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RESEARCH ARTICLE

Evaluation of community pharmacy-based services for type-2 diabetes in an Indonesian setting: pharmacist survey

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Abstract *Background* Diabetes is an emerging chronic disease in developing countries. Currently the management of diabetes in developing countries is mainly hospital or clinic based. With burgeoning numbers of patients with diabetes, other models need to be evaluated for service delivery in developing countries. Community pharmacists are an important option for provision of diabetes care. Currently, data regarding practices of community pharmacists in diabetes care have been limited to developed countries. *Objectives* To evaluate current community pharmacy-based services and perceived roles of pharmacists in type 2 diabetes care, and characteristics (pharmacist and pharmacy) associated with current practice. *Setting* Community pharmacies in a developing country setting (Surabaya, Indonesia). *Methods* A questionnaire was administered to pharmacists managing a random sample of 400 community pharmacies in Surabaya, Indonesia. Current practice and pharmacists' perceived roles were rated using Likert scales, whilst an open-ended question was used to identify priority roles. Logistic regression models determined characteristics associated with current practice. *Results* A response rate of 60 % was achieved. Dispensing (100 %) and education on how to use medications (72.6 %) were common current pharmacy practices. More than 50 % of pharmacists were supportive towards providing additional services beyond dispensing. The highest priorities for services beyond dispensing were education on medications [i.e. directions for use (58.6 %) and common/important adverse effects (25.7 %)], education on exercise (36.5 %), education on diet (47.7 %), and monitoring medication compliance (27.9 %). Facilitators identified were: being perceived as part of a pharmacist's role (for all priority services), pharmacies with more than 50 diabetes customers per month (for diet education), and pharmacists' involvement in diabetes training (for compliance monitoring). The key barrier identified was lower pharmacist availability (for diet education as well as compliance monitoring). *Conclusions* Most community pharmacies in Surabaya, Indonesia have only provided a basic service of dispensing for type 2 diabetes patients. Many pharmacists believed that they should extend their roles particularly regarding patient education and monitoring. The development of pharmacist professional roles would assist in managing the burgeoning burden of diabetes. The identified facilitators/barriers provide baseline data to support the development of community pharmacy-based diabetes services.

Keywords Community pharmacist · Diabetes · Indonesia · Pharmacy services

Impacts of findings on practice

- Community pharmacists in Indonesia would like to have a more outspoken professional role in diabetes care.

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- Community pharmacists in Indonesia need to develop a community pharmacy model that helps to manage the increasing burden of diabetes.
- Barriers and facilitators identified in this study should assist the Government and the national bodies by providing baseline data supporting the development of a model to deliver diabetes services in community pharmacies in Indonesia.

Introduction

Diabetes is an emerging chronic disease in developing countries. Indonesia is a major developing country with a population of 237.6 million [1]. It was estimated that in 2013, 8.5 million people (an approximate prevalence of 3.6 %) were living with diabetes, and is expected to increase to 14.1 million by 2035 [2]. In developing countries such as Indonesia, diabetes is mainly managed in hospital outpatient or clinic settings [3, 4]. An opportunity exists for community pharmacists to assist with the management of the burgeoning population with diabetes by providing a range of services in the area of diabetes.

Community pharmacies in Indonesia are privately owned and have limited roles within the Government insurance plans [5]. Based on Government Regulations, a community pharmacy can be owned by a pharmacist and/or a non-pharmacist; regardless of the ownership, a pharmacist manager is required to be legally responsible for the pharmacy practice [6]. Further, at least one pharmacist must be available when the pharmacy is open [6]. They usually do not have computerised dispensing/patient record systems. In 2006, pharmaceutical care was included in the Indonesian legislation emphasising the need for community pharmacists' involvement in chronic diseases, including diabetes [7]. Based on the standards, pharmaceutical care should include: (1) prescription medication service (i.e. prescription review, drug supply/dispensing, drug information and counseling, and monitoring); (2) promotion and education; and (3) home/residential care [7]. The standards also recommend a pharmacy has a private counselling area/room to provide pharmaceutical care [7].

Currently, reports of community pharmacists involvement in diabetes care are limited to developed countries, such as the USA, the UK and other European countries [8–14]; thus, this study aims to provide data from a developing country setting (Indonesia). Indonesian studies have reported limited patient care was provided in community pharmacies; none was specific to diabetes care and they were limited by their small sample sizes [15–18]. This present study should provide baseline data to assist the Government and pharmacy national bodies in developing community pharmacy-based diabetes services in Indonesia.

