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Qualitative analysis of community pharmacists' opinions on their involvement in reducing potentially inappropriate prescribing

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1 **Abstract**

2 **Purpose**

3 Older people are at risk of potentially inappropriate prescribing (PIP) due to polypharmacy arising from
4 multimorbidity. Despite available explicit criteria to reduce PIP, it is highly prevalent. While commu-
5 nity pharmacists have the required knowledge to help reduce PIP, they are not currently engaged with
6 the problem. This study explores the views of community pharmacists on their potential involvement
7 in reducing PIP and determines the challenges to its implementation.

8
9 **Methods**

10 Semi-structured interviews with pharmacists working in community pharmacies in Ireland. The Theo-
11 retical Domains Framework (TDF) was used to develop the topic guide and to analyse the transcripts.
12 Domains of highest relevance for PIP reduction were identified based on their frequency or whether the
13 participants emphasised the impact of constructs within a domain. Local ethical approval was obtained.

14 **Results**

15 Of 18 participants, 12 were female, median age was 30 years (IQR, 27-35) with a median of 6 years
16 (IQR 3-8) of experience. Seven TDF domains were identified as relevant to PIP reduction. Pharmacists
17 were uncertain about their role in reducing PIP and reluctant to challenge physicians' prescribing deci-
18 sions. Challenges pertained to the environment, knowledge, social influences, professional role and
19 identity.

20 **Conclusions**

21 Pharmacists welcomed new responsibilities in reducing PIP as part of their daily practice but expressed
22 a need for removal of social and environmental barriers as well as, provision of relevant guidelines and
23 education about PIP. This study provides useful insights into the target domains for overcoming barriers
24 of pharmacist-involvement in reducing PIP.

25 **Keywords**

26 Pharmacist, primary care, older patients, prescribing, qualitative

27 **Introduction**

28 Older multi-morbid people are at substantial risk of having potentially inappropriate prescribing (PIP)
29 [1,2]. The risk of PIP increases as people grow older and is strongly associated with the higher number
30 of daily medicines, i.e. polypharmacy, used to treat multi-morbid illness [3-5]. Patient safety is at risk
31 when older people are exposed to PIP because of the associated adverse drug events (ADEs) and drug-
32 related hospitalisations of PIP [6,7]. Previous studies indicate a high prevalence of PIP throughout the
33 primary care setting in Ireland, with prevalence estimates of 21-57% [3,5,8,9]. Similar prevalence esti-
34 mates have been reported in the neighbouring country, Northern Ireland (34%) [10] and in other Euro-
35 pean countries, e.g. Spain (38-46%) [11] and the Netherlands (35- 85%) [4]. No intervention has suc-
36 ceeded in reducing the substantial PIP prevalence in primary care despite the existence of explicit cri-
37 teria to identify PIP for over 10 years, and the evidence that they are effective in reducing PIP in hos-
38 pitalised, older patients [2,4,12]. Two of the most commonly cited sets of PIP criteria are Beers' criteria
39 [13-17] and Screening Tool of Older People's Prescriptions (STOPP) and Screening Tool to Alert to
40 Right Treatment (START) criteria [1]. There are currently four randomised clinical trials showing the
41 clinical efficacy of applying STOPP/START criteria to reduce PIP[2,18], falls incidence and overall
42 medication cost [19], as well as incidence of ADRs [12] in the hospital and nursing home settings.

43 Reviewing new and repeat prescriptions and completing medication reviews are recognized
44 ways of identifying PIP. Medication review is a broad term covering several interventions carried out
45 by prescribers themselves or by other practitioners providing advice to prescribers (e.g. pharmacists)
46 with the overall aim of improving the quality, safety and appropriateness of use of medicines [20].
47 Studies in primary care settings have demonstrated a significant positive effect of medication reviews
48 on the reduction of PIP in older people [21-24], and also in community pharmacy settings [24]. Phar-
49 macists are in a position to identify and help reduce PIP. However, prevalence data of PIP among com-
50 munity-dwelling older people indicate that pharmacists are not undertaking this important role of iden-
51 tifiers of PIP with a further remit of PIP prevention [25-27].

