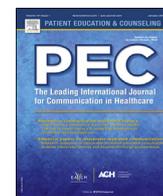




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# Patient Education and Counseling

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## 1 Preferences for pharmacist services to enhance medication 2 management among people with diabetes in Indonesia: 3 A discrete choice experiment

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### ABSTRACT

**Objectives:** To elicit patients' preferences for pharmacist services that can enhance medication management among people with diabetes in Indonesia.

**Methods:** A discrete choice experiment (DCE) among 833 respondents with diabetes in 57 community health centers (CHCs) and three hospitals in Surabaya, Indonesia. Consultation was the baseline service. Four attributes of consultation and two attributes of additional services were used in the DCE profiles based on literature and expert opinion. The DCE choice sets generated were partially balanced and partially without overlap. Random effect logistic regression was used in the analysis.

**Results:** Respondents preferred a shorter duration of consultation and flexible access to the pharmacist offering the consultation. A private consultation room and lower copayment (fee) for services were also preferred. Respondents with experience in getting medication information from pharmacists, preferred to make an appointment for the consultation. Total monthly income and experience with pharmacist services influenced preferences for copayments.

**Conclusion:** Differences in patients' preferences identified in the study provide information on pharmacist services that meet patients' expectations and contribute to improve medication management among people with diabetes.

**Practice implication:** This study provides insight into evaluating and designing pharmacist services in accordance with the preferences of people with diabetes in Indonesia.

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## 11 1. Introduction

12 Medication management is essential for the optimal treatment  
13 of diabetes. Poor medication management increases the risk of  
14 complications and results in higher medical costs. The prevalence  
15 of poor medication management among people with diabetes is  
16 high and varies between 36–93 % worldwide, as reported by two  
17 systematic reviews [1,2].

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18 Pharmacists, as part of a diabetes care team, can contribute to  
19 increased medication management by collaborating with the  
20 physician. The transition from product-oriented retail to patient-  
21 oriented service provider enables pharmacists to integrate their  
22 position in the diabetes care team to provide a holistic approach to  
23 diabetes care [3]. A recent systematic review shows that many  
24 pharmacist services have been developed to improve medication  
25 management among people with diabetes, such as consultation,  
26 brochures/leaflets, medication review, patient group discussions,  
27 and telephone calls. These various services are shown to have a  
28 significant impact on improving glycemic goal and medication  
29 taking [4].

30 The variety of pharmacist services in the literature raises the  
31 question of which one is the most suitable to apply. Many factors  
32 influence the effectiveness of services, and these factors might  
33 differ between countries and regions. In particular, patient

34 preferences need to be considered and explored before imple- 97  
35 menting such services because these preferences, to a great extent, 98  
36 determine the service outcomes. The pharmacists' role in patient 99  
37 care needs to be tailored to the patients' needs and expectations. 100  
38 Deciding on suitable services is a challenge, and for that reason, 101  
39 insight into patient preferences is essential. A discrete choice 102  
40 experiment (DCE) is one of the methods to elicit preferences [5,6]. 103  
41 Several studies have used DCE to obtain information on patient 104  
42 preferences for pharmacist services [7-14]. Still, only a few studies 105  
43 have explicitly focused on preferences for services that help to 106  
44 improve medication management among people with diabetes 107  
45 [10,14,15]. 108

46 In Indonesia, pharmacists in medical facilities are expected to 109  
47 provide services based on pharmaceutical care standards, 110  
48 including dispensing medication as well as consultation, medi- 111  
49 cation review, telephone calls, and other services mentioned 112  
50 above [16,17]. In practice, however, many pharmacists cannot 113  
51 offer all types of services because of time and resource limitations 114  
52 [18]. Thus, pharmacist care provision differs depending on the 115  
53 medical facility. Moreover, there are public and private medical 116  
54 facilities in the Indonesian health system with different service 117  
55 policies. 118

56 This study elicits preferences for pharmacist services that can 119  
57 improve medication management among people with diabetes in 120  
58 Surabaya, Indonesia. No published studies on patient preferences 121  
59 in Indonesia are currently available. The prevalence of poor 122  
60 medication management is high in Indonesia (more than 40 % of 123  
61 patients do not adhere to recommended treatment) [19-21], as 124  
62 was also shown in a study in three districts in Surabaya, Indonesia, 125  
63 among older people with diabetes (81.03 % non-adherence) [22]. 126  
64 Limited resources and a high number of patients in the community 127  
65 health centers (CHCs) in Indonesia encourage pharmacists to 128  
66 contribute by giving optimal services to the patient without 129  
67 interfering with the physician's role. There is limited information 130  
68 on the specific types of pharmacist services that meet patients' 131  
69 needs in Indonesia. This study provides insight into which 132  
70 pharmacist services are preferred by people with diabetes in 133  
71 CHCs and hospitals in Indonesia. 134

## 72 2. Methods 135

### 73 2.1. Study design 136

74 The DCE method was used to elicit preferences for pharmacist 137  
75 services among people with diabetes. The DCE consisted of several 138  
76 choice sets and each set contained two profiles of pharmacist 139  
77 services that can improve medication management [6]. The 140  
78 profiles were described through attributes with varying attribute 141  
79 levels. The selection of attributes and attribute levels are 142  
80 subsequently explained. First, consultation was used as the 143  
81 baseline service because it is one of the most common pharmacist 144  
82 services used to improve medication management [4]. Consulta- 145  
83 tion was defined as an interaction between pharmacists and 146  
84 patients regarding medication use and problems. Second, educa- 147  
85 tional based services (brochure or patient group discussion) and 148  
86 behavioral-based services (medication review or telephone call 149  
87 refill reminder) were included as additional services to this 150  
88 baseline consultation service. These services were presented in the 151  
89 DCE in the form of two attributes (educational-based services and 152  
90 behavioral-based services) with three levels. Third, in addition to 153  
91 these service attributes, there were four additional attributes 154  
92 related to the consultation itself (duration of consultation, place for 155  
93 consultation, access to pharmacist, and patient copayment) with 156  
94 two levels. The attributes were identified based on the literature 157  
95 [9,12], and discussion with pharmacists with experience in 158  
96 healthcare services research in Indonesia [23]. This process

159 allowed us to identify the appropriate attributes related to 160  
161 pharmacist care services in the Indonesian context. For example, 162  
163 access to pharmacists was included because, in Indonesia, not all 164  
165 pharmacists provide consultation immediately when the patient 166  
167 arrives at the pharmacy. 168