Aim of the study

To evaluate, in an Indonesian setting, the extent of current community pharmacy-based services and perceived roles of pharmacists in type 2 diabetes care, and characteristics (pharmacist and pharmacy) associated with the current practice.

Methods

This study was approved by the Human Research Ethics Committee of Curtin University (PH-09-11) and *Ikatan Apoteker Indonesia*—IAI (Indonesian Pharmacists Association) (001/SK/BPD-IAI/SURABAYA/2010).

Setting and sample size

The study was conducted in Surabaya, the second largest city in Indonesia, with approximately 3.1 million inhabitants [19]. A list of community pharmacies in Surabaya was obtained from a survey performed in 2011 [20]. Community pharmacies located in specialist clinics other than cardiovascular/endocrinology/internal medicine were excluded due to their limited contact with type 2 diabetes patients, giving a sampling frame of 597 community pharmacies. A minimum sample size of 120 was required in the logistic regression analysis to identify associations between variables exhibiting a moderate effect size (80 % power, $\alpha = 0.05$). Hence, this study aimed to recruit one pharmacist from each of 200 pharmacies to provide more power to detect associations. Allowing for a 50 % response rate to the survey, a sample size of approximately 400 community pharmacies was considered adequate. A random sample was obtained using the SPSS Statistics version 17.0.

Data collection

Questionnaire development

The survey questionnaire consisted of three sections: (A) respondent pharmacist characteristics, (B) services for type 2 diabetes patients—current practice and perceived roles of pharmacists, and (C) pharmacy characteristics; in addition to an information sheet and a consent form. Section B contained a list of diabetes services that was based on a generic model generated from the literature [7, 21–

24]. A six-point Likert scale was used to reflect current practice (level of frequency of providing each service; 1 = never, 6 = always) and perceived roles (extent of agreement to each service; 1 = definitely no, 6 = definitely yes). To further explore priority roles, it included an open-ended question: '*In your opinion, what are the five most important services that should be provided at pharmacies for type 2 diabetes patients?'* The questionnaire was face and content validated by a panel of seven academics, two board members of the IAI and two Indonesian community pharmacists. Their feedback, where appropriate, was incorporated into the questionnaire.

The questionnaire (English version) then followed a translation process to an Indonesian version that was conceptually equivalent: (1) forward translation to Bahasa Indonesia by one of the investigators whose first language was Bahasa Indonesia, (2) back-translation to English by an independent English-first language translator, and (3) the back-translation was compared to the original version by two of the investigators whose first language was English. The forward-translation questionnaire (Bahasa Indonesia) was pre-tested by 10 community pharmacists in Surabaya. The pre-testing resulted in minor changes to the final questionnaire. It was administered twice with a 2-week interval to the same pharmacists; and test–retest reliability for diabetes services (Section B) were assessed using the Kappa statistic tests (where responses were grouped for Likert scale ratings of 1–4 vs. ratings 5–6). The resulting Kappa scores ranged from 0.41 to 1.00, corresponding to 'acceptable' to 'excellent' levels of test–retest reliability [25].

Questionnaire administration

First round—A seminar on new pharmacy regulations (a topic unrelated to the questionnaire) was conducted in July 2011. An invitation letter directed to 'The Pharmacist' was sent to the sample of 400 community pharmacies to attend the seminar. The invitation was limited to one pharmacist as a representative of his/her pharmacy and did not include any information the questionnaire would be distributed. At the beginning of the seminar, the questionnaire was distributed and the study was explained. Those who completed the questionnaire could submit at the seminar, while those who did not were asked for their responses by survey staff (via telephone or personal visit to the pharmacies). Second round—The same questionnaire was mailed in August 2011 to the remainder of the sample of community pharmacies whose pharmacists did not attend the seminar. A covering letter introducing the study was provided. After 4 weeks, the pharmacies were contacted by survey staff (via telephone or personal visit to the pharmacies) to ensure that the pharmacists had received the questionnaire and to seek responses.

Data analysis

SPSS Statistics version 19.0 was used for data analysis. Descriptive statistics summarised the characteristics of the respondents and their pharmacies (Sections A and C). Regarding diabetes services (Section B), frequencies were calculated for responses from Likert scales of current practice and perceived roles of pharmacists. Content analysis was used for responses from open-ended questions to select the five priority services that should be provided. These responses were coded, and frequencies were calculated.

