

1 ***Trends in the cost of medicines, consultation fees and clinic visits in Malaysia's private***  
2 ***primary healthcare system: employer health insurance coverage***

3

4 **Short title**

5 ***Cost of medicines, consultation fees and clinic visits in Malaysia's private primary***  
6 ***healthcare system:***

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30

31 **Abstract**

32 **Objective:**

33 To examine trends in the cost of medicines, consultation fees and clinic visits among the  
34 employees covered by the employer health insurance in Malaysia's private primary  
35 healthcare system in Malaysia

36 **Designs:** Retrospective cross-sectional study

37 **Setting:** PMCare claims database from January 2016 to August 2019

38 **Participants:** 83,556 outpatient clinic visits involving 10,150 IIUM employees of the  
39 International Islamic University Malaysia (IIUM) to private general practitioners (GPs). During  
40 the study period, IIUM adopts the incentive structure of capping coverage at Ringgit Malaysia  
41 (RM) 45/outpatient visit (USD 10.58) to cover for consultation fees and medicine costs.

42 **Main outcome measures:** The monthly percentage change in the number of clinic visits,  
43 medicine costs, consultation fees and total costs between January 2016 and August 2019. A  
44 simple linear regression using Stata v15.1 was also performed to measure the association  
45 between the characteristics of the prescribed medicines and medicine charges.

46 **Results:**

47 The number of clinic visits per patient increased by 17% from January 2016 to August 2019,  
48 with consultation fees increasing by 113.9% and total costs by 7.9% per clinic visit per patient.  
49 Conversely, the cost of medicines and the number of medicines prescribed per clinic visit per  
50 patient decreased by 39.7% and 6.3% respectively.

51 **Conclusions:**

52 Within the incentive structure of capping the total amount of coverage per clinic visit,  
53 medicine costs were reduced by decreasing the number of medicines prescribed, to offset  
54 the increased consultation fees. This may create perverse incentives that affect medicine use  
55 with negative consequences for the health system and health insurers.

56

### 57 **Plain Language summary**

- 58 • The use of patient level data to identify the effect of insurance structure that caps the  
59 total amount per clinic visit on patient access to medicines and health systems is a  
60 strength.
- 61 • The findings of this study are applicable to other employers across countries that have  
62 insurance structure that caps the total amount per clinic visit.
- 63 • This study was conducted among private health clinics and therefore cannot be  
64 applied to other settings such as community pharmacies and public primary health  
65 clinics.
- 66 • This study is limited generalizability to other types of incentive structures among  
67 employer health insurance schemes.

68 **Keywords:** Medicine costs, employer health insurance, incentive structure, private health  
69 system Malaysia, quality targets

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71

## 72 **Introduction**

73 Drug pricing, hence access and affordability, is a vital and critical issue for any country,  
74 including developed and developing countries, and a major contributor to high  
75 healthcare costs. <sup>1,2</sup> We have seen that in low- and middle-income countries  
76 expenditure on medicines can account for up to 60% of total healthcare expenditure,  
77 and can be catastrophic for some families especially in countries with high co-payment  
78 levels. <sup>3-5</sup> Even in high income countries, the cost of medicines is growing with the launch  
79 of new medicines for cancer and orphan diseases at ever increasing prices, with  
80 expenditure on these medicines for complex, chronic and rare diseases likely to reach  
81 50% of total medicine expenditure in developed countries by the end of 2023. <sup>6-8</sup> In  
82 Malaysia, healthcare expenditure is increasing in recent years, which is a major  
83 challenge for the Malaysian government. <sup>9</sup> In the latest Malaysian statistics on  
84 medicines published in February 2020, drug expenditure for 2015-2016 increased by 2.3  
85 % from RM 5.2 billion[USD 1.19 billion] in 2015 to RM 5.3 billion[USD 1.22 billion] in  
86 2016. <sup>10</sup> In the 2021 budget, the Ministry of Health Malaysia allocated RM 31.9 billion  
87 [USD 7.34 billion] to cover total health expenditures including COVID-19 related issues.  
88 <sup>11</sup> The overall health expenditure has been estimated to account for 82% of total public  
89 expenditure in Malaysia. <sup>12</sup> The increase in healthcare costs has been mainly attributed  
90 to an increase in the overall cost of medicines, the use of medicines and more public  
91 health programmes. <sup>13</sup> For instance, the overall prevalence of diabetes among the  
92 population of Malaysia is 16.8% and growing, higher in some areas, with a corresponding  
93 impact on the costs of medicines and healthcare including the cost of complications. <sup>14</sup>