169 In total, 64 profiles were generated from the combination of all 170  
171 attributes and attribute levels. A subset of 16 profiles was chosen 171  
172 using the orthogonal main effect fractional factorial design method 172  
173 (software SPSS). This method was selected because it produces a 173  
174 subset with a minimum number of profiles compared to other 174  
175 designs, and thus it offers relative efficiency [24]. To apply this 175  
176 method, we made sure that there is no dependency between the 176  
177 levels of the different attributes, i.e., each combination of attribute 177  
178 levels was possible in practice [6]. The profiles in the selected 178  
179 subset showed to be partly balanced and partly overlapped. One 179  
180 profile out of 16 profiles was chosen as the baseline profile, and the 180  
181 others were used as the alternatives. This baseline profile was 181  
182 determined based on the average behavior of patients in Indonesia. 182  
183 It was neither the best nor the worst profile to minimize bias. This 183  
184 kind of study was the first one conducted in Indonesia and we were 184  
185 not sure about the response rate. Therefore, we did not test the 185  
186 other baseline profiles using a block design, for example. A total of 186  
187 16 choice sets were generated. Each choice set contained the 187  
188 baseline and one of the alternative profiles. The first-choice set was 188  
189 repeated to be able to investigate the consistency of the responses. 189  
190 The place of the baseline profile varied across the DCE choice sets 190  
191 to reduce potential response bias. No opt-out option was provided 191  
192 in the DCE, assuming that pharmacists should generally offer at 192  
193 least some services to the patients to help improve medication 193  
194 management. 194

### 195 2.2. Questionnaire and pre-test 196

197 The questionnaire first included questions regarding prefer- 197  
198 ences for the attribute of pharmacist services. This was followed by 198  
199 the DCE questions. Appendix A presents the English wording of the 199  
200 DCE questions and preference questions. The face validity of the 200  
201 questionnaire was checked with the help of ten potential 201  
202 respondents. These potential respondents were asked to fill in the 202  
203 questionnaire and explain their understanding of the ques- 203  
204 tions, which provided input on improving the questionnaire before 204  
205 the data collection process. The principal researcher recruited and 205  
206 gave a briefing to four research assistants on how to conduct 206  
207 interviews using the questionnaire and how to ask the questions 207  
208 for the DCE. 208

209 Ethical approval was obtained from the Institutional Ethical 209  
210 Committee University of Surabaya (067/KE/II/2019); letter of data 210  
211 collection approval in CHCs was obtained from the Surabaya City 211  
212 Health Office (072/9061/436.7.2/2019); letter of data collection 212  
213 approval in one public hospital (070/6236/43,686/2019), two 213  
214 private hospitals (Kp.2.07/2/18/PT.PHC-2019 and 934/RSHU/Dir./V/ 214  
215 2019) in Surabaya, Indonesia. 215

### 216 2.3. Respondents and data collection 217

218 The data collection was carried out in Surabaya, Indonesia, in 218  
219 February-November 2019 by the four research assistants. Two 219  
220 groups of respondents were sampled from 57 CHCs and three 220  
221 hospitals. The minimal sample needed in the study was 391 for 221  
222 CHCs and 381 for hospitals. Details on the calculation of the 222  
223 sample size can be found in Appendix B. The respondents in each 223  
224 sample were selected by the research assistants with the help of 224  
225 pharmacists and nurses in each medical facility as follows: each 225  
226 outpatient who visited the CHC or hospital, and met the inclusion 226  
227 criteria, received an explanation about the study and was asked to 227  
228 participate. The study only included adult people (>18 years old) 228

with diabetes who were taking diabetes medication and visited CHCs or hospitals included in the study. Respondents who had difficulties communicating with others and all inpatients with diabetes were excluded from this study.

Respondents who were willing to participate were asked to sign a letter of informed consent. Each respondent then answered the questions included in the questionnaire while waiting for their medication in the presence of a research assistant who registered the answers. Respondents did not participate in any real intervention and were only asked to respond to the questions. Keycards were used to visualize the possible answers for the respondents. This method helped the respondents to remain focused, especially in answering the DCE questions.

#### 2.4. Data analysis

Data on the respondents' socio-demographic characteristics and preferences for attribute levels were analyzed using descriptive statistics. The analysis of the DCE data was based on random utility theory (RUT) [25,26]. Since the same baseline profile was included in all DCE questions, the responses to these questions (the dependent variable) were treated as binary (0 = choose the baseline profile 1 = choose the alternative profile). Thus, a random effect logistic regression was used to analyze the DCE data (software package STATA 15 SE version). The independent variables included in this study were variables that show the differences in attribute levels in each choice set, as well as interactions between the differences in the levels of the attributes and patient socio-demographic characteristics.

First, the main effect models were estimated, i.e., using only the attribute differences as independent variables. Then, full models were estimated by including the attribute differences and interactions between attribute differences and socio-demographic profiles. The odds ratios (ORs) were also estimated. The marginal rate of substitution (MRS) was calculated for each non-price

(copayment) attribute as the ratio between the coefficient of that price attribute and the coefficient of the non-price attribute:

$$MRS = - \frac{\alpha_n}{\alpha_{price}}$$

Where  $\alpha_n$  is the coefficient related to the difference in a given non-price attribute, and  $\alpha_{price}$  is the coefficient related to the difference in the price attribute. The MRS can be interpreted as the willingness to trade off higher price for a change in a given attribute; in this case, respondents' willingness to trade off higher copayment for a change in the attribute level of pharmacist services.

### 3. Results

The response rate for the CHCs and hospitals was 91.95 % and 95.07 %, with a total of 457 and 579 completed questionnaires, respectively. The inconsistency indicator detected 83 and 120 respondents in the CHCs and hospitals with inconsistent answers, respectively. The DCE analysis was only performed for the respondents with consistent answers. Binary regression analysis on the inconsistency indicator showed that only respondents in CHCs who sometimes missed to take their medication more often gave inconsistent answers (Appendix C).

The socio-demographics of the respondents can be found in Table 1. Respondents from hospitals tended to have a longer duration of diabetes, comorbidities, and higher educational background compared to the CHCs. Respondents in CHCs had lower total monthly income profiles compared to hospitals. There was no association between the total monthly income, educational background, and comorbidities based on the correlation test for respondents in hospitals.

#### 3.1. Preferences for attribute levels

Details on the preferences for attribute levels stated by the respondents prior to the DCE can be found in Table 2. Most

