An evaluation of community pharmacy-based services for type 2 diabetes in an Indonesian setting: patient survey

Yosi Wibowo, Richard Parsons, Bruce Sunderland, Jeffery Hughes

Background: Diabetes is an emerging chronic disease in developing countries. Its management in developing countries is mainly hospital/clinic based. The increasing diabetes burden in developing countries provides opportunities for community pharmacists to deliver a range of services. Since the management of diabetes requires the patient's own involvement, it is important to gain their views in order to develop pharmacy-based diabetes services. Studies on diabetes patients' views have been limited to developed countries. **Objectives:** To investigate, within a developing country setting (Indonesia), current use of pharmacy services by type 2 diabetes patients; and to evaluate their views regarding community pharmacists' roles, and the characteristics that influence their views. Methods: A questionnaire survey was conducted within 10 purposefully selected community pharmacies in Surabaya, Indonesia. Each pharmacy recruited approximately 20 patients seeking antidiabetic medications. Usage of pharmacy services was identified using binary responses ('yes'/'no') and views on pharmacists' roles were rated using Likert scales; an open-ended question was used to identify patient perceived priority roles. Logistic regression models were used to determine characteristics associated with patients' views. **Results:** A total of 196 pharmacy patients with type 2 diabetes responded (58.3% response rate). Most patients used community pharmacies for dispensing (100%) and education on how to use medications (79.6%). There were mixed views towards pharmacists providing services beyond dispensing. The highest priorities identified were from the 'patient education' domain: education on medications [i.e. directions for use (64.5%), storage (26.6%), common/important adverse effects (25.5%)]; and the 'monitoring' domain: monitoring medication compliance (37.3%). Patients with higher incomes or who were working were less supportive of these expanded services; whereas patients who previously used a service, those with risk factors for complications or having poor/unknown glycaemic control were more supportive. **Conclusions:** Community pharmacies in Surabaya, Indonesia in this study were mainly utilised for dispensing. However, many type 2 diabetes patients using these pharmacies report limited monitoring of blood glucose levels and poor glycaemic control, which indicates an opportunity for greater pharmacist involvement. Yet for this to occur, patients' limited expectations of

pharmacists roles will need to be broadened. Characteristics influencing these views should inform the development of pharmacy-based diabetes services in the environment of the burgeoning burden of diabetes.

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Abstract

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8 in developing countries is mainly hospital/clinic based. The increasing diabetes burden in

9 developing countries provides opportunities for community pharmacists to deliver a range of

10 services. Since the management of diabetes requires the patient's own involvement, it is

11 important to gain their views in order to develop pharmacy-based diabetes services. Studies on

12 diabetes patients' views have been limited to developed countries.

13 **Objectives:** To investigate, within a developing country setting (Indonesia), current use of

14 pharmacy services by type 2 diabetes patients; and to evaluate their views regarding community

15 pharmacists' roles, and the characteristics that influence their views.

16 **Methods:** A questionnaire survey was conducted within 10 purposefully selected community

17 pharmacies in Surabaya, Indonesia. Each pharmacy recruited approximately 20 patients seeking

18 antidiabetic medications. Usage of pharmacy services was identified using binary responses

19 ('yes'/'no') and views on pharmacists' roles were rated using Likert scales; an open-ended

20 question was used to identify patient perceived priority roles. Logistic regression models were

21 used to determine characteristics associated with patients' views.

22 **Results:** A total of 196 pharmacy patients with type 2 diabetes responded (58.3% response rate).

23 Most patients used community pharmacies for dispensing (100%) and education on how to use

24   medications (79.6%). There were mixed views towards pharmacists providing services beyond

25   dispensing. The highest priorities identified were from the 'patient education' domain: education

26   on medications [i.e. directions for use (64.5%), storage (26.6%), common/important adverse

27   effects (25.5%)]; and the 'monitoring' domain: monitoring medication compliance (37.3%).

28   Patients with higher incomes or who were working were less supportive of these expanded

29   services; whereas patients who previously used a service, those with risk factors for

30   complications or having poor/unknown glycaemic control were more supportive.

31   **Conclusions:** Community pharmacies in Surabaya, Indonesia in this study were mainly utilised

32   for dispensing. However, many type 2 diabetes patients using these pharmacies report limited

33   monitoring of blood glucose levels and poor glycaemic control, which indicates an opportunity

34   for greater pharmacist involvement. Yet for this to occur, patients' limited expectations of

35   pharmacists roles will need to be broadened. Characteristics influencing these views should

36   inform the development of pharmacy-based diabetes services in the environment of the

37   burgeoning burden of diabetes.