52 When designing an intervention to change traditional working practice, it is fundamental to
53 understand the processes underlying the behaviour [28,29]. In the case of pharmacists, it is essential to
54 understand the barriers and facilitators for the involvement, or lack thereof, of community pharmacists
55 in reducing PIP. The Theoretical Domains Framework (TDF) was originally developed by Michie *et*
56 *al.* [30] and later updated by Cane *et al.* [31]. The TDF considers a wide range of possible theoretical
57 explanations for the relevant behaviours [28,32,33]. The 12 domain TDF [30] has been widely used in
58 health research to define behaviours and to identify barriers and facilitators to that behaviour [28,33,34].
59 The identification of such domains relevant for a specific behaviour change is an important step in the
60 design of an intervention [31,35]. In this study, the 14 domain TDF was employed to identify barriers
61 and facilitators of pharmacist-involvement in reducing PIP. The 14 domain TDF has previously been
62 used to explore a similar topic: the utilisation of a screening tool in medicines usages reviews (MURs)

63 by community pharmacists [35]; and was deemed appropriate to investigate their involvement in reduc-
64 ing PIP.

65 Whilst large randomised controlled trials are examining various ways to assess the interventions
66 targeted at prevention of PIP in hospital care settings [2,36,37], little research is being carried out in
67 primary care. To date, the views of the community pharmacists on reducing PIP have been given little
68 attention [35]. Therefore, this study aimed to explore the views of community pharmacists on their
69 potential involvement in reducing PIP, and to determine the perceived barriers and facilitators to the
70 implementation of PIP reduction in community pharmacy practice.

71 **Methods**

72 **Compliance with Ethical Standards**

73 Ethical approval for this study was granted by the Clinical Research Ethics Committee of the Cork
74 Teaching Hospitals prior to recruitment. Written informed consent was obtained from all participants
75 included in the study.

76 **Sampling**

77 Community pharmacists working in community practice in Cork in Ireland were recruited using con-
78 venience sampling based on a sampling matrix. The convenience sampling method was chosen due to
79 time constrictions of the study and to increase the likelihood of respondents. Hence, a close geographic
80 proximity allowed the researcher (CH) to conduct face-to-face interviews with participants at suitable
81 location. Pharmacies located in Cork were identified and contacted by telephone. The study was intro-
82 duced to the pharmacist on call at that actual time, and the pharmacist was asked to take part in the
83 study. An agreed interview date, time and location were then arranged. Currently working in community
84 practice was the only inclusion criterion, and there were no exclusion criteria.

85 A sampling matrix was designed to ensure variation of important participant characteristics in the study
86 population (see Online Resource I). The design of the matrix was done by three researchers (CH, LS
87 and SB) together with a panel of pharmacists with backgrounds in academia and community pharmacy
88 practice. The final matrix design was approved by all authors. Matrix parameters chosen were: (i) ex-
89 perience from working with nursing homes (either from working in a nursing home or from working in
90 a pharmacy serving nursing homes), (ii) years of experience working as a community pharmacist (<3
91 years, ≥3 years and ≥10 years), and (iii) number of pharmacists working simultaneously in the phar-
92 macy. A cut-off of 3 years of community experience was chosen as a matrix parameter because phar-
93 macists in Ireland after a 3-year period can choose to take up employment subsequently as Supervising/

94 Superintendent Pharmacist¹. Being a supporting or a supervising pharmacist was considered to influ-
95 ence the level of confidence and knowledge. A threshold of 10 years or more experience was then
96 agreed by the authors and the expert panel due to an expected seniority after 10 years which might have
97 influenced their opinions and answers. Experience of working in a nursing home was considered to
98 have an influence on the pharmacists' answers relating to medication reviews and polypharmacy issues
99 as these are commonly undertaken by pharmacists in Irish nursing homes. The number of registered
100 pharmacists on duty in the pharmacy at any one time was believed to have an impact on their perceived
101 capability to perform medication reviews compared to those pharmacies with a single pharmacist on
102 duty. Although not matrix parameters, the areas in which the pharmacists worked i.e. urban or rural as
103 well as associated affluence or disadvantage were considered when recruiting. Areas with social afflu-
104 ence and disadvantage were identified from the deprivation index viewer (available from www.pobal.ie)
105 [38].