**Table 1**  
Socio-demographics and characteristics of the respondents.

Characteristics variables	Value range	Community health centers		Hospitals	
		Frequency	Mean ± St.Dev.	Frequency	Mean ± St.Dev.
Age	≤ 60 years old	213 (56.95 %)	58.77 ± 9.525	220 (47.93 %)	60.93 ± 8.981
	> 60 years old	161 (43.05 %)		239 (52.07 %)	
Duration of diabetes	≤ 60 months/5 years	245 (65.51 %)	69.43 ± 73.012	174 (37.91 %)	100.24 ± 91.14
	> 60 months/5 years	129 (34.49 %)		285 (62.09 %)	
Gender	Male	94 (25.13 %)	0.75 ± 0.434	123 (26.80 %)	0.73 ± 0.443
	Female	280 (74.87 %)		336 (73.40 %)	
Comorbidity	No comorbidity	132 (35.29 %)	0.65 ± 0.479	79 (17.21 %)	0.83 ± 0.378
	With comorbidity	242 (64.71 %)		380 (82.79 %)	
Marital status	Single/widowed/divorce	109 (29.14 %)	0.71 ± 0.455	136 (29.63 %)	0.70 ± 0.457
	Married/living together	265 (70.86 %)		323 (70.37 %)	
Educational background	Other educational background	343 (91.71 %)	0.08 ± 0.2	394 (85.84 %)	0.14 ± 0.349
	Higher educational background	31 (8.29 %)		65 (14.16 %)	
Work status	Do not work/retired	262 (70.05 %)	0.30 ± 0.459	371 (80.83 %)	0.19 ± 0.394
	Work	112 (29.95 %)		88 (19.17 %)	
Total monthly income <sup>a</sup>	< 1.400.000 IDR	181 (48.40 %)	0.52 ± 0.500	160 (35.01 %)	0.65 ± 0.478
	≥ 1.400.000 IDR	193 (51.60 %)		297 (64.99 %)	
Ability to cover for the household expenses	Yes	313 (83.69 %)	1.16 ± 0.370	393 (85.62 %)	1.14 ± 0.351
	No	61 (16.31 %)		66 (14.38 %)	
The needs of help to take medication from others	No	349 (93.32 %)	0.07 ± 0.250	380 (82.79 %)	0.17 ± 0.378
	Yes	25 (6.68 %)		79 (17.21 %)	
Missed to take medication in the past two months	No	231 (61.76 %)	0.38 ± 0.487	325 (70.81 %)	0.29 ± 0.455
	Yes	143 (38.24 %)		134 (29.19 %)	
Source of medication information	Non-pharmacist	106 (28.34 %)	0.72 ± 0.451	232 (50.54 %)	0.49 ± 0.501
	Pharmacist	268 (71.66 %)		227 (49.46 %)	

<sup>a</sup> 10,000 Indonesian Rupiah (IDR) ≈ 0.74 USD.

**Table 2**  
Preferences for attribute levels of pharmacist services.

Attributes	Level	Community health centers		Hospitals	
		Frequency	Mean ± St.Dev.	Frequency	Mean ± St.Dev.
Duration of the service	20 min	346 (92.51 %)	0.07 ± 0.263	384 (83.66 %)	0.16 ± 0.370
	40 min	28 (7.49 %)		75 (16.34 %)	
Place for consultation	Private room	149 (39.84 %)	0.60 ± 0.490	227 (49.46 %)	0.51 ± 0.501
	Common area	225 (60.16 %)		232 (50.54 %)	
Access to pharmacist	Walk at any day	329 (87.97 %)	0.12 ± 0.326	365 (79.52 %)	0.20 ± 0.404
	Appointment	45 (12.03 %)		94 (20.48 %)	
Patient copayment	Free of charge	361 (96.52 %)	0.03 ± 0.183	443 (96.51 %)	0.03 ± 0.184
	10.000 IDR*	15 (3.48 %)		16 (3.49 %)	
Brochure/leaflet	No	243 (64.97 %)	0.35 ± 0.478	241 (52.51 %)	0.47 ± 0.500
	Yes	131 (35.03 %)		218 (47.49 %)	
Patient group discussion	No	159 (42.51 %)	0.58 ± 0.495	271 (59.04 %)	0.41 ± 0.492
	Yes	215 (57.49 %)		188 (40.96 %)	
Medication review	No	261 (69.79 %)	0.30 ± 0.460	213 (46.41 %)	0.54 ± 0.499
	Yes	113 (30.21 %)		246 (53.59 %)	
Phone call refill reminder	No	315 (84.22 %)	0.16 ± 0.365	250 (54.47 %)	0.46 ± 0.499
	Yes	59 (15.78 %)		209 (45.53 %)	

\* 10.000 Indonesian Rupiah (IDR) ≈ 0.74 USD.

**Table 3**  
Result of the DCE - main effect model for respondents in the community health center and hospital.

	Dependent variable (0=if respondents choose baseline profile; 1=if respondents choose alternative profile)					
	Community health center			Hospital		
	Regression coefficient (standard error)	Odds ratio (standard error)	MRS (IDR) <sup>ϕ</sup>	Regression coefficient (standard error)	Odds ratio (standard error)	MRS (IDR) <sup>ϕ</sup>
Independent variables						
Δ Duration of consultations <sup>†</sup>	-0.01510*	0.98502*	1887.50	-0.00638*	0.99364*	671.58
One-minute extra	(0.00338)	(0.00333)	(willing to substitute for 20 min less waiting)	(0.00298)	(0.00297)	(willing to substitute for 20 min less waiting)
Δ Place for consultation <sup>†</sup>	0.34668*	1.41437*	2166.75	0.40382*	1.49753*	2125.37
Private room instead of common area	(0.07046)	(0.09965)	(willing to substitute for private room)	(0.06310)	(0.09449)	(willing to substitute for private room)
Δ Access to the pharmacist <sup>†</sup>	1.25754*	3.51676*	7859.63	0.83969*	2.31565*	4419.42
Walk on any day instead of appointment	(0.07212)	(0.25363)	(willing to substitute for walk-in any day)	(0.06353)	(0.14711)	(willing to substitute for walk-in any day)
Δ Brochure/leaflet <sup>†</sup>	0.05244	1.05383	327.75	-0.05805	0.94360	305.53
Brochure instead added	(0.07583)	(0.07992)	(willing to substitute if brochure added)	(0.06651)	(0.06276)	(willing to substitute if brochure added)
Δ Medication review <sup>†</sup>	0.16559*	1.18009*	1034.94	0.30686*	1.35916*	1615.05
Medication review added	(0.08132)	(0.09597)	(willing to substitute if medication review added)	(0.07207)	(0.09796)	(willing to substitute if medication review added)
Δ Phone call refill reminder <sup>†</sup>	0.15460	1.16720	966.25	0.21963*	1.24562*	1155.95
Phone call refill reminder added	(0.08053)	(0.09399)	(willing to substitute if phone call refill reminder added)	(0.07148)	(0.08904)	(willing to substitute if phone call refill reminder added)
Δ Patient group discussion <sup>†</sup>	0.26436*	1.30260*	1652.25	0.41449*	1.51361*	2181.53
Patient group discussion added	(0.09926)	(0.12929)	(willing to substitute if patient group discussion added)	(0.09024)	(0.13659)	(willing to substitute if patient group discussion added)
Δ Patient copayment for consultation <sup>†</sup>	-0.00016*	0.99984*		-0.00019*	0.99981*	
1 IDR extra	(7.03e-06)	(7.03e-06)		(6.24e-06)	(6.24e-06)	
Constant	0.35040*			0.11862		
(standard error)	(0.11522)			(0.09516)		
ρ (correlation between the observations)	0.26402			0.14939		
(standard error)	(0.02194)			(0.01552)		
Observations (respondents)	374			459		
Log-likelihood function	-3066.654			-3794.6308		
Wald $\chi^2$	788.00*			1048.71*		

MRS, marginal rate of substitution; \*P < 0.05; <sup>ϕ</sup> 10.000 Indonesian Rupiah (IDR) ≈ 0.74 USD; <sup>†</sup> Δ Duration of service (no changes = 0; 20 min less waiting), Δ Place for consultation (no changes = 0; changes from private to common area = -1), Δ Access to pharmacist (no changes = 0; changes from walk in any day to appointment = -1), Δ Patient copayment (no changes = 0; less than 10.000 IDR = -10.000), Δ Brochure/leaflet (not added = 0; added = 1), Δ Patient group discussion (not added = 0; added = 1), Δ Phone call refill reminder (not added = 0; added = 1), Δ Medication review (not added = 0; added = 1).