Logistic regression models were developed to identify characteristics (pharmacy and pharmacist) associated with the current provision of diabetes services. Responses for current services were classified into binary variables which indicated 'regular service' (Likert scale ratings of 5 or 6) versus 'less frequent service' (Likert scale ratings of 1–4). Some of the services were merged if they related to the same theme, and a mean rating was calculated and converted into a binary variable as above. Pharmacist characteristics included gender, experience and diabetes training; and pharmacy characteristics included pharmacy setting (stand-alone/shopping mall complex/doctor clinic), pharmacy ownership, total number of customers, number of customers dispensed antidiabetic medications, and pharmacist availability. Pharmacist availability was calculated as a ratio of total reported pharmacist working hours per week to total pharmacy opening hours per week. The models also included an independent variable indicating perceived roles of pharmacists; this was classified into binary variables to indicate 'agreement' (Likert scale ratings of 5 or 6) versus 'disagreement' (Likert scale ratings of 1 to 4). A backward elimination strategy was used, whereby all independent variables were included initially, and then the least significant variables were dropped (one at a time) until the p value associated with each of the variables remaining in the model was <0.05.

Results

Response rate

From 400 questionnaires distributed, a total of 240 responses were useable; yielding a response rate of 60 %. This included: 143 responses to the 204 questionnaires distributed in the first round (response rate of 70.1 %); and 97 responses out of 196 questionnaires distributed in the second round (response rate of 50.5 %). A response rate of 240 from a sample of 597 community pharmacies with a confidence interval of 95 % has a precision of ±4.8 % in any estimate. The characteristics of respondent pharmacists (Section A)

and their responses to the questions related to diabetes services (Section B) were not significantly different between the first and second rounds (p values >0.05).

Pharmacist and pharmacy characteristics

The characteristics of respondent pharmacists (Section A) and their premises (Section C) are summarised in Table 1.

Most respondents were female (median age of 37 years), and were pharmacist managers. The term 'pharmacist manager' was defined as a pharmacist who was legally responsible for a pharmacy. A majority had more than 5 years registration experience (59.2 %), and received diabetes training in the last year (57.1 %).

Most respondents worked at pharmacies reported as stand-alone (63.6 %) and owned by proprietors (69.9 %). The term 'proprietor' described a non-'pharmacist manager' owner. 'Pharmacist manager' ownership accounted for 30.1 % of pharmacies. The median opening hours of the pharmacies was 14 h per day, and most pharmacies had only one pharmacist on the staff, i.e. the pharmacist manager. To evaluate the notional pharmacist availability in each pharmacy, a ratio of total pharmacist working hours per week to total pharmacy opening hours per week was calculated. This ranged from 0.0 to 2.1; with most pharmacies having ratios of less than 1.0 (83.7 %). Hence, many pharmacies had no pharmacist on duty at some time during the week when the pharmacy was open.

Approximately 40 % of the pharmacies had between 1000 to 2000 customers per month, and 51 to 100 patients with diabetes per month. A private room/area dedicated for counseling was provided in 21.8 % of pharmacies.

Current pharmacy-based diabetes services and perceived roles

All respondent pharmacists reported dispensing activities. Services other than dispensing were limited. The only frequent service reported by the majority of respondents was 'patient education' on medications, particularly directions for use (72.6 %). Responses describing the current practice are summarised in Table 2.

Pharmacists' perceived roles in diabetes care are also summarised in Table 2. All respondents agreed about their traditional role of dispensing. In addition, more than 50 % agreed that all activities listed within 'initial assessment', 'treatment plan', 'patient education', 'monitoring', and 'review' were pharmacists' roles.

In terms of priority roles, pharmacists' responses can be seen in Table 3. The top five services listed as priorities were education on medications [i.e. directions for use (58.6 %) and common/important adverse effects (25.7 %)],

Table 1 Pharmacist and pharmacy characteristics (N = 240)