94 In Malaysia, the private health system is not under governmental drug pricing  
95 regulations but completely determined by free market forces. We see a similar situation  
96 in other countries with more liberal pricing systems among private health insurance  
97 companies.<sup>15,16</sup> This has permitted manufacturers, wholesalers, and healthcare  
98 providers in the private sector in Malaysia to sell medicines at unregulated prices,<sup>17</sup>  
99 generally leading to higher costs with high markups and profit margins.<sup>18-20</sup> In the  
100 Malaysian primary private health system, general practitioners (GPs) are allowed to  
101 prescribe and sell medicine because there is no regulation that separates prescribing  
102 and dispensing, which facilitates the practice.

103 The private sector requires patients to pay for services out-of-pocket because  
104 this sector is not subsidized. However, there are employer health benefit schemes for  
105 some employees accessing the private sector, which are funded by non-profit  
106 institutions, private health insurance, and private institutions.<sup>21</sup> Examples of such  
107 institutions include private universities and private corporations. Some public agencies  
108 also provide their employees with private insurance. This can be welcomed in view of  
109 the long waiting times that can be experienced by patients seeking to access ambulatory  
110 care within the public healthcare system in Malaysia.<sup>22,23</sup> Arrangements for this type of  
111 health insurance is made by employers with insurance providers to offer medical care  
112 for their employees through panel medical clinics affiliated with insurance companies.  
113 Knowing that their basic health and well-being are being taken care of ensures that  
114 employees are fully focused on their daily tasks and contribute to the overall success of  
115 employer's business.<sup>24</sup>

116           The coverage of medical care within different insurance companies in Malaysia  
117 depends on the insurance structure including coverage for outpatient, dental, or  
118 inpatient treatment. Some employers cap expenditure coverage per clinic visit and some  
119 cap according to annual medical utilization under their insurance structure. Under such  
120 arrangements, employees are not required to pay for the service rendered if the amount  
121 is within the approved limit because it will be covered by the insurance company.  
122 However, out of pocket payments are needed if the total amount exceeds the current  
123 coverage amount per visit.

124           Previous studies have evaluated medicine use and cost mainly among private  
125 retail pharmacies where patients pay out-of-pocket.<sup>17</sup> We are currently unaware of any  
126 study conducted among private health clinics regarding medicine use and costs.  
127 However, we are aware that there can be differences in care provided between  
128 ambulatory care physicians in the public versus private sectors especially the  
129 management of viral infectious diseases exacerbated by patient expectations.<sup>25</sup> It is  
130 also unclear on how medicines are used and how much they cost in private medical  
131 clinics. Also, it is uncertain what effects the incentive structures of employer health  
132 benefit scheme have on medical consultation fees and medicine charges at panel clinics  
133 in Malaysia. We have seen differences in prescribing behaviour in other countries  
134 between the same physicians working in both sections again driven by issues such as  
135 patient expectations and incentive systems.<sup>26</sup> Consequently, we wanted to study such  
136 issues further in Malaysia to provide future direction. As a result, this study sought to  
137 evaluate the trends in medicine costs, consultation fees, and the total costs per clinic  
138 visit to GP among employees covered by the incentive structure of employer health

139 insurance. Also, to examine the potential influences of incentive structure on the  
140 aforementioned parameters as well as the number of medicines and the number of  
141 tablets prescribed per clinic visit.