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Introduction

Indonesia is a major developing country with a population of 237.6 million [1], and is among the

top 10 countries in the world according to the number of people with diabetes [2]. In 2013, it was

estimated that 8.5 million people in Indonesia were living with diabetes, and this number is

expected to increase to 14.1 million by 2035 [2]. Diabetes in Indonesia is currently managed in

hospital outpatient or clinic settings [3,4]. An increased number of people with diabetes will

require more community-based care, providing an opportunity for community pharmacists to

deliver a range of diabetes services. While the 2012 Indonesia Health Profile reported a total of

17,613 pharmacies (mainly community-based) [5]; Indonesian community pharmacies currently

68 have limited roles within Government insurance plans, providing services mainly to the private

69 sector [6].

70

71 The introduction of Standards for Pharmaceutical Care in Community Pharmacies in 2006 has

72 emphasised the need for community pharmacists to be involved in the care of patients with

73 chronic diseases, including diabetes [7].The standards included a range of services, i.e.

74 prescription medication service (i.e. prescription review, drug dispensing/supply, drug

75 information and counselling, and monitoring), health promotion and education to promote self-

76 care, and home/residential care [7]. A previous study involving a survey of community

77 pharmacists in Surabaya, Indonesia reported despite community pharmacists' expressed

78 willingness to take up a broader role in diabetes care, the majority performed limited services

79 beyond dispensing [8]. Studies in developed countries (such as the UK, the USA, Canada and

80 European countries), however, reported that more than 50% of community pharmacies have

81 provided extended services for diabetes patients, including: education related to medications,

82 lifestyle education, supporting patients in performing self-monitoring of blood glucose (SMBG),

83 and monitoring compliance with medications [9-16].

84

85 To increase the uptake of pharmacy-based services amongst diabetes patients in Indonesia, it is

86 important to understand the perspectives of diabetes patients on pharmacy-based services that

87 would assist with their care. This is especially so since diabetes is a chronic disease that requires

88 daily care in the hands of patients [17]. Several studies have been conducted to investigate

89 diabetes patient views regarding aspects of community pharmacists' roles, however, these have

90 thus far been limited to developed countries, such as the UK and the USA [17-21]. Two previous

91   small studies conducted in community pharmacies in Indonesia, although not specific to diabetes

92   patients, have found that general patients had positive perceptions of pharmacy services,

93   providing facilitation for pharmacists to develop their professional roles [22,23]. This present

94   study aimed to investigate, within an Indonesian setting, the current use of community pharmacy

95   services by patients with type 2 diabetes; and to evaluate their views on the potential roles of

96   community pharmacists, and the characteristics that influence their views. The results of the

97   study should inform the Government, professional bodies, and practitioners on the development

98   of pharmacy-based diabetes services in a developing country setting (Indonesia).

99

100

Methods

102   This study was approved by the Human Research Ethics Committee of Curtin University (PH-

103   09-11) and *Ikatan Apoteker Indonesia* – IAI (Indonesian Pharmacists Association)

104   (001/SK/BPD-IAI/SURABAYA/2010).

105

Setting and sample recruitment

107   The aims of the study included the estimation of the prevalence of service usage and patient

108   views. A sample size of 200 was defined which if broadly representative of the population of

109   pharmacy patients with type 2 diabetes in Surabaya, the 95% confidence intervals for the true

110   prevalence estimates would be within 7% of the figures obtained from the sample (based on a

111   prevalence estimate of 50%). For the analysis of characteristics associated with respondents'

112   views, a sample of 200 would be expected to be adequate to identify any independent variables

113   exhibiting a moderate to small effect size (with power=80%, α=0.05) [24].

114

115   A previous pharmacist survey had been conducted on a random sample of 400 community

116   pharmacies in Surabaya (60% response rate), providing data on the characteristics of the

117   community pharmacies and diabetes services provided (reported elsewhere) [8]. Based on the

118   pharmacy characteristics data, 10 community pharmacies were purposefully selected as sampling

119   sites in this study, aiming to include different geographical areas and socio-economic levels in

120   Surabaya. Surabaya consists of 31 sub-districts which can be categorised into five geographical

121   areas, namely: centre, west, east, north and south; and four socio-economic levels, from high

122   (labelled '1') to low (labelled '4') [25]. Each pharmacy was responsible for recruiting

123   approximately 20 patients. Patients eligible for the survey were those aged over 18 years, with a

124   diagnosis of type 2 diabetes for which they were receiving oral antidiabetic medications. Patients

125   were recruited as they were seeking oral antidiabetic medications at these pharmacies, and their

126   written consent was obtained.

127

128   **Data Collection**

129   **Questionnaire development.** The survey questionnaire consisted of four sections: (A) patient

130   demographics, (B) services for type 2 diabetes patients – use of services and views on

131   pharmacists' roles, (C) diabetes profile, and (D) monitoring profile. The questionnaire cover

132   page contained information about the study and a consent form. Section B of the questionnaire

133   contained a list of services for type 2 diabetes patients that was drafted based on a generic model

134   generated from the literature [26-30]. A binary choice question was used to capture patient usage

135   of each service ('yes'/'no'), and a 6-point Likert scale was used to reflect patient views on

136   pharmacists' roles (1=definitely no, 6=definitely yes). This was followed by an open-ended

137 question to explore patient priorities regarding their views of pharmacist roles: *'In your opinion,*

138 *what are the five most important services that should be provided at pharmacies to assist you*

139 *with your diabetes?'* The questionnaire was face and content validated by a panel of seven

140 academics, two board members of the IAI, two Indonesian community pharmacists and two

141 diabetes patients. Their feedback, where appropriate, was incorporated into the questionnaire.