Pharmacist characteristics	n (%)
Gender	
Male	38 (15.8)
Female	202 (84.2)
Age, years—median (range)	37 (23–79)
Year of registration, median (range)	2000 (1962–2010)
Position	
Pharmacist manager as well as owner	63 (26.3)
Pharmacist manager	161 (67.1)
Other pharmacist	16 (6.6)
Years of experience as community pharmacist	
≤5 years	98 (40.8)
6–10 years	64 (26.7)
>10 years	78 (32.5)
Diabetes training/continuing education in last year	
None	103 (42.9)
1–5 h	90 (37.5)
6–10 h	23 (9.6)
>10 h	24 (10.0)
Pharmacy characteristics	**n (%)[a]**
Setting	
Stand alone	152 (63.6)
Pharmacy within shopping mall complex	10 (4.2)
Pharmacy within doctor clinics	77 (32.2)
Ownership	
Pharmacist manager as owner	45 (18.8)
Single or group proprietor[b]	139 (69.9)
Partnership proprietor–pharmacist manager	27 (11.3)
Opening days per week, median (range)	7 (6–7)
Opening hours per day, median (range)	
Monday—Saturday (N = 239 pharmacies)	14 (5–24)
Sunday (N = 153 pharmacies)	13 (2–24)
Counselling area/room	52 (21.8)
No. of pharmacists per pharmacy, median (range)	1 (1–4)
Customers per month	
≤1000	93 (38.8)
1001–2000	97 (40.6)
>2000	49 (20.5)
Customers purchasing oral antidiabetic medications per month	
≤50	93 (38.9)
51–100	108 (45.2)
>100	38 (15.9)
Customers purchasing insulin per month	
≤10	217 (90.8)
10–50	19 (7.9)
>50	3 (1.2)

[a] 1 missing response for all of the pharmacy variables, giving a total N = 239

[b] Proprietor is defined as either non-pharmacist or pharmacist (other than the pharmacist manager) owner

Table 2 Current pharmacy-based services for type 2 diabetes patients and perceived roles of pharmacists (N = 240)

Diabetes services	Being regularly provided n (%)[a]	Being viewed as "part of roles" n (%)[b]
Dispensing		
Prepare medications	240 (100.0)	240 (100.0)
Provide labels on directions for use	240 (100.0)	240 (100.0)
Services beyond dispensing		
Initial assessment		
Patient history[c]	42 (17.5)	149 (62.1)
Baseline physical examination (e.g. measure weight/height, blood pressure)	33 (13.8)	134 (55.9)
Baseline test (e.g. check blood glucose)	50 (20.9)	151 (62.9)
Treatment plan[d]	37 (15.4)	140 (58.3)
Patient education		
Disease process	41 (17.1)	150 (62.5)
Treatment targets	60 (25.0)	161 (67.1)
Antidiabetic medications:		
Directions for use	174 (72.6)	215 (89.6)
Use of insulin devices	103 (43.0)	203 (84.6)
Storage requirements	147 (61.3)	206 (85.9)
Special precautions to follow	135 (56.3)	199 (82.9)
Common/important adverse effects	128 (53.4)	197 (82.1)
Exercise	95 (39.6)	175 (72.9)
Diet	112 (46.7)	184 (76.7)
SMBG	97 (35.0)	172 (71.7)
Prevention/treatment of acute complications	69 (28.7)	169 (70.4)
Prevention/treatment of chronic complications	58 (24.2)	163 (67.9)
Needs for regular medical monitoring	41 (17.1)	138 (57.5)
Foot self-care	38 (16.1)	141 (58.7)
Smoking cessation	93 (38.9)	177 (73.7)
Monitoring		
Monitor compliance with:		
Antidiabetic medications	67 (28.0)	172 (71.7)
Exercise plan	47 (19.6)	137 (57.1)
Diet plan	62 (25.8)	152 (63.4)
Plan for prevention/treatment of chronic complications	39 (16.2)	148 (61.7)
Scheduled medical monitoring	31 (13.0)	133 (55.4)
Monitor treatment outcomes:		
Check records on SMBG	37 (15.5)	153 (63.7)
Carry out blood glucose tests	53 (22.1)	154 (64.2)
Measure BMI	17 (7.1)	122 (50.9)
Measure blood pressure	47 (19.6)	147 (61.2)
Check results on laboratory tests	38 (15.8)	144 (60.0)
Monitor for adverse effects	41 (17.1)	160 (66.7)
Review[e]	40 (16.7)	146 (60.8)

SMBG self-monitoring of blood glucose, *BMI* body mass index

[a] Percentages of Likert scale ratings of 5 and 6 (1 = never, 6 = always)

[b] Percentages of Likert scale ratings of 5 and 6 (1 = definitely no, 6 = definitely yes)