106 **Interview topic guide**

107 An interview topic guide (see Online Resource II) was designed to explore the 14 domains of the frame-
108 work [30,31] while also allowing the participants to freely share their opinions. Using the TDF to design
109 the topic guide is a helpful tool in formulating questions that will enable the identification of the behav-
110 iour and the barriers and facilitators to that behaviour. The use of a TDF-formulated topic guide has
111 also been shown to effectively elicit responses from the interviewees that they would not otherwise
112 report [29]. The topic guide was refined by consensus among all authors and with an expert panel of
113 pharmacists with backgrounds in academia and community pharmacy practice. The topic guide was
114 pilot tested in two community pharmacists. During the study it was refined on an iterative basis after
115 each interview was transcribed to allow for emerging themes to be explored in subsequent interviews.
116 Interviews were conducted until the point of thematic saturation as described by Francis *et al.* [39]. The
117 interviews were introduced with some general questions regarding their awareness and beliefs about
118 PIP and medication reviews. Participants were shown the recently developed deprescribing algorithms
119 and asked to give their opinion about the content, layout and usefulness in their daily practice [40-43].
120 Participant demographic details were also collected including gender, age, number of years of experi-
121 ence in community pharmacy.

122 **Data collection**

123 Semi-structured interviews with pharmacists working in community pharmacies in Ireland conducted
124 by one researcher (CH). This type of interviews was chosen as it encourages interviewees to share the

¹ The Supervising/Superintendent pharmacists is the person responsible for the day-to-day management and operation of the pharmacy and must have a minimum of three years' post-registration experience (http://www.thepsi.ie/gns/Pharmacy_Practice/practice-guidance/Guidance_for_pharmacists/Guidance_for_Supervising_Pharmacists.aspx).

125 views and opinions that are important to him/her [44]. Interviews were conducted face-to-face or over
126 the telephone. At the time of the interviews the participant received an information letter and gave their
127 written consent. Interviews were audio-recorded and transcribed verbatim. Transcripts were returned to
128 participants for review, but no one accepted this offer.

129 **Qualitative data analysis**

130 Transcripts were anonymised and transferred to the QSR NVivo® Version 11 software. In line with
131 framework analysis, a familiarisation process took place whereby the researcher (CH) repeatedly lis-
132 tened to the interview audio-recordings and read the interview transcripts. From the transcribing process
133 and familiarisation process the researcher (CH) attained an overview of specific beliefs within the data
134 [45]. Following this step, CH coded excerpts from the interview transcripts into one or more of the 14
135 TDF domains. Three randomly selected transcripts were coded by a second researcher (LS) to assure
136 validity and reliability of the data analysis. Disagreement in coding between the two researchers was
137 resolved through discussion and consensus. Domains for which transcript excerpts were coded into
138 were summarized by CH. Supporting excerpts were attached to each domain summary. The summaries
139 were reviewed by LS. The two researchers determined the domains of relevance for PIP reduction using
140 a similar approach to previous studies [28,35]. A domain was deemed relevant if excerpts were coded
141 frequently into this or if the participants emphasised the significant impact of barriers and/or facilitators
142 within a domain on their involvement in reducing PIP.

143 **Results**

144 A total of 21 pharmacists were approached of whom 18 agreed to participate. One pharmacist refused
145 to participate and the remaining two were unavailable at the time of the study. There were no dropouts
146 in this study. Interviews were conducted in the period from June to end of August 2017. The interviews
147 were a mean length of 19 minutes (SD 6.00) and took place at the pharmacy in which the participant
148 worked. Data saturation was reached after 15 interviews with no new themes emerging from conducting
149 an additional three interviews. Characteristics of the participants are described in Text box 1.

150 [Insert Text box 1]

151 Pharmacists were familiar with the term ‘inappropriate prescribing’ and defined this as: (i) any
152 medication prescribed that has the potential to cause harm, side-effects or drug interactions; (ii) over-
153 prescribing or prescribing without a documented indication; (iii) prescribing a medicine to relieve side-
154 effects of another medicine that the patient is taking; (iv) prescribing any medication for longer than
155 indicated; and (v) prescribing a medicine not suitable for older people. A few pharmacists mentioned
156 the explicit STOPP/START criteria [1,46] to identify PIP but the majority referred to treatment guide-
157 lines such as the NICE guidelines [47] and no pharmacist used explicit set of criteria to identify PIP in
158 their daily work. The pharmacists perceived the presented deprescribing algorithms [40-43] to give a

159 good overview and to be user-friendly. However, some pharmacists also believed that the information
160 on the algorithms was well-known among pharmacists, and did not believe algorithms to have signifi-
161 cant influence on their involvement in reducing PIP.

162 Pharmacists described medication reviews as the systematic process of reviewing patients'
163 medications and identifying drug-related problems. No pharmacist had experience of doing medication
164 reviews in community pharmacy setting but some had experience from educational sessions or from
165 working in hospitals or nursing homes. No pharmacist interviewed was carrying out medication reviews
166 as part of their current routine practice.