142

143 The questionnaire (English version) then went through a translationprocess to an Indonesian

144 version: (i) forward translation to Bahasa Indonesia by one of the investigators whose first

145 language is Bahasa Indonesia; (ii) back-translation to English by an independent English first-

146 language translator; and (iii) the back-translation was compared to the original version by two of

147 the investigators whose first language was English. The forward-translation questionnaire was

148 piloted by 10 type 2 diabetes patients. This resulted in minor changes to the final questionnaire.

149 To assess reliability, the questionnaire was distributed on two occasions separated by a two-week

150 interval. Responses to the Likert scales were grouped (ratings of 1 to 4, and ratings of 5 to 6) to

151 ensure that Kappa was able to be calculated; the resulting Kappa scores for diabetes services

152 (Section B) ranged from 0.412 to 1.000, which were classified as 'acceptable' to 'excellent'

153 levels of test-retest reliability[31].

154

155 **Questionnaire administration.** Owners of the 10 selected pharmacies were approached. In the

156 case of refusal, that pharmacy was replaced with another pharmacy in the same geographical

157 area and socio-economic level (Table 1). At each pharmacy, 40 questionnaires were issued, and

158 the pharmacist and/or pharmacy staff member was briefed about the study and how to complete

159 the questionnaire. The pharmacist and/or the pharmacy staff member was asked to explain about

160   the study to the eligible patients and to invite them to participate; each pharmacy aimed to recruit

161   approximately 20 patients. Once completed, the questionnaire was placed in a sealed envelope

162   by the respondent and submitted to the pharmacist/pharmacy staff. The completed questionnaires

163   as well as the remaining unused questionnaires were then handed to the investigators by the

164   agreed deadline.

165

166   **Data Analysis**

167   Descriptive statistics were used to summarise the patient characteristics: demographics (Section

168   A), diabetes profile (Section C), and monitoring profile (Section D). SPSS version 19.0 was used

169   to perform the analysis.

170

171   In relation to diabetes services (Section B), frequencies were calculated for binary responses

172   ('yes'/'no') related to the patient usage of services and for responses from Likert scales related to

173   the extent of patient agreement regarding pharmacists' roles. Moreover, content analysis was

174   used for responses from the open-ended question to explore patient views on the five priority

175   services that should be provided at the pharmacies. An initial coding frame structure was

176   established from the generic model generated from the literature. The responses were coded (if

177   new codes emerged, they were added to the thematic codes in the coding frame), and

178   frequencies were calculated for each code [32].

179

180   It was of particular interest to identify characteristics associated with the views of patients related

181   to pharmacy-based diabetes services. For this reason, the responses regarding patients' views for

182   each type of service were classified into binary variables, to indicate 'strong agreement' (Likert

183　scale ratings of 5 to 6) versus 'ambivalence or disagreement' (Likert scale ratings of 1 to 4) that a

184　service should be provided by the pharmacy. These binary variables were used as dependent

185　variables in logistic regression models to identify patient characteristics associated with the

186　strong support for each role. Some roles were considered to be different aspects of an

187　overarching role. For example, the roles to provide information on: the taking of medications,

188　use of insulin devices, storage of medications, precautions, and adverse effects were all

189　components of 'medication education'. In order to analyse characteristics associated with strong

190　support for an overarching or 'composite' role, the arithmetic average of the Likert responses for

191　the component roles was calculated and then converted to a binary variable in a manner similar

192　to that used for the individual roles (scores of 5 or more were taken to indicate strong support,

193　otherwise ambivalence or low support). Taking the simple average of the component roles

194　implicitly gives equal weight to each of the roles within a composite. It would have been

195　preferable to use Factor Analysis to identify if some of the component roles were more important

196　than others, but the sample size was considered too small for this refinement. It is generally

197　recommended that sample sizes of 300 or more should be used to obtain stable factor loadings

198　[24]. Patient characteristics included as independent variables were gender, age, education,

199　employment, income, health insurance cover, diabetes organisation membership, duration of

200　diabetes (time since diagnosis), risk factors for complications, complications and diabetes

201　(glycaemic) control. The models also included an independent variable indicating patients'

202　previous use of the service (binary responses: 'yes'/'no'). For dependent variables which were

203　'composite' (for example 'medication education'), the binary responses indicating previous use

204　of each component service were treated as numeric (zero for 'No', one for 'Yes'), and their mean

205　was calculated and used in the model as an independent variable to show the degree of previous

206   use of the composite service. A mean value close to 1 indicated that most components of

207   thecomposite role had been used, while a lower value indicated less use. A backward elimination

208   strategy was used to identify all the variables which significantly contributed to each model.