**Table 4**  
Result of the discrete choice experiment –the full model for respondents in the community health center and hospital.

Choice of model	Choice of model			
	Dependent variable (0=if respondents choose baseline profile; 1=if respondents choose alternative profile)			
	Community health center		Hospital	
	Regression coefficient (standard error)	Odds ratio (standard error)	Regression coefficient (standard error)	Odds ratio (standard error)
<b>Independent variables</b>				
Δ Duration of consultation †	–0.04858*	0.95258*	–0.01753	0.98262
One-minute extra	(0.01432)	(0.01364)	(0.01295)	(0.01273)
Δ Place for consultation †	–0.01829	0.98187	0.31296	1.36747
Private room instead of common area	(0.29671)	(0.29134)	(0.27186)	(0.37176)
Δ Access to the pharmacist †	2.90019*	18.17761*	0.75739*	2.13270*
Walk on any day instead of appointment	(0.30352)	(5.51734)	(0.27178)	(0.57963)
Δ Patient copayment for consultation <sup>a, †</sup>	–0.00017*	0.99983*	–0.00015*	0.99985*
1 IDR extra	(0.00003)	(0.00003)	(0.00003)	(0.00003)
Δ Brochure/leaflet †	0.48416	1.62281	–0.25643	0.77381
Brochure instead added	(0.35007)	(0.56811)	(0.31930)	(0.24708)
Δ Medication review †	0.80161*	2.22914*	0.59334	1.81002
Medication review added	(0.36594)	(0.81572)	(0.33345)	(0.60355)
Δ Phone call refill reminder †	–0.42126	0.65622	–0.02202	0.97822
Phone call refill reminder added	(0.35017)	(0.22979)	(0.32702)	(0.31989)
Δ Patient group discussion †	0.39616	1.48611	0.19466	1.21490
Patient group discussion added	(0.46191)	(0.68645)	(0.43613)	(0.52985)
Δ Duration of consultation*age above 60 <sup>ϕ</sup>	–0.00287 (0.00700)	0.99713 (0.00698)	–0.00118 (0.00631)	0.99882 (0.00631)
Δ Duration of consultation*female <sup>ϕ</sup>	0.00703 (0.00802)	1.00705 (0.00808)	0.00398 (0.00666)	1.00399 (0.00669)
Δ Duration of consultation*married <sup>ϕ</sup>	0.01253 (0.00761)	1.01261 (0.00771)	0.00678 (0.00688)	1.00680 (0.00693)
Δ Duration of consultation*higher education <sup>ϕ</sup>	0.00212 (0.01163)	1.00212 (0.01165)	–0.00966 (0.00816)	0.99038 (0.00808)
Δ Duration of consultation*work <sup>ϕ</sup>	0.00139 (0.00757)	1.00139 (0.00758)	–0.01112 (0.00748)	0.98895 (0.00740)
Δ Duration of consultation*higher total monthly income <sup>ϕ</sup>	0.01462* (0.00688)	1.01473* (0.00698)	0.00358 (0.00645)	1.00358 (0.00647)
Δ Duration of consultation*unable to cover household expenses <sup>ϕ</sup>	–0.00495 (0.00881)	0.99507 (0.00877)	–0.01382 (0.00823)	0.98628 (0.00812)
Δ Duration of consultation*duration of diabetes above 5 years <sup>ϕ</sup>	0.01377* (0.00675)	1.01386* (0.00685)	0.00154 (0.00573)	1.00154 (0.00574)
Δ Duration of consultation*with comorbidities <sup>ϕ</sup>	–0.00825 (0.00666)	0.99178 (0.00661)	0.00658 (0.00713)	1.00660 (0.00718)
Δ Duration of consultation*needs help to take medication <sup>ϕ</sup>	–0.00160 (0.01307)	0.99840 (0.01305)	–0.00045 (0.00720)	0.99955 (0.00719)
Δ Duration of consultation*experience missing to take medication <sup>ϕ</sup>	0.00017 (0.00663)	1.00017 (0.00663)	–0.00293 (0.00599)	0.99707 (0.00597)
Δ Duration of consultation*pharmacist as source of medication information <sup>ϕ</sup>	0.01775* (0.00714)	1.01791* (0.00726)	0.00295 (0.00554)	1.00295 (0.00556)
Δ Place for consultation*age above 60 <sup>ϕ</sup>	0.07029 (0.14465)	1.07282 (0.15518)	–0.08110 (0.13289)	0.92210 (0.12254)
Δ Place for consultation*female <sup>ϕ</sup>	0.08261 (0.16447)	1.08612 (0.17864)	0.04277 (0.13974)	1.04370 (0.14584)
Δ Place for consultation*married <sup>ϕ</sup>	0.19748 (0.15804)	1.21833 (0.19254)	–0.22034 (0.14428)	0.80225 (0.11575)
Δ Place for consultation*higher education <sup>ϕ</sup>	–0.20850 (0.23698)	0.81180 (0.19238)	–0.07032 (0.16946)	0.93210 (0.15795)
Δ Place for consultation*work <sup>ϕ</sup>	0.09056 (0.15622)	1.09478 (0.17103)	0.05114 (0.15614)	1.05247 (0.16433)
Δ Place for consultation*higher total monthly income <sup>ϕ</sup>	0.41815* (0.14233)	1.51915* (0.21622)	0.21967 (0.13611)	1.24567 (0.16954)
Δ Place for consultation*unable to cover household expenses <sup>ϕ</sup>	–0.10916 (0.18006)	0.89659 (0.16144)	–0.48578* (0.17429)	0.61522* (0.10723)
Δ Place for consultation*duration of diabetes above 5 years <sup>ϕ</sup>	–0.03583 (0.13957)	0.96481 (0.13465)	0.15572 (0.12032)	1.16849 (0.14060)
Δ Place for consultation*with comorbidities <sup>ϕ</sup>	–0.12965 (0.13796)	0.87840 (0.12118)	0.02665 (0.14920)	1.02701 (0.15323)
Δ Place for consultation*needs help to take medication <sup>ϕ</sup>	0.24512 (0.26619)	1.27777 (0.34013)	–0.01821 (0.15010)	0.98195 (0.14739)
Δ Place for consultation*experience missing to take medication <sup>ϕ</sup>	0.00218 (0.13657)	1.00218 (0.13687)	–0.15068 (0.12593)	0.86012 (0.10832)
Δ Place for consultation*pharmacist as	–0.00864 (0.14792)	0.99140 (0.14665)	0.26697* (0.11646)	1.30600* (0.15210)