## 142 **Methods**

### 143 **Study design and setting**

144 This retrospective cross-sectional study used PMCare claims data covering the period  
145 from January 2016 to August 2019. PMCare is an insurance company that manages and  
146 administers the International Islamic University Malaysia (IIUM) medical benefit  
147 scheme. It has approximately 650,000 members with approximately 2000 medical  
148 providers affiliated with PMCare throughout Malaysia.<sup>27</sup> IIUM is a public university that  
149 was established in 1983, and has approximately 27,000 students from across the world.  
150<sup>28,29</sup> IIUM adopts the incentive structure of capping coverage at Ringgit Malaysia (RM)  
151 45/outpatient visit (USD 10.58) to cover for consultation fees and medicine costs. This  
152 cap has been in place throughout the study period. IIUM panel private medical clinics  
153 provide outpatient services to IIUM community without any charges if the amount is  
154 less than RM 45 [USD 10.68] per outpatient clinic visit. Any coverage in excess of this  
155 amount must be paid out-of-pocket.

156

157 The study subjects were IIUM community members (employees and  
158 dependents). Dependents refer to children and spouses of employees of IIUM. All IIUM  
159 community members seeking outpatient treatment from IIUM panel medical clinics

160 serviced by GPs during the study period were included. There were 1668 panel medical  
161 clinics visits included in this study. The extracted data from the PMCare claims database  
162 included claim codes, dates of clinic visit, patient codes, medicine costs, consultation  
163 fees, total costs, medicine names and doses, the treatment duration, and the number  
164 of tablets prescribed. Clinic visits without a charge for consultation fees were excluded  
165 because this is likely for patients taking medications only without having to see a GP.

166 Patient's age, gender, and diagnoses were also recorded. Patients' ages were  
167 calculated according to the date of the first visit included in the database. Missing  
168 information or incomplete data for variables such as claims codes and drug prices were  
169 excluded from the analysis. Overall, though, less than 0.5% of observations with  
170 incomplete data or extreme values, i.e., more than two times of the 99th percentile  
171 value, were subsequently excluded from the analysis (Figure 1). This study used the term  
172 "patients" to refer to IIUM community (employees and their dependents).

### 173 **Outcome measures**

174 The total number of clinic visits and the number of clinics visit per patient were  
175 calculated monthly. The mean medicine costs, GP consultation fees, and total costs  
176 (medicine costs plus consultation fees) for each clinic visit per patient per month were  
177 also measured. The number of medicines prescribed for each patient per clinic visit per  
178 month was recorded. To evaluate whether the above cost is influenced by the quantity  
179 prescribed for each medicine within the employer coverage, this study included as  
180 examples the five most common prescribed medicines, namely paracetamol, loratadine,  
181 cetirizine, diclofenac, and chlorpheniramine. Details identification of these five common



182 medicines can be found from our previous work.<sup>30</sup> Only tablet formulations of these  
183 medicine were included. The number of tablets prescribed to each patient per clinic visit  
184 was calculated monthly.

#### 185 **Data analysis**

186 Descriptive statistics such as percentages and numbers for categorical variables or the  
187 mean  $\pm$  SD for continuous variables were used to describe patient characteristics and  
188 outcome measures, as appropriate. These included the total number of clinic visits and  
189 number of clinic visits per patient. The percentage change between January 2016 and  
190 August 2019 was calculated for medicine costs, consultation fees, total costs, number of  
191 clinic visits, as well as the number of medicines and tablets prescribed. A linear trend  
192 analysis of these variables was performed over the years of the study period to assess  
193 the changes in trends of these variables. Data for total costs were not normally  
194 distributed; consequently, they were log transformed for analysis.

195 A simple linear regression was also used to measure the association between the  
196 characteristics of the prescribed medicines, i.e. the number of medicines and the  
197 number of tablets for paracetamol, loratadine, cetirizine, diclofenac, chlorpheniramine,  
198 alongside medicine charges. The medicine characteristics were the independent  
199 variables, and the medicine charges were the dependent variable. Regression  
200 coefficients and 95% confidence intervals (CIs) were used to present the results. These  
201 were considered statistically significant for a  $p$ -value  $<0.05$ . All analyses were performed  
202 using Stata version 15.3 (StataCorp, College Station, TX USA).<sup>31</sup>

203

## 204 **Results**

### 205 **Patients and clinic visits**

206 A total of 83,207 outpatient clinic visits were made by 10,356 IIUM community members  
207 (34% employees and 66% dependents) during the study period. Female patients  
208 comprised 48.97% of the total members (n = 5071), and the mean age of all patients was  
209 26.33 ± 17.63 years. Female patients were slightly older than their male counterparts  
210 (26.32 ± 16.81 years vs. 25.94 ± 17.370 years, Table 1).