209   Through this approach all independent variables were included initially, and then the least

210   significant variable was dropped (one at a time) until the p-value associated with each of the

211   variables remaining in the model was less than 0.05.

212

213

214   **Results**

215

216   **Sample recruitment**

217   This study included 10 community pharmacies as sampling points after approaching 11

218   community pharmacies in Surabaya. One pharmacy refused, as the employee pharmacist was

219   planning to resign and they were in the process of recruiting a new one. From the final 10

220   pharmacies, a total of 336 questionnaires were distributed and 204 were returned; however, eight

221   patients reported the use of insulin at the beginning of their therapies and were deemed to have

222   type 1 diabetes, leaving a sample size of 196 (a response rate of 58.3%) (Table 1).

223

224 [Insert Table 1 here]

225

226 **Characteristics of pharmacy patients with type 2 diabetes**

227 The demographic information of participating patients (Section A) is summarised in Table 2.

228 Approximately 60% of respondents were female and half of respondents were aged 60 years or

229 older. Approximately half of the respondents did not have health insurance plans.

230

231 [Insert Table 2 here]

232

233 The diabetes data reported by participating patients (Section C) are shown in Table 3. The

234 median duration of diabetes (time since diagnosis) was seven years. More than 80% of

235 respondents reported that their treatment regimen included oral antidiabetic medications and diet

236 modifications. It is important to note that this variable did not measure whether the doctor made

237 the medication/diet/exercise recommendations, but rather whether the patient remembered and/or

238 reported it. Almost 60% of the respondents reported having at least one diabetes-related

239 complication, and most of the patients reported having at least one risk factor for complications.

240

241 [insert Table 3 here]

242

243 Table 4 shows the monitoring profile reported by participating patients (Section D). HbA1c

244 refers to glycosylated hemoglobin, which identifies average plasma glucose concentration over

245 the previous three months. To provide insight to patients' diabetes (glycaemic) control, variables

246 related to the symptoms of hypo/hyperglycaemia and HbA1c values were combined to indicate:

247   fair-good control (i.e. no symptoms and HbA1c ≤8.0%); poor control (i.e. presence of symptoms

248   and/or HbA1c >8.0%); and unknown (i.e. symptoms 'none/don't know' and/or HbA1c values

249   'none/don't know'). Using this derived variable, most respondents were perceived to have either

250   poor diabetes control (45.9%) or unknown diabetes control (42.3%).

251

252   [insert Table 4 here]

253

254   **Patients' use of pharmacy services and their views on pharmacist roles**

255   Responses describing patient usage of pharmacy services are summarised in Table 5. In addition

256   to the traditional role of dispensing ('treatment administration'), the most frequent services

257   received were 'patient education' about medications, particularly directions for use (79.6%) and

258   special precautions to follow (71.9%).

259

260   Table 5 also shows responses regarding pharmacists' roles. All patients agreed with pharmacists'

261   roles in dispensing. Beyond dispensing, more than 70% of respondents expected pharmacists to

262   provide 'patient education' about medications. About half of respondents supported other

263   activities related to 'patient education' and 'monitoring'. There were large gaps between patient

264   usage and expectation regards education on: medication storage and adverse effects, SMBG,

265   prevention of complications, need for regular monitoring, and foot care. In addition, patients

266   expected pharmacists to provide more monitoring services than those currently provided.

267

268   [insert Table 5 here]

269

270 In terms of the priority roles of pharmacists, patients' responses can be seen in Table 6. The top

271 five services perceived by patients as priorities (in addition to pharmacists' traditional roles of

272 dispensing being already provided) were from the 'patient education' domain – education related

273 to medications [i.e. directions for use (64.5%), common/important adverse effects (25.5%),

274 storage requirements (26.6%)] and the 'monitoring' domain – monitoring compliance with

275 medications (37.3%). No new services were raised, beyond those already listed in the

276 questionnaire, from this open-ended question, suggesting that from the respondents' perspective

277 the range of services that should be provided by community pharmacies described in Table 5 was

278 complete.

279

280 [insert Table 6 here]

281

282 **Characteristics associated with patients' views on pharmacist roles**

283 Logistic regression models were used to identify patient characteristics which were associated

284 with patients' views on pharmacists' roles. The odds ratios of significant characteristics are

285 summarised in Table 7.

286

287 [insert Table 7 here]

288

289 Patient experience (previous use) with a service was strongly associated with their views that the

290 service should be provided by pharmacists [Odds Ratios (ORs) 4.4 to 11.3]. Patients with

291 poor/unknown glycaemic control or those who had risk factors for complications were more

292 supportive of pharmacists providing some monitoring services (ORs 2.3 to 10.2). On the other

293 hand, patients with higher incomes or those who were working were less supportive towards

294 pharmacists providing some education and monitoring services (ORs 0.3).

