad, Duncanson et al. 2020). In IBD, pharmacists have the opportunity to acquire additional clinical skills and apply their knowledge and expertise through primary care services to their patients in collaboration with GPs and other healthcare professionals such as gastroenterologists and IBD nurses (Massuger et al. 2019; PricewaterhouseCoopers Australia 2013).

This exploratory study provides valuable insights into factors that contribute to the varying degree of knowledge among pharmacists working in a primary care setting. The study was limited by a relatively small sample size, cross-sectional design and online delivery method of the survey. Firstly, data to calculate the number of registered pharmacists working in a primary care setting was not available at the time of the study. Despite efforts to collect data about a participant's principal place of practice by postcode, and because pharmacists may be employed in more than one location, the information collected by the Australian Health Practitioner Regulation Agency (Ahpra) was insufficient for the needs of this study. Secondly, due to the anonymity of the survey, it was not possible to identify the number of pharmacists who chose not to complete the survey and determination of a response rate was not possible. Thirdly, the online delivery may suggest that those who prefer electronic methods may be more receptive to participating. Another limitation could be related to pharmacists' interest in the survey research topic. As IBD can be considered a silent disease of small prevalence in comparison to other chronic diseases, pharmacists may not have enough patients with IBD to warrant awareness or understanding of IBD management. Based on the leverage salience theory, the survey topic is one of the most important factors that influence response rates (Groves, Singer & Corning 2000). In addition, incentives have been used in some studies to motivate survey participation in forms of monetary compensation (such as gift cards) and can be considered a constraint of this study, as we did not offer any incentives. For this study, we only included pharmacists who were working in a primary care setting; therefore, the sample is unrepresentative of all Australian pharmacists. Further, the global COVID-19 pandemic may have added to the increased workload limiting available time for pharmacists to participate in the survey, nor could we plan for alternative recruitment strategies. Given all these possible limitations, the sample size limits inferences associated with the study outcomes, with likely Type II errors. Like any survey design, there is possible participation and self-reporting bias. As this was an Australian study, it limits the generalisability of results to other countries regarding IBD knowledge.

CONCLUSION

Despite the incidence and prevalence of IBD increasing globally, there are few studies evaluating knowledge and perceptions of healthcare professionals, especially pharmacists in primary care. Such studies are important to allow for the adoption of proactive approaches that can deliver appropriate and evidence-based care to people living with IBD. This study indicates that the limited exposure to patients with IBD is directly associated with pharmacists' suboptimal knowledge managing IBD. As healthcare professionals, pharmacists have a responsibility to update and increase their knowledge of IBD. The ideal positioning of primary care pharmacists to support people with IBD could be capitalised on with access to a comprehensive educational response such as a specialty training pathway. Educational interventions to improve understanding of treatment options and the availability of accessible resources suited to primary care management of IBD are potential opportunities for targeting this knowledge gap. With high practical and translational implications, future research could focus on whether educational interventions can improve and/or maintain pharmacists' knowledge and perception in managing IBD.

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Conflict of interest
The authors declare that there is no conflict of interest.

Abbreviations
IBD = Inflammatory bowel disease; GP(s) = General practitioners; OTC = Over-the-counter.

Ethical Statement
The Research Ethics Committee approved the study protocolee at Hunter New England Health [2019/ETH00167] and the University of Newcastle Human Research Ethics Committee (HREC) [H-2019-0201].

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