[c] A composite variable—taking patient history: age, duration of diabetes, lifestyle, family history of diabetes, presence of other cardiovascular risk factors, knowledge about diabetes, diabetes treatment, history of acute and chronic complications, psychosocial status, history of other medical conditions; a mean rating ≥5 was used

[d] A composite variable—involvement in the treatment plan: set of individualised treatment targets; and development of treatment plans involving antidiabetic medications, exercise, diet and prevention/treatment of chronic complications; a mean rating ≥5 was used

[e] A composite variable—review comprised of referral, treatment adjustment and education adjustment; a mean rating ≥5 was used

education on exercise (36.5 %), education on diet (47.7 %), and monitoring medication compliance (27.9 %). Presumably, the low priority assigned to dispensing was because it was acknowledged as part of the current practice.

Characteristics associated with the current provision of pharmacy-based diabetes services

Logistic regression models were used to identify characteristics (pharmacist and pharmacy) associated with the current practice. The odds ratios of significant characteristics are summarised in Table 4.

Respondent pharmacists who considered a service was part of their roles were more likely to provide the service. Other facilitators identified were pharmacies with more than 50 diabetes customers per month (for diet education services) and pharmacists' involvement in diabetes training (for compliance monitoring services). A barrier identified for providing diet education and compliance monitoring services was lower pharmacist availability.

Discussion

This study achieved a response rate of 60 % giving a precision of ± 4.8 % (95 % confidence interval) for any estimate which was adequate for statistical analyses. A higher response rate was reported for the first round compared to the second round, however, no significant differences were found in the responses related to diabetes services between these rounds. There is a possibility of some non-respondents not sharing the same practice and/or views of respondents, hence, some caution should be exercised in generalising the findings. It should be emphasised, however, that non-respondents were working at pharmacies which were not different in terms of the socio-economics of their geographical locations compared with respondents ($p = 0.88$) [26]. In addition, the characteristics of respondents compared well with respect to gender and age data of community pharmacists registered in Surabaya (2006–2011) [27] and a previous study of community pharmacists in Jakarta, Indonesia [15]. The characteristics of pharmacy premises in this study were comparable to previous studies in Jakarta regarding ownership [15] and number of customers [18]. As part of this study was requesting information on future services there is a possibility of respondents being more positive about them than might be the case when it comes to implementation. There was however no reason for them to overstate their views.

Table 3 Open-ended views on priority pharmacy-based services for type 2 diabetes patients (N = 222)[a]

Priority diabetes services[b]	n (%)
Dispensing	
Prepare medications	30 (13.5)
Provide labels on instructions for use	43 (19.4)
Services beyond dispensing	
Initial assessment	
Patient history:	
Diabetes treatment	14 (6.3)
Patient education	
Diabetes process (including complications)	20 (9.0)
Antidiabetic medications:	
Directions for use	130 (58.6)
Use of insulin devices	20 (9.0)
Storage requirements	38 (17.1)
Special precautions to follow	17 (7.7)
Common/important adverse effects	57 (25.7)
Exercise	81 (36.5)
Diet	106 (47.7)
Self-monitoring of blood glucose	32 (14.4)
Prevention/treatment of acute complications	21 (9.5)
Prevention/treatment of chronic complications	20 (9.0)
Need for regular medical monitoring (e.g. blood glucose levels)	13 (5.9)
Monitoring	
Monitor compliance with:	
Antidiabetic medications	62 (27.9)
Monitor treatment outcomes:	
Check records on SMBG	21 (9.5)
Carry out blood glucose tests	45 (20.3)
Measure blood pressure	22 (9.9)
Check results on patient laboratory tests	12 (5.4)
Monitor for adverse effects	15 (6.8)
Review	
Refer patients if necessary	11 (5.0)
Others (not a specific service)	
Develop PMRs (obtain patient history)	17 (7.7)
Provide diabetes education	32 (14.4)

Responses to an open-ended question: *'In your opinion, what are the five most important services that should be provided at pharmacies for type 2 diabetes patients?'*

SMBG self-monitoring of blood glucose, *PMR* patient medication record

[a] From a total of 240 respondents, there were 5 missing responses, 13 invalid responses; giving a total N = 222

[b] Services selected by more than 10 respondents

Table 4 Odds ratios and 95 % confidence intervals of significant characteristics associated with the current provision of services for type 2 diabetes patients ('patient education' and 'monitoring')