295

296

Discussion

298 This study has foundmost type 2 diabetes patients recruited had complications and/or risk factors

299 for complications (80.1% and 58.7%, respectively), and/or had poor/unknown glycaemic control

300 (45.9% and 42.3%, respectively). It is evident that in the current hospital outpatient/clinic

301 treatment model many patients were poorly monitored. This is consistent with a population study

302 of type 2 diabetes patients in Indonesia which reported that 67.9% of type 2 diabetes patients had

303 not achieved good glycaemic control (HbA1c <7.0%), and approximately 60% of the patients

304 had complications and/or risk factors for complications (i.e. dyslipidaemia and/or hypertension)

305 [3].

306

307 Moreover, this study reported that follow-up care tended to be inadequate, with only about one-

308 third of respondents reporting annual HbA1c monitoring and eye or foot examinations.

309 Supporting this finding, the Patient and Health Provider Survey in Indonesia (2012) indicated

310 that the majority of patients had not received foot or eye examinations within the past year, only

311 30% had had their HbA1c checked and many had expressed a wish to see health care providers

312 more often [33]. It was suggested that this poor quality of care and patient outcomes might relate

313 to the lack of awareness of, accessibility to and affordability of diabetes care for this patient

314 group [33]. Together with the findings of this study it provides a basis for community

315 pharmacists to provide a range of services.

316

317 **Patients' use of pharmacy services and their views on pharmacist roles**

318 This study indicated little involvement of Indonesian community pharmacies in the care of

319 patients with type 2 diabetes. Respondents mostly utilised pharmacists for their supply role

320 (dispensing). A previous Indonesian studyhas confirmed the limited services provided to general

321 pharmacy patients [22].

322

323 Amongst non-supply roles, many respondents chose roles closely related to dispensing as the

324 priority roles of pharmacists, i.e. education related to medications, and monitoring compliance

325 with medications. Similar findings were evident from some international studies involved

326 diabetes patients [17-21].Two qualitative studies indicated that patients identified the primary

327 expertise of the community pharmacist as medicines supply, and there were mixed perceptions of

328 community pharmacists' roles extending to advising on prescription medicines, providing

329 disease-related/health advice or providing monitoring services (using clinical testing devices)[21,

330 34].

331

332 It is interesting that the responses to the open-ended question that patients perceived that services

333 related to dispensing and patient education were those that should be provided to type 2 diabetes

334 patients from community pharmacies (Table 6). All of those they considered should be provided

335 had been included in the options that could be provided (Table 5). This also indicated that

336 patients did not have additional requirements for services not identified initially for this study.

337

Characteristics associated with patients' views on pharmacist roles

339   The logistic regression models consistently found that a patient's support for a service was

340   influenced by their experience (previous use) of the service (Odds Ratios, ORs ≥4.4). Supporting

341   this finding, studies worldwide have shown that type 2 diabetes patients have increased

342   perceptions of pharmacists' ability to assist them after receiving pharmacy-based services [35-

343   39]. It should be emphasised that most patients in this study (at that time) received limited

344   services from community pharmacies, thus they might not be aware of what pharmacists should

345   and could do.

346

347   The implementation of *Jaminan Kesehatan Nasional* - JKN (National Health Coverage) in 2014

348   provides the best opportunity to optimise the use of Indonesian community pharmacies. It is

349   important for the Government and IAI to establish an agreement on the basic services that should

350   be available in community pharmacies. While the current payment under the scheme includes a

351   very low prescription fee [40], the IAI should negotiate adequate remuneration for pharmacists to

352   provide the services, thus enabling community pharmacies to remain viable.

353

354   In addition to patients' past experiences, patients who were working and/or had higher incomes

355   were generally less supportive of some of the proposededucation or monitoring services (ORs

356   ≤0.5). This might be because these groups of patients were likely to be younger (mean age 63.7

357   years for non-workers versus 54.0 years for workers, $p<0.0001$; and mean age 60.4 years for

358   income ≤Rp 5 million versus 58.6 years for income >Rp 5 million, $p=0.358$). Two previous

359   studies have reported that older patients, or those living with diabetes for a long time, were more

360   supportive of pharmacists' contributions [21, 41]. It has been suggested that elderly people are

361   one of the groups whose need for additional advice on medications and other related services has

362   been demonstrated [42].

363

364   Notably, patients who had risk factors for complications and/or had poor/unknown glycaemic

365   control were much more supportive of pharmacists monitoring treatment outcomes or adverse

366   drug reactions (ORs ≥2.3). Such patients might reflect those with lower health status,

367   representing a target group who might be more motivated and responsive to pharmacists'

368   involvement. It has been suggested that patients who benefit most from pharmacist-led

369   education/coaching and disease state management services include those with poor glycaemic

370   control and multiple comorbidities [43]. It is evident that overall treatment outcomes in this

371   patient cohort are concerning and expanding the community pharmacy role into patient

372   management needs to be investigated.