167 **Qualitative analysis themes**

168 Transcript excerpts were most frequently coded into five domains: (i) *beliefs about capabilities*, (ii)
169 *environmental context and resources*, (iii) *knowledge*, (iv) *social influences* and (v) *social professional*
170 *role and identity*. The two domains *memory, attention and decision processes* and *reinforcement* were
171 less frequently coded. However, those participants who made comments coded into these domains at-
172 tached significant importance to the factors identified. The interview data coded into these seven do-
173 mains are summarized in Table 1 with illustrative quotations.

174 Beliefs about capabilities

175 Pharmacists perceived themselves as appropriate healthcare providers to identify PIP. Competencies
176 were attributed to: being trained to do it; being good at identifying PIP; having a good relationship with
177 patients due to the nature of patients visiting their pharmacy more often than their General Practitioner
178 (GP); and looking at older patients' prescription drugs with fresh eyes.

179 Beliefs about capabilities were affected by a pharmacist's level of confidence and this subse-
180 quently influenced the likelihood of the pharmacist communicating any recommendations to the GP.
181 One pharmacist's self-perceived duty as a pharmacist gave her the confidence to act when an instance
182 of PIP was identified (Table 1). Another, younger pharmacist (1.5 years of experience) described how
183 her lack of confidence restrained her from actively giving her input despite her beliefs about her role
184 (Table 1).

185 Environmental context and resources

186 Being busy with serving many patients and doing administrative work were believed to restrict time to
187 do medication reviews and to have follow-up contact with prescribers to discuss potential changes.
188 Pharmacists described a need to prioritise their time and focus on more immediately unsafe issues, such
189 as major drug-drug interactions, rather than reviewing medication lists for PIP, which was felt to have
190 more medium or long-term implications for the patient (Table 1). Protected time to review medications
191 facilitated by extra pharmacist staff was a suggested solution.

192 Another challenge was a lack of communication between healthcare providers, e.g. between
193 pharmacists and GPs, and was thought to lead to confusion about medication changes and to impede
194 the implementation of these changes. Pharmacists described being unsure where the responsibility for
195 stopping PIP resides. Suggested improvements included more direct lines of communication and will-
196 ingness to collaborate from all parties. Geographic proximity and face-to-face interaction were believed
197 to be key facilitators of a good collaborative relationship (Table 1).

198 Other challenges pertained to a lack of patient information, e.g. diagnosis or indication for a
199 drug. Receiving hospital discharge letters and gaining access to a centralised clinical record system for
200 sharing patient information between pharmacists and GPs were suggested improvements.

201 Knowledge

202 Pharmacists believed their pharmacology/therapeutics knowledge to be sufficient to identify PIP but
203 stressed the need for continuing professional education to bring their knowledge in line with new med-
204 ications and most up-to-date guidelines. Interdisciplinary training was suggested as one way to meet
205 these educational needs whilst simultaneously improving collaboration between pharmacists and GPs
206 (Table 1).

207 Guidelines were perceived to be valuable information sources partly because of their generally
208 easy application to daily practice and partly for the evidence-base guidance to pharmacists' recommen-
209 dations. However, some pharmacists criticised guidelines for limitations such as describing how to
210 identify PIP without specific guidance on how to manage it (Table 1).

211 Social influences

212 Patient demands and their relative interest in medication were noted to strongly influence the changing
213 or discontinuation of medication. Some patients were described as demanding treatment and not being
214 content to adjust their medication due to fear of change or loyalty to the doctors' prescription orders
215 (Table 1).

216 Pharmacists also noted however that their regular contact with patients put them in a position
217 to influence the patients' behaviours. Pharmacists described how negative interactions with GPs re-
218 sulted in loss of confidence in their own recommendations; conversely, being acknowledged by pa-
219 tients' GPs motivated pharmacists to discuss potential changes with those GPs (Table 1).

220 Social professional role and identity

221 Pharmacists described their current role to include: (a) informing patients about their medication; (b)
222 maintaining patient safety perspective over financial benefits for the pharmacy; and (c) being familiar
223 with patients' particular medication needs. Pharmacists agreed that they had a role in PIP prevention
224 but were divided regarding the extent to which they should intervene when PIP is detected. A clear

225 description of the pharmacist's role in reducing PIP and an acceptance of this role among healthcare
226 professionals was suggested as a way in which to increase the involvement of pharmacists (Table 1).