211  
212 The number of clinic visits per patient per month increased by 17% from 1.41  
213 visits in January 2016 to 1.65 visits in August 2019 (Figure 2). A linear trend analysis  
214 revealed that the number of clinic visits per patient increased significantly ( $p=0.046$ )  
215 over the study period (Table 2). The five most common diagnoses that were associated  
216 with clinic visits among all IIUM community, not only based on patients prescribed with  
217 five common drugs (used as examples for the analysis of number of medicines and  
218 number of tablets), included acute upper respiratory infections (39%), dermatitis and  
219 eczema (6.42%), infectious gastroenteritis and colitis (5.18%), acute tonsillitis (3.42%),  
220 and gastritis (3.01%).

### 221 **Drug costs, GP consultation fees, and total costs**

222 The mean medicine costs per clinic visit per patient decreased from RM 34.61 in January  
223 2016 to RM 20.85 in August 2019 (a decrease, - 39.75%, Table 3). The decreasing trend  
224 for medicine costs was first observed in late 2018. Conversely, the mean consultation  
225 fees per clinic visit per patient increased from RM 10.65 in January 2016 to RM 22.78 in

226 August 2019 (an increase, 113.9%). Similarly, there was a slight increase in the mean  
227 total costs per clinic visit from RM 39.66 in January 2016 to RM 42.47 in August 2019 (an  
228 increase, 7.89%, Figure 3). Result from a linear trend analysis showed that there was  
229 significant decrease in medicine costs ( $p<0.0001$ ) and total cost ( $p<0.0001$ ). While,  
230 increasing in consultation fees ( $p<0.0001$ ) over the study period was also significant  
231 (Table 2)

### 232 **Numbers of medicines and tablets prescribed**

233 The mean number of medicines prescribed per clinic visit per patient slightly decreased  
234 from 2.38 drugs in January 2016 to 2.23 drugs in August 2019 (a decrease, -6.30%, Figure  
235 1). During the study period, the mean numbers of tablets of cetirizine (11.6 tablets in  
236 January 2016 vs. 7.75 tablets in August 2019, a decrease, -33.18%), chlorpheniramine  
237 (11.11 tablets in January 2016 vs. 10.31 tablets in August 2019, a decrease, -7.2%), and  
238 paracetamol (15.81 tablets in January 2016 vs. 13.33 tablets in August 2019, a decrease,  
239 -15.68%) prescribed per patient per clinic visit modestly decreased over time.  
240 Contrarily, there were slight increases in the number of tablets prescribed per patient  
241 per clinic visit for diclofenac (9.52 tablets in January 2016 vs. 10.64 tablets in August  
242 2019, an increase, 11.47%) and loratadine (9.65 tablets in January 2016 vs. 10.13 tablets  
243 in August 2019, an increase, 4.97%, Figure 2). A linear trends analysis showed that  
244 decreasing the number of medicines ( $p<0.0001$ ), decreasing tablet cetirizine ( $p<0.0001$ )  
245 and paracetamol ( $p=0.04$ ) over study period were significant, while other medicines  
246 were non-significant (Table 2).

247 The simple linear regression analysis showed that increasing number of medicines  
248 prescribed (coefficient, 4.488, 95% CI 4.412, 4.565  $p<0.0001$ ), increasing tablets of  
249 cetirizine (coefficient 0.130, 95% CI 0.094, 0.166  $p<0.0001$ ), chlorpheniramine  
250 (coefficient 0.066, 95% CI 0.0003-, 0.132  $p=0.049$ ), diclofenac (coefficient 0.095, 95% CI  
251 0.013, 0.177  $p=0.023$ ), loratadine (coefficient 0.235, 95% CI 0.156, 0.313 $p<0.0001$ ) and  
252 paracetamol (coefficient 0.066, 95% CI 0.040, 0.091  $p<0.0001$ ) were all associated with  
253 increasing overall medicine charges.