**Table 4** (Continued)

Choice of model	Choice of model			
	Dependent variable (0=if respondents choose baseline profile; 1=if respondents choose alternative profile)			
	Community health center		Hospital	
	Regression coefficient (standard error)	Odds ratio (standard error)	Regression coefficient (standard error)	Odds ratio (standard error)
source of medication information <sup>ϕ</sup>				
Δ Access to pharmacist*age above 60 <sup>ϕ</sup>	−0.44816* (0.14654)	0.63881* (0.09361)	−0.02741 (0.13270)	0.97296 (0.12911)
Δ Access to pharmacist*female <sup>ϕ</sup>	−0.06893 (0.16609)	0.93340 (0.15503)	0.05950 (0.13949)	1.06130 (0.14804)
Δ Access to pharmacist*married <sup>ϕ</sup>	−0.30980 (0.15999)	0.73359 (0.11737)	0.41843* (0.14426)	1.51957* (0.21921)
Δ Access to pharmacist*higher education <sup>ϕ</sup>	−0.14553 (0.23992)	0.86456 (0.20743)	−0.29848 (0.16958)	0.74194 (0.12582)
Δ Access to pharmacist*work <sup>ϕ</sup>	−0.45734* (0.15744)	0.63297* (0.09966)	−0.28218 (0.15611)	0.75414 (0.11773)
Δ Access to pharmacist*higher total monthly income <sup>ϕ</sup>	−0.54077* (0.14413)	0.58230* (0.08393)	−0.18357 (0.13574)	0.83229 (0.11298)
Δ Access to pharmacist*unable to cover household expenses <sup>ϕ</sup>	0.27475 (0.18297)	1.31621 (0.24082)	0.75485* (0.17492)	2.12729* (0.37210)
Δ Access to pharmacist*duration of diabetes above 5 years <sup>ϕ</sup>	0.07609 (0.14097)	1.07906 (0.15211)	0.04019 (0.12014)	1.04101 (0.12506)
Δ Access to pharmacist*with comorbidities <sup>ϕ</sup>	0.20098 (0.13920)	1.22260 (0.17018)	0.04638 (0.14891)	1.04747 (0.15598)
Δ Access to pharmacist*needs help to take medication <sup>ϕ</sup>	−0.45107 (0.26945)	0.63695 (0.17162)	−0.19075 (0.14993)	0.82634 (0.12389)
Δ Access to pharmacist*experience missing to take medication <sup>ϕ</sup>	−0.41710* (0.13768)	0.65895* (0.09073)	0.16346 (0.12577)	1.17758 (0.14810)
Δ Access to pharmacist*pharmacist as source of medication information <sup>ϕ</sup>	−0.98560* (0.15063)	0.37322* (0.05622)	−0.40339* (0.11631)	0.66805* (0.07770)
Δ Patient copayment for consultation*age above 60 <sup>ϕ</sup>	0.00002 (0.00002)	1.00002 (0.00002)	−3.17e-06 (0.00001)	1.00000 (0.00001)
Δ Patient copayment for consultation*female <sup>ϕ</sup>	−7.30e-06 (0.00002)	0.99999 (0.00002)	−9.61e-06 (0.00001)	0.99999 (0.00001)
Δ Patient copayment for consultation*married <sup>ϕ</sup>	0.00004* (0.00002)	1.00004* (0.00002)	−0.00001 (0.00001)	0.99999 (0.00001)
Δ Patient copayment for consultation*higher education <sup>ϕ</sup>	0.00002 (0.00002)	1.00002 (0.00002)	0.00002 (0.00002)	1.00002 (0.00002)
Δ Patient copayment for consultation*work <sup>ϕ</sup>	3.05e-06 (0.00002)	1.00000 (0.00002)	0.00002 (0.00002)	1.00002 (0.00002)
Δ Patient copayment for consultation*higher total monthly income <sup>ϕ</sup>	0.00006* (0.00001)	1.00006* (0.00001)	0.00003* (0.00001)	1.00003* (0.00001)
Δ Patient copayment for consultation*unable to cover household expenses <sup>ϕ</sup>	0.00004* (0.00002)	1.00004* (0.00002)	0.00005* (0.00002)	1.00005* (0.00002)
Δ Patient copayment for consultation*duration of diabetes above 5 years <sup>ϕ</sup>	−0.00002 (0.00001)	0.99998 (0.00001)	−0.00001 (0.00001)	0.99999 (0.00001)
Δ Patient copayment for consultation*with comorbidities <sup>ϕ</sup>	−3.04e-06 (0.00001)	1.00000 (0.00001)	−0.00004* (0.00002)	0.99996* (0.00002)
Δ Patient copayment for consultation*needs help to take medication <sup>ϕ</sup>	0.00004 (0.00003)	1.00004 (0.00003)	2.07e-06 (0.00002)	1.00000 (0.00002)
Δ Patient copayment for consultation*experience missing to take medication <sup>ϕ</sup>	4.48e-07 (0.00001)	1.00000 (0.00001)	0.00003* (0.00001)	1.00003* (0.00001)
Δ Patient copayment for consultation*pharmacist as source of medication information <sup>ϕ</sup>	−0.00010* (0.00002)	0.99990* (0.00002)	−0.00004* (0.00001)	0.99996* (0.00001)
Δ Brochure*age above 60 <sup>ϕ</sup>	−0.21041 (0.17285)	0.81025 (0.14005)	−0.16554 (0.15708)	0.84743 (0.13311)
Δ Brochure*female <sup>ϕ</sup>	−0.14772 (0.19858)	0.86267 (0.17131)	0.02637 (0.16478)	1.02672 (0.16919)
Δ Brochure*married <sup>ϕ</sup>	0.15260 (0.18728)	1.16486 (0.21815)	−0.03487 (0.17113)	0.96573 (0.16526)
Δ Brochure*higher education <sup>ϕ</sup>	0.18766 (0.28772)	1.20643 (0.34712)	−0.15370 (0.20080)	0.85753 (0.17219)
Δ Brochure*work <sup>ϕ</sup>	−0.28758 (0.18648)	0.75007 (0.13988)	0.20764 (0.18565)	1.23076 (0.22850)
Δ Brochure*higher total monthly income <sup>ϕ</sup>	−0.33129 (0.17037)	0.71800 (0.12233)	0.04772 (0.16056)	1.04888 (0.16841)
Δ Brochure*unable to cover household expenses <sup>ϕ</sup>	−0.27384 (0.21506)	0.76045 (0.16354)	0.37126 (0.20616)	1.44956 (0.29884)
Δ Brochure*duration of diabetes above 5 years <sup>ϕ</sup>	−0.22304 (0.16699)	0.80008 (0.13361)	0.04450 (0.14236)	1.04551 (0.14884)
Δ Brochure*with comorbidities <sup>ϕ</sup>	−0.25960 (0.16505)	0.77136 (0.12732)	0.16111 (0.17543)	1.17481 (0.20609)
Δ Brochure*needs help to take medication <sup>ϕ</sup>	0.15009 (0.32243)	1.16194 (0.37464)	0.00586 (0.17923)	1.00588 (0.18028)