227 Memory, attention and decision process

228 Raising awareness of PIP to pharmacists, doctors and patients was thought to enhance PIP reduction.
229 Suggested initiatives were campaigns from health authorities to patients and/or healthcare providers
230 (Table 1). The purpose of these campaigns should be to inform patients or GP about particularly prob-
231 lematic drug classes and raise awareness (Table 1).

232 Reinforcement

233 State reimbursement, or professional acknowledgement, for doing medication reviews were both con-
234 sidered to be motivating factors to do medication reviews. However, concerns were raised about the
235 quality of Government mandatory medication reviews and how incentives may shift focus away from
236 patient benefits to financial and personal benefits instead.

237 **Discussion**

238 This study used a theoretical approach to explore the views of community pharmacists on their involve-
239 ment in reducing PIP in older people and their perceived barriers and facilitators to this . Despite beliefs
240 about capability and responsibility for reducing PIP structured medication reviews and recommenda-
241 tions about stopping medications do not form a routine part of daily practice for community pharmacists
242 in Ireland. It is clear from this study that for some pharmacists there was a sense of conflict in what they
243 knew to be the identifiable instances of PIP and what they actually did to reduce PIP.

244 Pharmacists in expressed uncertainties about the extent of what their role in reducing PIP should
245 be. They described a reluctance to work outside of their current role and to challenge prescribing deci-
246 sions taken by GPs, such as recommending drug discontinuation. The consequences of this uncertainty
247 about the pharmacist's role in patient care, such as reducing PIP, have also been described in the liter-
248 ature [23,26]. In the study by Patterson *et al.* [23], the inconsistent description of pharmacists' respon-
249 sibilities in a primary care team was considered to hinder collaboration between pharmacists and other
250 healthcare professionals. They described how some healthcare professionals felt that pharmacists do
251 not adequately handle their responsibilities and described a likely relationship between this belief and
252 a general lack of awareness of the role of the pharmacist [23]. Schindel *et al.* [26] described how a lack
253 of consistency in the pharmacy service influences patients' expectations in that they may be informed
254 variably about pharmacist services.

255 When asked specifically about stopping medications, pharmacists in our study described un-
256 certainty of where final responsibility for PIP avoidance lies. In a recent review, this same theme caused
257 confusion for GPs and also differing opinions of GPs regarding pharmacist support [48]. Extending the
258 role of the pharmacist to include patient care may therefore require a clear description of the tasks and

259 responsibilities expected to be undertaken by pharmacists that this is clearly communicated to all stake-
260 holders.

261 Our findings suggest a need for a shared goal of medicines optimisation, and that by having
262 more interdisciplinarity within training in medication reviews, this may be achieved. Consistent with
263 our findings, the study by Patterson *et al.* [23] described that collaboration between pharmacists and
264 GPs was challenged by (i) a lack of understanding of each other's professional role in combination with
265 (ii) the busy professional practice environment and (iii) the absence of a shared platform with patient
266 information. To date, there is no centralised system in which patient information is shared between
267 community pharmacies and GP practices in the Republic of Ireland. It would be reasonable to suggest
268 that having access to diagnoses and co-morbidities would increase the clinical relevance of pharmacist
269 recommendations and improve communications with other healthcare providers. Sharing patient clin-
270 ical data was suggested in our study as one fundamentally important way to improve communication
271 and collaboration between community pharmacists and GPs. This was also suggested in the study by
272 Bergman *et al.* [25] as a mean of improving satisfaction among some GPs with pharmacist recommen-
273 dations, which were often criticised for lacking consideration of patient context. Keller *et al.* [27] also
274 showed how shared patient information enhanced the communication between pharmacists and physi-
275 cians and increased mutual professional trust between them.

276 Pharmacists in the present study welcomed more education and guidelines on reducing PIP.
277 These guidelines should ideally: give instructions on the steps following the identification of a PIP; be
278 up-to-date; and be used by all, including prescribers. To date, guidelines on stopping inappropriate
279 medications in older people have been criticised for being too disease-specific and not addressing the
280 steps of stopping and/or changing a medication identified as inappropriate [48-50]. There is a need to
281 design guidelines that meet the needs of healthcare professionals in busy medical and pharmacy clinical
282 practice in terms of content, instructions and relevance. The existing Beers' criteria and the
283 STOPP/START criteria as well as the recently developed deprescribing guidelines and algorithms by
284 Farrell *et al.* [40,43], Bjerre *et al.* [41] Pottie *et al.* [42], Reeve *et al.* [51] and the newly developed
285 STOPP Frail criteria [52] may meet these criteria. However, a recent study by Cardwell *et al.* [35] has
286 highlighted a number of barriers to the utilisation of screening tools by community pharmacist in daily
287 practice - those barriers being similar to those of this study. Future investigation on the application of
288 these deprescribing guidelines in primary care setting is thus warranted and may provide useful insights
289 into the implementation of more deprescribing to reduce PIP in primary care.