## 254 **Discussion**

255 This study discussed the trends of medicine costs, consultation fees, and clinic visits, as  
256 well as the effects of the incentive structure of employer health insurance on patient  
257 prescribed drugs and their related costs in the private primary healthcare system.  
258 Overall, the cost of medicines decreased over the study period whereas consultation  
259 fees and total costs per clinic visit increased. From the perspective of expenditure on  
260 medicines, decreased drug spending is desired, but whether the trade-off between  
261 decreasing drug costs and increasing consultation fees reduces patient access to  
262 prescription drugs must be clarified to ensure optimal patient care. Since this study  
263 evaluated the prescribed medicines and associated costs within the coverage of  
264 employer health insurance, it is difficult to compare these findings directly with those of  
265 other studies, which typically reported employer drug benefit plans, changes in  
266 employer sponsored health insurance and employee preference for health insurance<sup>32-</sup>  
267 <sup>34</sup>. These studies found that increasing co-payments or coinsurance rates, as well as  
268 requiring mandatory generic substitution, all reduced plan payments and overall drug

269 spending among working-age enrollees with employer-provided drug coverage.<sup>32</sup> The  
270 majority of private insurance plans, which are employer-sponsored, are becoming more  
271 expensive for the elderly and provide less comprehensive coverage, with coverage  
272 availability also limited.<sup>33</sup> Overall, employers' plans on average are more generous in  
273 firms with a higher proportion of high-wage workers, and variation in health risks and  
274 wages among workers is positively associated with the probability of offering a choice  
275 of plans.<sup>34</sup>

276

277 Medicine costs were found to decrease over time in this study, with the  
278 reduction appearing toward the end of the study period. Simultaneously, consultation  
279 fees increased at a faster rate than the reduction in medicine costs, resulting in total  
280 costs that approached the maximum allowable coverage of RM 45/clinic visit. This  
281 situation is most likely attributed to the incentive structure of health insurance that  
282 provides general allowable coverage of capping the total charges per clinic visit. With  
283 this structure in place, medicine costs and consultation fees can be modified to achieve  
284 the allowable coverage. We believe it is unlikely that the observed reduction in  
285 medicine costs in this study is due to increased product competition and hence  
286 potentially lower prices.<sup>4</sup> This is because a previous study showed that despite the  
287 availability of multiple generic brands in Malaysia, only a few off-patent medicines were  
288 procured at relatively high prices.<sup>18</sup> This suggests that the competition in this free  
289 market is not effectively driving reduction in prices which may again reflect the current

290 incentive structures including any rebates or incentives from pharmaceutical  
291 companies.

292

293           The reason for the observed reduction in medicine costs in the current study is  
294 most likely due to a reduction in the number of medicines prescribed. . In this case,  
295 the increase in consultation fees appears to result in private GPs reducing the cost of  
296 medicines they prescribed by reducing the number of medicines prescribed per clinic  
297 visit. To illustrate further, instead of receiving three types of medications, patients are  
298 now only receiving two types per clinic visit. Patients may also use out-of-pocket money  
299 to cover excess costs. A small reduction of 6% in number of common medicines  
300 prescribed for acute illness observed in the current study may not undermine patient  
301 care, but the increased cost to employer insurer for a separate claim and the increase  
302 out-of-pocket money for patients is a cause for concern.

303           Personal communication with GPs indicated that only drug charges within the  
304 coverage ( $\leq$ RM 45) were captured in the database, whereas excess charges covered out-  
305 of-pocket by the patients themselves were not recorded. Although such a situation  
306 would permit patients to be prescribed all necessary drugs, rising out-of-pocket  
307 expenditure could limit patient access to suggested medicines and affect their care over  
308 the long term. From a social welfare viewpoint, the increase in out-of-pocket spending  
309 will lead to higher expenditures on medicines because seeking treatment is not a luxury  
310 commodity but is required by patients particularly patients with chronic diseases. For  
311 those who can afford to pay, a high price is not a deterrent and they (patients and

312 families) are willing to pay higher prices in order to alleviate symptoms and prolong their  
313 lives.<sup>35</sup> Those who cannot afford to pay would not necessarily be taking higher cost  
314 medicines leading to lower use. All of these can contribute to high consumer spending  
315 in the longer term which will reduce social welfare.<sup>36</sup> Consequently, employees,  
316 employers, and health insurers could potentially pay a high price for the cost of  
317 medicines and services offered that eventually compromising patient care. However, we  
318 need to investigate the appropriateness of any prescriptions before we can say anything  
319 with certainty.