**Table 4** (Continued)

Choice of model	Choice of model			
	Dependent variable (0=if respondents choose baseline profile; 1=if respondents choose alternative profile)			
	Community health center		Hospital	
	Regression coefficient (standard error)	Odds ratio (standard error)	Regression coefficient (standard error)	Odds ratio (standard error)
Δ Brochure*experience missing to take medication <sup>‡</sup>	0.17577 (0.16420)	1.19217 (0.19576)	0.18086 (0.14864)	1.19824 (0.17811)
Δ Brochure*pharmacist as source of medication information <sup>‡</sup>	0.22490 (0.17236)	1.25220 (0.21582)	−0.04519 (0.13743)	0.95582 (0.13136)
Δ Medication review*age above 60 <sup>‡</sup>	−0.11734 (0.17720)	0.88928 (0.15758)	−0.10072 (0.16326)	0.90419 (0.14762)
Δ Medication review*female <sup>‡</sup>	−0.17564 (0.20193)	0.83892 (0.16940)	−0.00451 (0.17201)	0.99550 (0.17124)
Δ Medication review*married <sup>‡</sup>	0.15701 (0.19377)	1.17001 (0.22671)	0.09304 (0.17756)	1.09751 (0.19487)
Δ Medication review*higher education <sup>‡</sup>	−0.08990 (0.29329)	0.91402 (0.26808)	−0.02413 (0.20943)	0.97616 (0.20444)
Δ Medication review*work <sup>‡</sup>	−0.07438 (0.19076)	0.92832 (0.17709)	−0.10223 (0.19249)	0.90282 (0.17378)
Δ Medication review*higher total monthly income <sup>‡</sup>	0.25304 (0.17464)	1.28794 (0.22493)	−0.11575 (0.16716)	0.89070 (0.14889)
Δ Medication review*unable to cover household expenses <sup>‡</sup>	−0.00688 (0.22189)	0.99314 (0.22037)	−0.25538 (0.21608)	0.77463 (0.16738)
Δ Medication review*duration of diabetes above 5 years <sup>‡</sup>	−0.34819* (0.17094)	0.70596* (0.12068)	0.08636 (0.14800)	1.09020 (0.16135)
Δ Medication review*with comorbidities <sup>‡</sup>	0.02300 (0.16906)	1.02326 (0.17299)	0.00677 (0.18397)	1.00679 (0.18522)
Δ Medication review*needs help to take medication <sup>‡</sup>	0.05295 (0.32808)	1.05437 (0.34592)	−0.13121 (0.18468)	0.87704 (0.16197)
Δ Medication review*experience missing to take medication <sup>‡</sup>	−0.24637 (0.16729)	0.78163 (0.13076)	0.19604 (0.15515)	1.21658 (0.18876)
Δ Medication review*pharmacist as source of medication information <sup>‡</sup>	−0.69863* (0.18308)	0.49727* (0.09104)	−0.52264* (0.14310)	0.59295* (0.08485)
Δ Phone call reminder*age above 60 <sup>‡</sup>	0.11441 (0.17357)	1.12121 (0.19461)	0.14888 (0.16046)	1.16053 (0.18622)
Δ Phone call reminder*female <sup>‡</sup>	0.12566 (0.19801)	1.13390 (0.22452)	0.04593 (0.16909)	1.04700 (0.17704)
Δ Phone call reminder*married <sup>‡</sup>	0.37453* (0.18725)	1.45431* (0.27232)	0.22560 (0.17446)	1.25308 (0.21861)
Δ Phone call reminder*higher education <sup>‡</sup>	−0.23368 (0.28631)	0.79162 (0.22665)	−0.00544 (0.20592)	0.99458 (0.20480)
Δ Phone call reminder*work <sup>‡</sup>	0.24013 (0.18901)	1.27142 (0.24031)	−0.07560 (0.18739)	0.92718 (0.17375)
Δ Phone call reminder*higher total monthly income <sup>‡</sup>	0.25106 (0.17067)	1.28538 (0.21938)	−0.16149 (0.16395)	0.85088 (0.13950)
Δ Phone call reminder*unable to cover household expenses <sup>‡</sup>	0.01969 (0.21719)	1.01989 (0.22151)	−0.13955 (0.20630)	0.86975 (0.17943)
Δ Phone call reminder*duration of diabetes above 5 years <sup>‡</sup>	−0.05329 (0.16837)	0.94811 (0.15963)	0.03644 (0.14545)	1.03712 (0.15085)
Δ Phone call reminder*with comorbidities <sup>‡</sup>	0.23497 (0.16481)	1.26487 (0.20846)	0.22152 (0.17952)	1.24797 (0.22403)
Δ Phone call reminder*needs help to take medication <sup>‡</sup>	0.01169 (0.32176)	1.01175 (0.32554)	−0.04031 (0.18286)	0.96049 (0.17564)
Δ Phone call reminder*experience missing to take medication <sup>‡</sup>	−0.14331 (0.16438)	0.86648 (0.14243)	0.09279 (0.15153)	1.09724 (0.16627)
Δ Phone call reminder*pharmacist as source of medication information <sup>‡</sup>	−0.17600 (0.17579)	0.83862 (0.14742)	−0.23818 (0.14075)	0.78806 (0.11092)
Δ Patient group discussion*age above 60 <sup>‡</sup>	−0.23574 (0.22504)	0.78999 (0.17778)	−0.07212 (0.21391)	0.93042 (0.19902)
Δ Patient group discussion*female <sup>‡</sup>	0.19190 (0.25529)	1.21155 (0.30930)	0.00390 (0.22582)	1.00390 (0.22670)
Δ Patient group discussion*married <sup>‡</sup>	−0.01399 (0.24662)	0.98611 (0.24319)	0.08152 (0.23200)	1.08493 (0.25170)
Δ Patient group discussion*higher education <sup>‡</sup>	−0.05982 (0.36355)	0.94194 (0.34244)	0.16761 (0.27635)	1.18247 (0.32677)
Δ Patient group discussion*work <sup>‡</sup>	−0.05677 (0.24398)	0.94481 (0.23051)	0.01532 (0.25115)	1.01544 (0.25503)
Δ Patient group discussion*higher total monthly income <sup>‡</sup>	0.11005 (0.22138)	1.11634 (0.24714)	0.05398 (0.22002)	1.05547 (0.23222)
Δ Patient group discussion*unable to cover household expenses <sup>‡</sup>	−0.41615 (0.28105)	0.65958 (0.18537)	0.05777 (0.27395)	1.05948 (0.29024)
Δ Patient group discussion*duration of diabetes above 5 years <sup>‡</sup>	−0.05209 (0.21592)	0.94924 (0.20496)	0.24249 (0.19366)	1.27442 (0.24681)
Δ Patient group discussion*with comorbidities <sup>‡</sup>	−0.16573 (0.21460)	0.84728 (0.18183)	0.02934 (0.23876)	1.02977 (0.24587)
Δ Patient group discussion*needs help to take medication <sup>‡</sup>	0.10880 (0.41050)	1.11494 (0.45768)	−0.17671 (0.24032)	0.83803 (0.20140)