290 Whilst some studies to date have shown a positive impact of pharmacist involvement in reduc-
291 ing PIP in primary care [21], more research is needed into the effective implementation of such inter-
292 ventions. The majority of barriers and facilitators identified in this study fall under the TDF domains
293 of: *environment, knowledge;* and *social professional role and social influences*. The design of future
294 interventions should target these domains. Our findings suggest that future research should focus on the
295 creation of guidelines that suit the primary care setting as well as investigating new strategies to improve

296 the collaboration and communication between healthcare professionals both across and within care set-
297 tings. Policy makers and the educational sector, such as Universities, could support the work of com-
298 munity pharmacists in preventing PIP by offering continuous training and encouraging interprofessional
299 education, whilst also researching new ways of making more patient-specific information available to
300 the pharmacist.

301 A strength of this study is its use of a robust theoretical framework to analyse the interview
302 data. Using the TDF ensures that a large variety of factors on behaviour are considered compared to a
303 more restricting set of factors being explored when using individual theories of behaviour change [35].
304 The use of TDF allows the mapping of findings to theory and is a useful way of identifying mediators
305 of change. Although the use of a pre-specified framework to develop the interview topic guide and to
306 analyse the data can prevent the emergence of non-predefined themes of relevance, nevertheless the
307 TDF has been applied successfully in previous studies to describe topics similar to this study [28,33-
308 35]. This study was not without limitations. The sample size of 18, although acceptable for qualitative
309 research, is small. The nature of qualitative analysis is subjective and despite the use of a sampling
310 matrix to recruit participants, the findings of this study, as with any qualitative research, are not gener-
311 alisable to all community pharmacists. Additionally, the convenience sampling methods has its limita-
312 tions to the generalisability of the study population, and the self-selected study population may have
313 introduced self-selection biases. However, the findings of this study may still be relevant to healthcare
314 providers in other countries.

315 In conclusion, pharmacists were generally aware of PIP in older people and its related problems.
316 Pharmacists mostly welcomed responsibilities into their involvement of reducing PIP but described
317 challenges of overcoming social and environmental barriers, compounded by a lack of relevant guide-
318 lines for reducing PIP and education on the subject of PIP. This study identified barriers and facilitators
319 of more pharmacist-involvement in reducing PIP in community practice. The findings pointed to the
320 need for greater collaboration between physicians and pharmacists in reducing PIP through clearer de-
321 scriptions and mutual awareness of their individual roles and responsibilities in this process. This study
322 provides useful insights into the target domains for overcoming barriers of pharmacist-involvement in
323 reducing PIP in community practice and may prove useful in the design of future pharmacist-led inter-
324 ventions to reduce PIP. Although exclusive to Irish community pharmacists, the findings may be of use
325 in the expansion of the role of the community pharmacist in other countries.

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330

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494 Text box 1: Characteristics of interview participants (N = 18)

- Community pharmacists interviewed worked in pharmacies placed in urban (n=15) and rural (n=3) areas, of which 13 areas were categorised as affluent and 5 were deprived areas according to data from www.pobal.ie.
- 12 female and 6 male pharmacists were interviewed and were a median age of 30 years (Inter Quartile Range, IQR 27-35).
- The pharmacists had a median of 6 years of experience from working in a community pharmacy (IQR 3-8) and 8 pharmacists had experience from working in or for a nursing home. Seven pharmacists had graduated before 2010 and 11 pharmacists after 2010.
- Eight pharmacists were working in a pharmacy with only one licensed pharmacist and 10 pharmacists worked in a pharmacy with 2 or more licensed pharmacists on duty. 16 pharmacists had help from technician staff in the pharmacy while 2 did not have technician staff.