320         Apart from decreasing in number of medicines prescribed, we also saw that the  
321 number of tablets prescribed per patient per month decreasing over time for cetirizine,  
322 chlorpheniramine, and paracetamol, which may explain decreases in the costs of these  
323 medicines. Given that these are common medicines used to treat acute minor illnesses  
324 such as coughs and colds as well as minor pain, there are only concerns if the reductions  
325 mean an increase in the inappropriate short-term use of antibiotics for upper respiratory  
326 tract infections, which will compromise future care.

327         The decreases in the numbers of prescribed medicine and tablets may also be  
328 partly attributable to the coverage provided by employer's insurance and a desire to  
329 reduce any sizable increase in out-of-pocket expenditures. As such, timely revision of  
330 the limit by employers is necessary to accommodate current healthcare costs.  
331 Insufficient insurance coverage can cause patients to discontinue their treatment. A  
332 study carried out in Vietnam revealed that patients with more severe illnesses or injuries  
333 were more likely to abandon their treatment if they believed that the financial burden

334 of medical expenses would significantly impact their families' financial situation.  
335 Without receiving proper treatment, there is a high likelihood of experiencing fatal  
336 consequences akin to "near-suicide" in the near future.<sup>37</sup>

337

338 There are a number of cost-cutting strategies that employers can implement including  
339 a review of current payments to physicians given appreciable increases in recent years  
340 (113.9% in 4 years). Under Schedule 7 of the Private Healthcare Facilities and Services  
341 Act (PHFSA) 1998, private clinic GPs consultation fees are capped at RM10 to RM35 per  
342 clinic visit.<sup>38</sup> Consultation fees based on the complexity of clinical cases may also be  
343 capped in addition to the fee range specified. However, this is a secondary  
344 consideration to generally improving the quality of care provided within targeted  
345 expenditures. The recent announcement in December 2019 on the deregulation of  
346 consultation fees for private GPs is expected to result in immediate higher charges  
347 among private health practitioners. However, whilst patients can choose from a large  
348 number of GPs based on their reputation or service quality, it's still burden for patients  
349 to pay high consultation fees which may compromise future care.

350 Another option to reduce the cost to employers is to have panel community pharmacies  
351 under their incentive structure of employer health insurance. Looking at the findings  
352 from this current study, most common illnesses seen by GPs are acute illnesses, which  
353 are manageable by community pharmacies. The top five common prescribed medicines  
354 observed from our previous work and included in the current study are common  
355 medicines under pharmacist supervision that do not require prescription from doctors.



356 All these are well suited for including community pharmacies as panel pharmacies.  
357 Furthermore, there is no consultation fee charged by community pharmacists (CPs),  
358 which will provide greater saving to employers. Studies showed that a sizeable  
359 proportion of these cases can be effectively managed in the community pharmacy  
360 setting with a high degree of patient satisfaction depending on the nature and severity  
361 of these ailments.<sup>39</sup> Data from the UK shows that more than one in 10 GP visits and one  
362 in 20 emergency department visits are for minor ailments that could be managed in  
363 community pharmacies.<sup>40</sup> This structure is vital to maximising the efficiency of health  
364 service delivery in Malaysia in the future.<sup>41</sup>

365 In addition, a review of the appropriateness of medicines prescribed is also  
366 required. We know from previous research that adherence to robust guidelines  
367 improves the quality of ambulatory care, which is certainly a consideration on this  
368 occasion.<sup>4,42,43</sup> In addition, there has been high adherence to a limited number of well  
369 proven medicines in ambulatory care in Stockholm, Sweden, enhanced by physician  
370 trust in the recommended medicines and the introduction of quality targets efficiently  
371 improving the quality of care.<sup>44-46</sup> Such developments can improve employee care  
372 within finite resources that eventually will benefit the organization. In addition to the  
373 revision of the maximum coverage amount, the employer may also consider capping  
374 individual medicine costs in addition to capping the total charges per clinic visit.<sup>30</sup> We  
375 know for instance in Europe that increased competition among the manufacturers of  
376 multiple sourced medicines and biosimilars has resulted in appreciable price reductions  
377 down by 98% from pre-patent loss prices in some occasions.<sup>4,47</sup> This is to prevent the