**Table 4** (Continued)

Choice of model	Choice of model			
	Dependent variable (0=if respondents choose baseline profile; 1=if respondents choose alternative profile)			
	Community health center		Hospital	
	Regression coefficient (standard error)	Odds ratio (standard error)	Regression coefficient (standard error)	Odds ratio (standard error)
Δ Patient group discussion <sup>a</sup> experience missing to take medication <sup>b</sup>	-0.30358 (0.21157)	0.73817 (0.15617)	-0.02187 (0.20260)	0.97837 (0.19822)
Δ Patient group discussion <sup>a</sup> pharmacist as source of medication information <sup>b</sup>	0.16461 (0.23555)	1.17894 (0.27770)	-0.01762 (0.18785)	0.98254 (0.18457)
Constant	0.3465074*	1.41412*	0.1280082	1.136562
(standard error)	0.1191348	0.168471	0.0972462	0.1105264
ρ (correlation between the observations of respondent)	0.2715858		0.1609684	
(standard error)	0.0231235		0.0164152	
Observations (respondents)	374		457	
Log-likelihood function	-2894.0963		-3682.0152	
Wald $\chi^2$	928.11*		1128.11*	

\* P < 0.05; <sup>a</sup> Marital status: 1 = married, Gender: 1 = female, Age: 1 > 60 years, total monthly income: 1 ≥ 1.400.000 IDR, work: 1 = work. Household: 1 = unable to cover household expenses, duration of diabetes: 1 > 60 months/5 years; comorbidity: 1 = with comorbidity disease, source of medication information: 1 = pharmacist; missed medication: 1 = have experience missing to take medication. <sup>b</sup> 10.000 IDR ≈ 0.74 USD; † Δ Duration of service (no changes = 0; 20 min less waiting), Δ Place for consultation (no changes = 0; changes from private to common area = -1), Δ Access to pharmacist (no changes = 0; changes from walk in any day to appointment = -1), Δ Patient copayment (no changes = 0; less than 10.000 IDR = -10.000), Δ Brochure/leaflet (not added = 0; added = 1), Δ Patient group discussion (not added = 0; added = 1), Δ Phone call refill reminder (not added = 0; added = 1), Δ Medication review (not added = 0; added = 1).

respondents, in both CHCs and hospitals, stated that they would prefer free of charge services (96.52 % vs 96.51 %) with shorter duration (92.51 % vs 83.66 %) and flexible access to the pharmacist (87.97 % vs 79.52 %). A common area for consultation instead of a private room was preferred by more than half of the respondents in CHCs (60.16 %), while respondents in hospitals showed a more balanced choice between the common area and private room. Respondents in CHCs also most often stated a preference for patient group discussion as an additional service next to a consultation, followed by brochure and medication review. Whereas, medication review was most often preferred by respondents in hospitals next to a consultation, followed by brochure and phone call refill reminder. A phone call refill reminder was relatively least often indicated as the preferred additional service by the respondents in CHCs. At the same time, patient group discussion was the relatively least preferred additional services among respondents in hospitals.

### 3.2. Results of the discrete choice experiment

The results of the main effect model (binary logistic regression with random effects) can be found in Table 3, including the corresponding ORs and MRS between the price and non-price attributes. Overall, the results in both samples indicated that all attributes of pharmacist consultation services influenced the respondents' choices. Most of the respondents preferred pharmacist services that offer the flexibility to access pharmacist anytime during working hours. This attribute had the highest MRS. On average, if everything else stays the same, respondents in CHCs and hospitals were willing to substitute 7.860 IDR (0.60 USD) and 4.419 IDR (0.31 USD), respectively, for flexible access to pharmacists. Private consultation rooms, shorter duration, and low copayments were attributes that influenced the respondent's choice. Additional patient group discussion or medication review also increased the odds of a profile being selected.

Table 4 presents the full model containing attribute differences and interactions between attribute differences and

socio-demographic profiles in CHCs. Similar to the main effect model, the results showed that access to pharmacists, duration of services, patient copayment, and additional services, namely medication review, influenced respondents to choose a pharmacist service package. Some interactions with socio-demographic profiles also significantly affected the respondent's decision to select a service package. Respondents with high total monthly income (≥ 1.400.000 IDR ∞ 100 USD) found it less important to have a shorter duration of consultation, flexibility to meet with pharmacists anytime during working hours, and free of charge services. Still, they found it more important to have a private room than respondents with low total monthly income (< 1.400.000 IDR ∞ 100 USD). Shorter duration of consultation and flexible access to pharmacists were less important factors for respondents who had experience getting medication information from pharmacists. Still, they found free of charge services more important compared to the rest of the respondents. Additional medication review was a less important factor for respondents with experience getting medication information from the pharmacist.

For the hospital setting, the full model analysis is presented in Table 4. Access to pharmacists and patient copayment had similar results to the main effect model. All of the additional services (brochure, patient group discussion, medication review, and phone call refill reminder) yielded non-significant results in the full model compared with the main effect model. Some significant interactions between attribute differences and socio-demographic characteristics are shown in Table 4. Respondents who had experience getting medication information from pharmacists found it less important to have flexible access to pharmacists, but for them, private consultation rooms and free of charge services were more critical when choosing a service package. Free of charge services seemed to be less important to influence respondents with higher total monthly income (≥ 1.400.000 IDR). This analysis also showed that respondents who had comorbidities found it more important to get free of charge services. Additional medication review was considered less important for respondents who had experience getting medication information from pharmacists.

297 **4. Discussion and conclusion**

298 **4.1. Discussion**

299 **4.1.1. Duration of the consultation**

300 Most of the respondents in CHCs and hospitals prefer a shorter  
 301 duration of consultation based on the direct questions on  
 302 preference for attributes and all the main effect DCE models (for  
 303 CHCs). These preferences could be explained by the conditions  
 304 observed in the medical facilities involved in the study. In  
 305 particular, due to the high number of patients in medical facilities  
 306 in Indonesia, patients are often confronted with long waiting times  
 307 before receiving medical services, as reported in the published  
 308 literature [27–29]. However, no clear evidence on the opportunity  
 309 cost of time spent on the pharmacist services, even though the  
 310 pharmacist's role in patient care can have an indirect effect on  
 311 reducing potential health expenditure for the patient by improving  
 312 their medication management [30]. Further study to explore the  
 313 reason behind preferences for a shorter duration of the consulta-  
 314 tion is needed to understand the associated factors. It should be  
 315 recognized, however, that the complexity and variation of the  
 316 medication require by each patient might influence the duration of  
 317 the consultation. This condition might explain why there is variety  
 318 in the time range of consultation in some published studies  
 319 [31–37]. This could be the reason why, in our study, respondents  
 320 with a long duration of diabetes prefer a longer duration of the  
 321 consultation. Respondents in CHCs who have experienced receiv-  
 322 ing medical information from pharmacists also consider the  
 323 shorter duration of the consultation to be less important. These  
 324 respondents might be aware of the benefits of a pharmacist  
 325 consultation and would like to have sufficient time to discuss their  
 326 medication problems, including medication management.