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499 Table 1 Interview quotations supporting the individual theoretical domains identified as relevant for PIP prevention in primary care

TDF domain	Supporting quotes
Beliefs about capabilities	<p>“I wouldn’t go down the route and ring up a doctor and saying: ‘You shouldn’t be on this’. The patient has been on this for longer than two weeks, you shouldn’t be giving this anymore’. I just don’t. That is probably my role to some extent but I wouldn’t like going down that route of complaining to another healthcare professional about what they are doing, so.” [Pharmacist 6, Code: Beliefs about capabilities]. “I’d be fairly confident. I’d be kind of, just thinking in my own head: ‘Look, I have a duty of care’ and if the doctors are a little bit annoyed with me, I’ll take that.” [Pharmacist 17, Code: Beliefs about capabilities]. “I would be happy enough to have a look through somebody’s medicine, if you’re given a bit of time to go through it beforehand. Instead of the cuff kind of walking off the street: ‘Oh here’s my 42 medicines in a brown paper bag’(...) But if you have time to go through stuff beforehand and had a bit of time to spend with the patient then definitely I think it would be both cost-effective and much, much more beneficial to the patient in the long term.” [Pharmacist 18, Code: Beliefs about capabilities].</p>
Environmental context and resources	<p>“I think communication is a huge issue because (...) if something [prescription] comes out from the hospital, the GP might not want to stop it. You know the hospital’s intention might have been ‘let’s go on this for 6 weeks’. But then the GP puts it on the repeat and then it comes to the pharmacist and I’m looking at it and they’ve been on it for two months. I’m not going to ring the GP after two months and say ‘oh, it’s probably inappropriate for you to stop this now’. It’s kind of like who actually [should tackle instances of PIP], and where does the buck stop. Who should say ‘this is where it stops’ or ‘this is where it starts’ or.” [Pharmacist 15, Code: Environment] “Well it’s just, I guess, everybody’s busy. Ehm, things maybe aren’t reviewed as often as they should be (...). So, you know, it doesn’t, it just flies by and you know, you’ve got a number of other reasons, which are far more immediate in terms of inappropriate prescribing, that you need to look out for. So, you know, those are the ones that you’re gonna go for, the ones that are immediately unsafe, I guess.” [Pharmacist 2, Code: Environment] “I suppose between the doctor and the pharmacist. It’s a two-way thing. There needs to be better relationship, I suppose, between the prescribing doctor and the pharmacist. Then again, I think it just depends on which doctor you talk to. Some of them are happy about engaging with the pharmacist and some of them aren’t. Some don’t want to, so. I suppose, so.” [Pharmacist 16, Code: Environment]</p>
Knowledge	<p>“I think interdisciplinary training would be very good. Get all the GPs and all the pharmacists into the room. Get a little bit of a talk, a lecture, have a dinner, and let them [GPs] understand how we [pharmacists] work and the position that we are in, because we [GPs and pharmacists] often don’t understand our jobs and they can explain. I mean we [pharmacists] go to visit the GP for our own thing. So, we kind of have a little bit more of an understanding [of the GP’s work]. But they [GPs] may ever come to a pharmacy and they may not know how we operate.” [Pharmacist 12, Code: Knowledge] “Maybe if there was some sort of training about how to review those [PIP] that would be good. (...) and some sort of training so then it makes us aware that ‘right, we’re going to look out for’ you know” [Pharmacist 9, Code: Knowledge and Memory, attention and decision] “It is useful [deprescribing algorithms] but like at the same time like I feel like it’s something that we all already know (...) I don’t think it’s the spotting is the big problem. It’s the like what do you do when you do spot it? So, it’s the training of what are we actually supposed to do. So, I suppose you do spot it but like I don’t necessarily know like what you’re supposed to do with it.” [Pharmacist 15, Code: Knowledge]</p>