378 individual drug price modification and also to improve accessibility and affordability of  
379 medicines for employees. <sup>48-51</sup>

380 Overall, drug price control mechanisms include reference pricing, tiered  
381 formularies, preferential suppliers, greater transparency in pricing as well as price caps.  
382 <sup>48,50,52</sup> These could also be considered by employers at their organization level <sup>53,54</sup>.  
383 Additional considerations include compulsory generic substitution given the robust  
384 quality control mechanisms in Malaysia, well publicized details on individual prices and  
385 charges for medicines as well as consultation fees at each clinic visit thereby making  
386 these costs more transparent to both the patient and the payer before the treatment is  
387 provided. The employer should also conduct regular monitoring on the individual  
388 pattern of employee medicine use and related claims against agreed guidance, with the  
389 employer organisation also looking to improve the quality of care provided through  
390 developing robust guidelines and monitoring adherence to them. Figure 4 summarizes  
391 all of the above recommendations.

392 We believe the findings of this study are applicable to other employers across countries  
393 that have insurance structure that caps the total amount per clinic visit. However, we  
394 accept there is limited generalizability to other types of incentive structures among  
395 employer health insurance schemes. In addition, this study was conducted among  
396 private health clinics and therefore cannot be applied to other settings such as  
397 community pharmacies and public primary health clinics. Nonetheless, we believe the  
398 study's findings are useful when comparing with other health insurance structures to  
399 improve patient access to medicines and health systems. This study evaluates the

400 prescribing of medicines and its associated costs within the context of employer health  
401 insurance coverage and we do not have information on supply and demand of  
402 healthcare that may also influence the prescribing. Another limitation that needs to be  
403 acknowledged is that this study is unable to characterise details of consultation fees and  
404 the exact type of cases seen by GPs, in which case complexity determines consultation  
405 fees. This, however, has no bearing on the study's findings. In addition, we could not  
406 assess the appropriateness of physician prescribing and patient health outcomes. This is  
407 important going forward and will be the subject of future research projects.

408

#### 409 **Conclusions**

410 This study revealed that the cost of medicines decreased over the study period, whereas  
411 consultation fees and total costs per clinic visit increased. Reducing the number of  
412 medicines and tablets prescribed for some treatments in order to modify the overall  
413 cost of medicines to come within approved expenditures limits patients' ability to be  
414 prescribed with a complete drug regimen. As a result, potentially compromising patient  
415 care if this is the case.

416 Overall, the current incentive structure of employers' health insurance, which caps the  
417 amount covered per clinic visit, does appear to influence the number of medicines  
418 prescribed and the costs associated with them, exacerbated by an appreciable increase  
419 in the costs of physician visits in recent years. Employers may consider mechanisms to  
420 optimise future drug prescribing and drug use including price capping of individual  
421 medicines, introducing guidelines and quality targets in addition to capping the total

422 amount per clinic visit of their insurance incentive. . Such considerations would improve  
423 the accessibility and affordability of appropriate medicines for employees, thereby  
424 making care more cost-effective and improving long-term outcomes benefiting both  
425 employees and employers.

426 **Ethics approval**

427

428 Ethics approval for this study was granted by the International Islamic University Malaysia  
429 Ethical Committee (IREC-2019-212). De-identified data were used, and the results were  
430 reported in an aggregated manner. The analysis of patient information for research purposes  
431 without any direct involvement of patients or public required the approval from the Ethical  
432 Committee only and waived the requirement for informed consent.

433 **Data Availability**

434

435 The datasets generated and/or analysed during the current study are not publicly available.  
436 Request to access the datasets should be directed to International Islamic University Malaysia  
437 Research Ethical Committee. The de-identified data could be shared with interested  
438 researchers after obtaining the approval from the above ethical committee  
439 (<http://www.iium.edu.my/centre/irec>). The reason for the restriction on public data  
440 deposition is due to the privacy and confidentiality of patients' health data.