327 **4.1.2. Access to pharmacist**

328 Flexible access to the pharmacist is also an important  
 329 characteristic for respondents when choosing a service package  
 330 in our DCE. This attribute has the highest MRS (Table 3). Similar  
 331 results are also found in other DCE studies, even though not  
 332 specifically focused on diabetes [9,12]. The reason behind these  
 333 preferences might be that many respondents want to have  
 334 convenient access to pharmacists whenever they need it [9,12].  
 335 Walk-in any day services might be, however, challenging to  
 336 implement as it depends on the availability of pharmacists. Given  
 337 the general practice in Indonesia, a high number of patients who  
 338 visit medical facilities and a limited number of human resources in  
 339 medical facilities can hinder the implementation of this service  
 340 [18,38]. Nevertheless, respondents with experience getting medi-  
 341 cation information from pharmacists prefer to make an appoint-  
 342 ment for consultation. There are several benefits of making an  
 343 appointment before the consultation: it is time-saving since it  
 344 reduces the need to wait for the services, as well as the possibility  
 345 to get dedicated time for the consultation and to get continuous  
 346 care from the same pharmacist [12]. Preferences toward access to a  
 347 pharmacist could be helpful for patients to contact pharmacist  
 348 conveniently whether they have medication problems, including  
 349 medication management.

350 **4.1.3. Copayment**

351 The study analysis shows that copayment is a crucial factor that  
 352 the respondents considered in a service package. In practice,  
 353 respondents can get general medication information for free, but  
 354 there are fees for services such as consultation. Respondents with  
 355 experience of getting medication information from the pharmacist  
 356 prefer lower patient copayment to get the services. This is seen in  
 357 both medical facilities. This finding is also consistent with other  
 358 DCE studies related to pharmacist services, which indicate that

most of the respondents prefer to have low-cost services [9,11,12,39]. Different preferences are found in the respondents with a higher total monthly income in both medical facilities, who find it less important to have a lower patient copayment. The possible reason for their preferences might be the potential benefit that they expect from the pharmacist services to help improve their medication management. On the other hand, respondents with comorbidity prefer lower patient copayment for the services. Potential high risk of medication problems and high medical costs for comorbidities, including medication management, might be the reason behind these preferences.

370 **4.1.4. Private consultation room**

371 A private consultation room seems to be preferred when  
 372 choosing pharmacist services (Table 3). In the final model,  
 373 respondents in hospitals who have experienced getting medical  
 374 information from pharmacists consider private consultation room  
 375 as an important factor that influences their preferences. A  
 376 preference for a private consultation room is mostly related to  
 377 privacy matters, as shown in some studies [12,40–43]. One study  
 378 showed that patients feel that a private room should be the  
 379 standard for pharmacist care, including confidential consultation.  
 380 Unavailability of a private room might influence patients' active  
 381 participation to seek pharmacists for pharmaceutical consultation  
 382 [43]. In the DCE analysis, we find that the choice of pharmacist  
 383 services among high-income respondents in CHCs is influenced by  
 384 the availability of a private consultation room. Unawareness about  
 385 the benefits of a private room for consultation might also influence  
 386 the preferences stated in the DCE [43].

387 **4.1.5. Additional services**

388 Medication review, brochure, and patient group discussion are  
 389 types of pharmacist services that respondents prefer to have in  
 390 addition to the consultation to help improve their medication  
 391 management (Tables 2 and 3). Previous studies have shown that  
 392 these three additional services are also more commonly provided  
 393 by the pharmacist, including diabetes care [4,44]. Medication  
 394 review is a pharmacist service to identify and provide recom-  
 395 mendations related to medication-related problems, including  
 396 medication management, to increase the quality and safety of  
 397 medication use to achieve the best possible therapy [45–47].  
 398 Preferences for medication review might be due to the possibility  
 399 of a comprehensive review of the patient's medication. In practice,  
 400 medication review needs a certain amount of time to be completed  
 401 [48,49], which makes it challenging for a pharmacist to implement  
 402 it, especially given the overload of pharmacists in the medical  
 403 facilities in Indonesia [18,38]. Respondents who have experienced  
 404 receiving medication information from pharmacists find it less  
 405 important to have a medication review as an additional service.  
 406 Their experience of a medication review during their contact with  
 407 pharmacists and the time-consuming process to review their  
 408 medication might be the reason behind their preferences.  
 409 However, this needs to be further explored. Patient group  
 410 discussion is another additional service preferred by respondents  
 411 in this study. During such discussion, pharmacists provide health  
 412 information to the group of patients in both medical facilities. A  
 413 brochure is also included as regulated by the pharmaceutical  
 414 standard care in Indonesia [16,17]. Group discussion can also  
 415 empower people with diabetes to achieve treatment goals and  
 416 enhance their self-management on diabetes treatment [50].

417 **4.1.6. Limitations**

418 There are some limitations to this study. First, findings from this  
 419 study only provide insight into the people with diabetes in the  
 420 CHCs where there are pharmacists. In practice, not all CHCs in  
 421 Indonesia have pharmacists. Second, the CHCs and hospitals

involved in this study are mostly located in urban areas. Different preferences might be found in medical facilities in rural areas. The DCE only included a limited number of attributes. Therefore, the results on the attributes that influence patients' choice should only be interpreted in relative terms. We also have not investigated preferences for all possible combinations of services, only preferences for a combination of consultation with one or two additional services. Third, there is no opt-out option on the DCE sets, which might bias the results. Profile selection using orthogonal main effect design in this study also prevents the analysis of interactions between attributes.

#### 4.2. Conclusions

This study indicates that people with diabetes in Indonesia have preferences over pharmacist services that have been recommended can help them to improve medication management. They prefer a shorter duration of consultation, private consultation room, lower patient copayments, and flexible access to pharmacists for discussing their medication problems. These need to be considered when designing services from a patient perspective. Medication review, phone call refill reminder, or patient group discussion are the additional services that patients prefer to be added to the consultation, but the extent of this preference depends on the medical facilities. The findings confirm that the patients' perspective provides valuable insights into the type of pharmacist services that meet patients' needs and can help patients improve medication management. Further study should be done to address the shortcomings of this study to provide more comprehensive evidence for pharmacist services in Indonesia.

#### 4.3. Practice implications

The results provide insight that can be used to evaluate pharmacists' current practice, explore barriers to pharmacist services, and design pharmacist services that meet patients' needs, especially the need to improve medication management among people with diabetes in Indonesia. Preferences for pharmacist services found in this study can be taken into consideration to design suitable services to be implemented in medical facilities that have pharmacists. These results can be combined with the pharmacists' preferences to provide complete input on the service design.

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#### Ethical approval and consent to participate

University of Surabaya Institutional Review Board granted a research ethics approval to conduct this research. This ethical approval was also supported by an approval letter for data collection in community health centers from the Surabaya City Health Office, a letter of data collection approval in one public hospital and two private hospitals. Informed consent was obtained from all respondents who participated in this study.

#### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

#### CRediT authorship contribution statement

**Bobby Presley:** Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Writing - original draft, Writing - review & editing. **Wim Groot:** Conceptualization, Methodology, Software, Validation, Formal analysis, Writing - review & editing, Supervision. **Doddy Widjanarko:** Investigation, Resources, Writing - review & editing. **Milena Pavlova:** Conceptualization, Methodology, Software, Validation, Formal analysis, Writing - review & editing, Supervision.

#### Declaration of Competing Interest

The authors have no conflict of interest to declare.

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#### Appendix A. Supplementary data

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