373

374   **Limitations**

375   The purposeful sampling method used in the study (20 patients from each of 10 pharmacies) was

376   considered the only feasible manner by which it could be conducted. The request for

377   approximately 20 patients was to ensure that each pharmacy included a range of patients in the

378   sample and in many cases this about half of their current type 2 diabetes patients. No full list

379   (sampling frame) of pharmacy patients with diabetes exists in Surabaya, so it was not possible to

380   obtain a truly random sample of patients with this condition. Thus, there is a possibility of non-

381   respondents not sharing the same practice and/or views of respondents, and some caution should

382   be exercised in generalising the findings. However, the pharmacies covered a wide range of

383   settings (geographic and socioeconomic), so that no particular background group of patients

384   would be excluded; and achieved a sound response rate of approximately 60%.   The

385   characteristics of the respondents in this study were comparable to those of a population study

386   involving all type 2 diabetes patients visiting 18 medical centres across Indonesia between

387   November 2008 and February 2009 (N=1785) with respect to age (60 years *versus* 59 years,

388   respectively), gender (female 59.2% *versus* 55.2%, respectively), and duration of diabetes (7

389   years *versus* 8 years, respectively) [3]. Hence, although the sample is not randomly selected and

390   the risk of response bias might limit the generalisation, the views of participants give some

391   insight into the diabetes services used or desired at community pharmacies in Surabaya.

392

Conclusions

394   Community pharmacies in Surabaya, Indonesia in this study are mainly utilised for their basic

395   services of dispensing. Many type 2 diabetes patients in these pharmacies reported limited

396   monitoring of blood glucose and poor glycaemic control; in addition, their follow-up care and

397   health outcomes were generally poor. These findings indicate a need and opportunities for

398   community pharmacists to provide a range of services for patients with diabetes. Hence,

399   strategies should be developed to broaden current pharmacy patients' limited views of

400   pharmacists' roles which are mainly perceived as extensions to the supply roles. It is evident that

401   patients support the provision of services once they have been provided. Patient characteristics

402   that influence these views provide a target group for implementation of a pharmacy-based

403   diabetes service that should be evaluated. This can provide a partial solution in the environment

404   of a burgeoning burden of diabetes in Indonesia.

405

406

Acknowledgements

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Table 1(on next page)

patient recruitment

1   Table 1   Patient recruitment data from 10 community pharmacies

2

Pharmacy code	Geographical area	Socio-economic level	Average number of diabetes patients per month	Number of questionnaires distributed	Number of useablequestionnaires returned
Pharmacy 1	East Surabaya	2	150	40	21
Pharmacy 2	Central Surabaya	1	200	28	18
Pharmacy 3	East Surabaya	3	70	35	20
Pharmacy 4	West Surabaya	4	100	32	19
Pharmacy 5	South Surabaya	3	140	37	20
Pharmacy 6	Central Surabaya	2	100	30	20
Pharmacy 7	South Surabaya	4	100	36	20
Pharmacy 8	North Surabaya	1	240	31	19
Pharmacy 9	West Surabaya	3	120	40	20
Pharmacy 10	North Surabaya	2	100	27	19
Total				**336**	**196**

3

Table 2(on next page)

demographic data

1 Table 2 Demographic data of patient respondents (N=196)

2

Patient demographics	Frequency (%)
Gender	
Male	80 (40.8)
Female	116 (59.2)
Age, years – median (range)	60.0 (32–86)
Ethnicity	
Asian	196 (100.0)
Others	0 (0.0)
Highest Education	
No schooling	6 (3.1)
Primary school	23 (11.7)
Junior high school	41 (20.9)
Senior high school	71 (36.2)
Diploma	18 (9.2)
Bachelor degree	25 (12.8)
Postgraduate degree	12 (6.1)
Employment status	
Working full-time (≥40 hours/week)	53 (27.0)
Working part-time (<40 hours/week)	20 (10.2)
Not working	123 (62.8)
Total household income (from all sources) per month[a]	
≤Rp 2 million	103 (52.6)
>Rp 2 million – 5 million	54 (27.6)
>Rp 5 million – 10 million	25 (12.8)
>Rp 10 million	12 (6.1)
Health insurance	
Self-sponsored insurance	31 (15.8)
Employer-sponsored insurance	56 (28.6)
Insurance scheme for the poor/near poor	9 (4.6)
No insurance	100 (51.0)
Member of a diabetes organisation	
Yes	74 (37.8)
No	122 (62.2)

3   Abbreviations:Rp, Indonesian rupiah

4   [a]2 missing responses

5

Table 3(on next page)

diabetes and health profile

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1   Table 3   Self-reported diabetes and health profile of patient respondents (N=196)