Characteristics	Patient education				Monitoring			
	Medications[a]	Physical activity	Diet	All education[b]	Compliance[c]	Treatment outcomes		Adverse drug reactions
						Perform clinical testings[d]	Check test results[e]	
Diabetes training								
No					Reference	Reference		Reference
Yes					4.4 (1.69–11.70)	4.7 (1.45–15.06)		3.7 (1.58–8.76)
Setting								
Not within doctor clinic						Reference	Reference	Reference
Within doctor clinic						5.1 (1.84–13.98)	2.6 (1.02–6.5)	4.1 (1.47–11.49)
Counselling area								
No				Reference				
Yes				3.7 (1.63–8.38)				
Customers purchasing oral antidiabetics								
≤50			Reference			Reference	Reference	
>50			2.6 (1.38–4.73)			3.8 (1.16–12.50)	3.3 (1.08–10.14)	
Pharmacist availability[f]								
Low			0.3 (0.17–0.70)	0.3 (0.15–0.69)	0.2 (0.05–0.73)	0.1 (0.03–0.71)	NS	NS
Moderate			Reference	Reference	Reference	Reference	Reference	Reference
High			NS	NS	NS	NS	3.6 (1.40–9.44)	2.2 (1.03–4.91)
Views								
Not part of their role	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Part of their role	3.7 (2.25–6.11)	4.2 (2.71–6.56)	3.5 (2.32–5.24)	4.3 (2.04–9.09)	5.4 (2.50–11.51)	5.0 (2.09–12.20)	3.5 (1.70–7.08)	3.6 (1.95–6.80)

NS not significantly different from the reference

[a] A composite variable—education related to antidiabetic medications: directions for use, use of insulin devices (calculated only from those who were currently/previously taking insulin), storage, special precautions and common/important adverse effects; a mean rating ≥5 was used

[b] A composite variable—all education items: disease process, treatment targets, antidiabetic medications, exercise, diet, self-monitoring of blood glucose, prevention/treatment of acute complications, prevention/treatment of chronic complications, need for regular monitoring, foot self-care and smoking cessation (calculated only from those currently, or had a history of, smoking); a mean rating ≥5 was used

[c] A composite variable—monitoring compliance with: antidiabetic medications; exercise and diet plan; plan for prevention/treatment of complications; and scheduled medical monitoring; a mean rating ≥5 was used

[d] A composite variable—performing clinical testings (i.e. measuring blood glucose, blood pressure and BMI); a mean rating ≥5 was used

[e] A composite variable—checking test results (i.e. SMBG and laboratory data); a mean rating ≥5 was used

[f] Ratio of total pharmacist working hours per total pharmacy opening hours (low < 0.17, moderate = 0.17–0.75, high > 0.75)

Current pharmacy-based diabetes services and perceived roles

While dispensing was well established as part of community pharmacy practice in Surabaya, services beyond dispensing were only provided to a limited extent. The most common practice was providing basic medication education on directions for use. Supporting this, studies in developed countries have reported that most pharmacists frequently counseled patients on aspects of their medications, such as administration [8, 9, 11, 12] and adverse effects [8]. However, pharmacists were also reported to play important roles in providing education on lifestyle and smoking cessation [8, 9], supporting patients for self-monitoring of blood glucose (SMBG) [8, 12, 14], and monitoring compliance with medications [8]. Monitoring treatment outcomes and involvement in the treatment plan have been reported as less common practices [8, 9, 12, 13], which was also evident in this Indonesian study.

Despite their limited provision of services beyond dispensing, the majority of community pharmacists in Surabaya agreed that they should extend their services. Services listed as priorities in the open-ended question included education on medications and lifestyle, and monitoring compliance with medications. Studies in developed countries also shared pharmacists' preferences around education and monitoring services, such as: education on medications [9, 12, 28, 29], healthy lifestyle [28], and SMBG [12, 28]; as well as monitoring compliance with medications [28], performing blood glucose tests [12], and providing feedback of glycaemic control [9, 29]. It has been reported that most Indonesian doctors spend little time to adequately counsel and educate their patients [30], thus pharmacists could contribute to filling this void.

Characteristics associated with the current provision of pharmacy-based diabetes services

The regression models demonstrated that when a service was perceived as being part of a pharmacist's role that perception was a facilitator for providing a range of patient services (Odds Ratios, ORs $\geq$ 3.5). Supporting this, a Norwegian study reported that pharmacists working in pharmacies offering diabetes services scored significantly higher agreement towards the service provision than those working in pharmacies that did not offer them [12].