Social influences	<p><i>“I suppose for our part it’s just time and for the patient’s part it’s just the interest in it. There are some patients who want to know everything that they’re on and every reason. And then other patients who genuinelyhave great belief in the doctor and pharmacist and they just think if they were ever prescribed [any medication] they need to take it.” [Pharmacist 13, code: Social influences]</i> <i>“A lot of it is: ‘well, if the doctor said’ or ‘if you said’ or you know, someone else said. They don’t kind of listen to themselves or do what they think they should do or what as I say, that maybe they are not informed enough.” [Pharmacist 17, Code: Social influences]</i> <i>“I sometimes, depending on the doctor, encourage the patient to go back and ask. If you just say to the doctor, eh to the patient: ‘maybe say to the doctor eh could you check your levels’. So, like you say it in a nice way so they don’t go like ‘well the pharmacist said’. But you know that they kind of think themselves and maybe they should be questioning it. You’re kind of empowering them a bit.” [Pharmacist 5, Code: Social influences]</i> <i>Sometimes it, it can be quite difficult as a pharmacist to deal with certain doctors or certain doctors in the hospitals. Not for the fact that they are authoritarian or anything like that but it’s that they’re busy too. They just don’t want the hassle of it. They’re the almighties sometimes (...)</i> <i>The channels need to be a bit more open. Sometimes they’re very closed and if they [the doctors] were a bit more open and a bit more receptive to what our [pharmacists] role as like a professional could be. Which I think some, some of them aren’t, then I think it would help a lot.” [Pharmacist 18, Code: Environment]</i></p>
Social professional role and identity	<p><i>“We should be doing more but we’re doing less [to reduce PIP than we should]. Whether that’s business or whether that’s some people are... shying away from it because they’re afraid that they’re out of touch, [such as some] older pharmacists. I’m not sure, but definitely there’s this un-realisation of what our role should be in [reducing PIP] for sure.” [Pharmacist 18, code: Social/Professional role]</i> <i>“I think it’s, the overall responsibility I think is a two-way think. I think it’s between the GP and pharmacy, and I don’t think either holds the overall responsibility (...) I suppose we wouldn’t review. I wouldn’t see it as a role, no. As a primary role. It would only be if there was an issue with the prescription or if there was an interaction [that the pharmacist would contact the prescriber]. But other than that I wouldn’t, no.” [Pharmacist 3, Code: Soc. Prof. role]</i> <i>“I take an active interest into the medication. I’ve no problems ringing a doctor about anything, any time. Even if it’s something small if I think it’s gonna benefit the patient. Within reason. I’m not going to be annoying them without reason over stuff either. You know. I always try to put patient benefit over profit first.” [Pharmacist 5, Code: Soc. Prof. role]</i></p>
Memory, attention and decision processes	<p><i>“Well those IPU [Irish Pharmacy Union] and HSE [Health Services Executive] campaigns about generic medications for example, have been very successful. I think a similar campaign along the lines of ‘do you need everything you’re taking?’. Or encouraging patients to go to their doctor. I think to a certain extent; the prescription levy did this very well. Where people went to their doctor and asked ‘do I really need to be taking all this?’” [Pharmacist 10, Code: Memory, attention & decision process]</i> <i>“Probably advertising it a bit more in so that, and even advertising it in doctor surgeries. Cause I did have someone ask me before about a person that could do, a certain doctor that would do a medication review, and I was pretty confused, and I said ‘but you know that everyone doctors and pharmacists can do it?’. But they’d heard from one person that there was this one doctor that does medication reviews and that was the answer. So, I suppose maybe it’s not advertised as a service or advertised as something that people can, pharmacists and doctors can do.” [Pharmacist 6, code: Memory, attention & decision process]</i> <i>“Well definitely there was one GP, when it all came out [regulations on benzodiazepine prescribing in Ireland], kind of contacted us and said: ‘how am I? Like, am I prescribing more benzodiazepines than any other GP?’. And like that’s an interesting</i></p>

	<p><i>one. Just to be able to say like, on a scale you are prescribing more. It might kind of open their eyes up a little (...) It would be hard, but it would be a nice study for someone to do at some stage. To say: 'look, as a GP you are prescribing this amount as opposed to the national average of such and such'.</i>” [Pharmacist 11, code: Memory, attention & decision process]</p>
Reinforcement	<p><i>“I suppose it’s [PIP] a bit under the radar in a lot of my daily work because you’re not incentivised to look for it (...) Well it’s really a case of your incentives. You know, you’re not incentivised to do it. It doesn’t really benefit you directly at all.”</i> [Pharmacist 2, Code: Reinforcement] <i>“If it [medication reviews] could be incorporated into your CPD [continuing professional development], I know pharmacists who would be much more inclined to do it because we’re all trying to clock up our CPD hours (...) it should be a thing that if you do your certain medicine reviews you can log this as CPD. You know that the PSI [the Pharmaceutical Society of Ireland], or the IPU would support us in that way. The IPU [Irish Pharmacy Union], support us in that way and encourage us.”</i> [Pharmacist 5, Code: Reinforcement] <i>“But I think if you try and force people to do it [medication reviews] for even for like a financial thing. Reimbursement or anything like this, it’s just going to come to like the same thing as we do with say the HSE claims or something. Say, you’re doing it for the wrong reasons and even in that case you mightn’t do it properly.”</i> [Pharmacist 7, Code: Reinforcement]</p>

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