2

Patient diabetes profile	Frequency (%) of 'yes'
Duration of diabetes, years – median (range)[a]	7 (1 – 42)
Current diabetes treatment	
Modifying diet	173 (88.3)
Exercise programme	123 (62.8)
Oral Antidiabetic Medication	189 (96.4)
Insulin	44 (22.4)
Risk factors[c]	157 (80.1)
BMI ≥ 25 kg/m²[b]	88 (44.9)
(History of) smoking	41 (20.9)
High cholesterol[d]	77 (39.5)
High blood pressure[e]	104 (53.6)
Complications[c]	115 (58.7)
Heart disease	34 (17.3)
Eye problems	52 (26.5)
Foot discomfort	81 (41.3)
Foot ulcers	14 (7.1)
Kidney problems	16 (8.2)

3   [a]Some missing responses
4   [b]BMI, body mass index = weight (kg) divided by height² (m²); some missing responses
5   [c]Respondents responded 'yes' for at least one complication/risk factor
6   [d]Respondents responded 'yes', either for *"Do you have high cholesterol?" or "Do you take medications to treat your high cholesterol?",* or for
7   both
8   [e]Respondents responded 'yes', either for *"Do you have high blood pressure?" or "Do you take medications to treat your high blood pressure?",*
9   or for both

10

Table 4(on next page)

monitoring profile

1   Table 4   Self-reported monitoring profile of patient respondents (N=195)[a]

2

Patient monitoring	Frequency (%) of 'yes'
Diabetes (glycaemic) control	
High blood sugar reactions *(in the last month)*	56 (28.7)
Low blood sugar reactions *(in the last month)*	43 (22.1)
Severe blood sugar reactions *(in the last year)*	26 (13.3)
HbA1c last value	53 (27.0)[b]
<6.5%	18
6.5−8%	27
>8%	8
Routine tests	
SMBG *(in the last week)*	74 (37.9)
Medical monitoring *(in the last 3 months)*	
Blood sugar	167 (86.1)
Blood pressure	166 (85.1)
Weight	124 (63.9)
HbA1c measurement *(in the last year)*	65 (33.3)
Medical monitoring *(in the last year)*	
Cholesterol	127 (65.1)
Kidney	84 (43.1)
Eyes	48 (23.2)
Feet	41 (21.0)

3   Abbreviations: SMBG, self-monitoring of blood glucose; HbA1c, glycosylated haemoglobin
4   [a]1 missing response
5   [b]number of respondents reported their HbA1c last value

6

Table 5(on next page)

patients' use of and views on pharmacy services

1   Table 5   Patients' use of community pharmacy services and their views on pharmacists' roles

2   (N=196)

Services	Being used N (%)	Being viewed as pharmacist roles[a] N (%)
Treatment administration		
Prepare medications	196 (100)	195 (100)
Provide labels with instructions for use	196 (100)	195 (100)
Patient education		
Disease process	93 (47.4)	120 (61.5)
Treatment targets	79 (40.3)	115 (59.0)
Antidiabetic medications:		
Directions for use	156 (79.6)	160 (82.1)
Use of insulin devices[b]	27 (61.4)	142 (72.7)
Storage requirements	93 (47.4)	144 (73.9)
Special precautions to follow	141 (71.9)	155 (79.5)
Common/important adverse effects	87 (44.4)	139 (71.3)
Exercise	66 (33.7)	96 (49.2)
Diet	84 (42.9)	101 (51.8)
SMBG	63 (32.1)	107 (54.9)
Prevention/treatment of acute complications	67 (34.2)	126 (64.6)
Prevention/treatment of chronic complications	45 (23.0)	116 (59.5)
Need for regular medical monitoring	48 (24.5)	97 (49.8)
Foot self-care	35 (17.9)	95 (48.7)
Smoking cessation[c]	12 (29.3)	72 (36.7)
Monitoring		
Monitor compliance with:		
Antidiabetic medications	100 (51.0)	127 (65.1)
Exercise plan	62 (31.6)	102 (52.3)
Diet plan	78 (39.8)	109 (55.9)
Plan for prevention/treatment of chronic complications	44 (22.4)	92 (47.2)
Scheduled medical monitoring	38 (19.4)	96 (49.3)
Monitor treatment outcomes:		
Check records on SMBG	58 (29.6)	101 (51.8)
Carry out blood glucose tests	58 (29.6)	113 (58.0)
Measure BMI	40 (20.4)	89 (45.6)
Measure blood pressure	55 (28.1)	103 (52.8)
Check results on patient laboratory tests	51 (26.0)	98 (50.3)
Monitor for adverse effects	63 (32.1)	110 (56.4)
Review		

Refer patients if necessary	69 (35.2)	110 (56.5)