Either a higher level of pharmacist availability (facilitator; ORs $\geq$ 2.2) or a lower level of pharmacist availability (barrier; ORs $\leq$ 0.3) was associated with the provision of several patient education and monitoring activities (Table 4). It is a legal requirement that a pharmacist is in attendance when the pharmacy is open [6]. In this study, however, less than 20 % of the pharmacies in Surabaya potentially had pharmacists available throughout their opening hours. Factors contributing to this may include weak monitoring systems and law enforcement, making the implementation dependent on the pharmacists' commitment. Since the majority of pharmacies were owned by proprietors (non-'pharmacist manager' owners), their commitment is also likely to influence this practice. This study found that more pharmacies owned by pharmacist managers had pharmacists available during all opening hours compared to those owned by proprietors (30.6 vs. 10.2 %, respectively; $p < 0.001$). Low pharmacist availability may reflect proprietors being more 'business' orientated, supplying medication in less expensive ways without using pharmacists. Some pharmacists would only be employed for legal purposes, leading to reduced salary costs. Because of poor salaries and shorter hours, pharmacists may take on other jobs leading to them not being available at pharmacies. Studies in Jakarta, Indonesia, reported that around 70 % of pharmacists worked in community pharmacies as their secondary jobs [15, 18].

This study showed low utilisation of community pharmacies by the public, which may contribute to their inability to provide resources, including maintaining pharmacist availability. The majority of community pharmacies reported having less than 2000 customers per month; this is considerably lower than the Australian figure (approximately 1400 customers per week) despite comparable ratios of population per pharmacy between Surabaya, Indonesia, and Australia (approximately 1:5000) [31]. In 2012, about 65 % of the Indonesian population was covered by some form of insurance plan, largely through *Jamkesmas* (the Government insurance plan for the poor/near poor) [32], in which their medications can be supplied at health centres. Those who can afford care preferred hospitals or clinics [3, 4], thus their medications were mainly supplied from hospital/clinic-based pharmacies. Many drug-stores/markets are also known to sell prescription drugs despite being licensed to sell only non-prescription drugs [5]. All of these factors may contribute to the lower number of customers in community pharmacies. The implementation of *Jaminan Kesehatan Nasional*—JKN (National Health Coverage) in 2014 should provide an opportunity to better integrate community pharmacy services into the health system, enabling their better utilisation [33].

This study found that pharmacists' involvement in diabetes training was a facilitator (ORs $\geq$ 3.7) for providing some education and monitoring activities. Supporting this, studies in Australia and Canada have shown that pharmacists involved in diabetes training provided more activities related to diabetes management when compared to untrained pharmacists [8, 31]. In Indonesia, it was not until 2008 that pharmacotherapy subjects were incorporated into

the national pharmacy curricula, as a basis for providing patient care. Thus, the IAI should consider organising formal general diabetes training to upskill the earlier graduates.

Pharmacies with counselling areas, or within doctor clinics, or with a higher number of diabetes customers were more likely to provide some education and monitoring activities (ORs $\geq$ 2.6). Nevertheless, only a small number of pharmacies (21.7 %) had a counselling area/room. This study also indicated that pharmacies within doctor clinics might present opportunities for pharmacists to build professional relationships with the doctors, encouraging the provision of additional services. Close proximity of practice sites was one of the facilitators for developing an effective collaboration [34]. Moreover, higher customer numbers might be correlated with higher turnover and thus affordability for the pharmacy to provide more services (e.g. maintaining pharmacist availability, employing adequate staff, diabetes training). An Australian study reported that higher turnover was one of the predictors for providing diabetes care [31].

Conclusions

Community pharmacies in Surabaya, Indonesia mainly provide basic services of dispensing for type 2 diabetes patients; however, there is scope for the current number of community pharmacies to provide a range of diabetes services. There is support from pharmacists to expand their current service provision around patient education and monitoring. The development of additional pharmacist professional services would provide an avenue for Indonesia to manage the burgeoning numbers of diabetes patients. The facilitators/barriers identified in this study should assist the Government and pharmacy national bodies by providing baseline data supporting the development of community pharmacy-based diabetes services.

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Ethical standard This study was approved by the Human Research Ethics Committee of Curtin University (PH-09-11) and *Ikatan Apoteker Indonesia*—IAI (Indonesian Pharmacists Association) (001/SK/BPD-IAI/SURABAYA/2010).

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