3   Abbreviations: SMBG, self-monitoring of blood glucose; BMI, body mass index
4   [a]1 missing response
5   [b]The percentage was calculated for patients currently/previously taking insulin (N=44)
6   [c]The percentage was calculated for patients currently (or had a history of) smoking (N=41)

Table 6(on next page)

Patients' open ended views on priority roles of pharmacists

Table 6 Patients' open-ended views on priority roles of pharmacists in diabetes care (N=169)[a]

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1   Table 6   Patients' open-ended views on priority roles of pharmacists in diabetes care(N=169)[a]

2

Priority services[b]	Number of responses (%)
Treatment administration	
Prepare medications	35 (20.7)
Provide labels with instructions for use	66 (39.1)
Patient education	
Disease process	27 (16.0)
Antidiabetic medications:	
Directions for use	109 (64.5)
Use of insulin devices	15 (8.9)
Storage requirements	45 (26.6)
Special precautions to follow	37 (18.9)
Common/important adverse effects	50 (25.5)
Exercise	27 (13.8)
Diet	33 (16.8)
Prevention/treatment of acute complications	27 (16.0)
Prevention/treatment of chronic complications	20 (11.8)
Monitoring	
Monitor compliance with:	
Antidiabetic medications	63 (37.3)
Monitor treatment outcomes:	
Carry out blood glucose tests	30 (17.8)
Measure blood pressure	25 (14.8)
Monitor for adverse effects	23 (13.6)
Others *(not a specific service)*	
Provide a complete range of medications	12 (7.1)
Information about medications	16 (9.5)

3   Responses to an open-ended question: *"In your opinion, what are the five most important services that should be provided at pharmacies to assist*
4   *you with your diabetes?"*
5   [a]From a total 196 respondents, there were 26 missing responses and 1 invalid response, giving a total N=169
6   [b]Services selected by more than 10 respondents

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Table 7(on next page)

significant characteristics associated with support for 'patient education' and 'monitoring' by pharmacists

1 Table 7 Odds ratios and 95% confidence intervals of significant characteristics associated with support for 'patient education' and

2 'monitoring' by pharmacists

	N	Patient education by pharmacists				Monitoring by pharmacists			
		Medications[a]	Exercise	Diet	All education[b]	Compliance	Treatment outcomes		Adverse drug reaction
							Perform clinical testings[d]	Check test results[e]	
Income									
Low	105	reference	reference	reference	reference	reference			reference
Moderate	54	NS	0.4 (0.17-0.90)	NS	NS	NS			NS
High	37	0.3 (0.10-0.72)	0.3 (0.10-0.80)	0.3 (0.12-0.61)	0.3 (0.10-0.68)	0.3 (0.10-0.72)			0.2 (0.09-0.53)
Employment									
Not working	123		reference		reference	reference	reference	reference	
Working	73		0.3 (0.15-0.83)		0.5 (0.24-0.94)	0.4 (0.21-0.88)	0.5 (0.24-0.97)	0.3 (0.15-0.74)	
Risk factors									
No	39								reference
Yes	157								3.4 (1.46-8.03)
Diabetes (glycaemic) control[f]									
Good/fair	23						reference	reference	reference
Poor	90						NS	4.9 (1.20-20.55)	3.2 (1.05-9.97)
Unknown	83						2.3 (1.22-4.51)	10.2 (2.44-42.95)	4.3 (1.36-13.57)
Previous use of the service									
No	[g]	reference	reference	reference	reference	reference	reference	reference	reference
Yes		4.5 (1.79-11.53)	10.3 (4.6-23.15)	4.4 (2.30-8.30)	4.5 (1.60-12.51)	5.2 (1.79-11.52)	13.6 (5.21-35.51)	11.3 (4.51-28.13)	6.3 (2.82-13.90)

3 [a] A composite variable – education related to antidiabetic medications: directions for use, use of insulin devices (calculated only from those currently/previously
4 taking insulin), storage, special precautions and common/important adverse effects; a mean rating ≥5 was used
5 [b] A composite variable – all education: disease process, treatment targets, antidiabetic medications, exercise, diet, self-monitoring of blood glucose,
6 prevention/treatment of acute complications, prevention/treatment of chronic complications, need for regular monitoring, foot self-care and smoking cessation
7 (calculated only from those currently, or had a history of, smoking); a mean rating ≥5 was used
8 [c] A composite variable – monitoring compliance with: antidiabetic medications, exercise and diet plan, plan for prevention/treatment of complications and
9 scheduled medical monitoring; a mean rating ≥5 was used
10 [d] A composite variable – perform clinical testings (measuring blood glucose, blood pressure and BMI); a mean rating ≥5 was used
11 [e] A composite variable – check test results (patient self-monitoring records and laboratory data); a mean rating ≥5 was used
12 [f] Diabetes (glycaemic) control is a composite variable of hyper/hypoglycaemia symptoms and HbA1c values
13 NS = not significantly different from the reference
14 [g] Numbers differ for each endpoint (service)