441 **Funding**

442 CSZ was supported by a research grant from The Ministry of Education Malaysia (Fundamental  
443 Research Grant Scheme, FRGS/1/2022/SKK16/UIAM/01/3). The funders were not involved in  
444 the design of the study and collection, analysis, and interpretation of data and in writing the  
445 manuscript.

446 **Declaration of conflicting interests**

447 The authors declare that they have no competing interests.

448 **Author Contributions**

449 All authors made a significant contribution to the work reported, whether that is in the  
450 conception, study design, execution, acquisition of data, analysis and interpretation, or in all  
451 these areas; took part in drafting, revising or critically reviewing the article; gave final approval  
452 of the version to be published; have agreed on the journal to which the article has been  
453 submitted; and agree to be accountable for all aspects of the work."

454 **Acknowledgements**

455 The authors would like to thank the staff from PMCare and IIUM Health Wellness Centre for  
456 their assistance and cooperation with data extraction.

457 .

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- 614

615 Table 1 Patient demographics

<b>Number of patients</b>	<b><i>n</i></b>	<b>%</b>
	10356	100
<b>Gender</b>		
Male	5285	51.03
Female	5071	48.97
<b>Age (years old)</b>		
Mean	26.33	
Median	23	
Mode	4	
Range	1 to 78	
SD	17.1	
<b>Age group (years old)</b>		
0 to 9	2094	20.22
10 to 19	2366	22.85
20 to 29	1473	14.22
30 to 39	1619	15.63
40 to 49	1527	14.75
50 to 59	1013	9.78
≥60	264	2.55

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622 Table 2  
 623 Results of linear trend analysis of all variables over years of study period  
 624

	Coefficient	<i>p</i>	95% confidence interval (CI)	
			Lower CI	Upper CI
<b>Number of tablets</b>				
Cetirizine	-0.3139387	<i>p</i> <0.0001	-0.487	-0.141
Chlorpheniramine	-0.0446359	<i>p</i> =0.303	-0.130	0.040
Diclofenac	0.0277069	<i>p</i> =0.667	-0.098	0.154
Loratadine	0.0473943	<i>p</i> =0.36	-0.054	0.149
Paracetamol	-0.092869	<i>p</i> =0.04	-0.182	-0.004
<b>Number of medicines</b>				
Number of medicines	-0.0557311	<i>p</i> =0.000	-0.066	-0.045
<b>Number of clinic visits</b>				
Number of clinic visits	0.0053861	<i>p</i> =0.046	0.000	0.011
<b>Total costs</b>				
Total costs	0.1881055	<i>p</i> <0.0001	0.138	0.238
<b>Total costs (log transformed)</b>				
Total costs (log transformed)	0.0080863	<i>p</i> <0.0001	0.007	0.009
<b>Medicine charges</b>				
Medicine charges	-1.037342	<i>p</i> <0.0001	-1.100	-0.975
<b>Consultation fees</b>				
Consultation fees	1.284824	<i>p</i> <0.0001	1.237	1.332

625



626 Table 3 Mean cost of consultation fees, drugs, total and mean number of clinic visits and  
627 prescribed drugs per patient per clinic visit

Year	Month	Consultation fees (RM)	Drug cost (RM)	Total cost (RM)	No. of visits (n)	No. of drugs prescribed (n)
2016	1	10.65	34.61	39.66	1.41	2.38
2016	2	15.58	27.88	40.65	1.62	2.46
2016	3	17.28	24.45	40.64	1.65	2.46
2016	4	17.88	23.97	40.96	1.59	2.46
2016	5	18.52	23.89	41.3	1.65	2.42
2016	6	18.6	23.59	41.35	1.63	2.46
2016	7	18.57	24.01	41.4	1.61	2.37
2016	8	18.84	23.41	41.1	1.75	2.4
2016	9	18.86	23.7	41.47	1.66	2.39
2016	10	19.13	23.18	41.25	1.64	2.29
2016	11	18.88	23.47	41.25	1.8	2.43
2016	12	19.08	23.59	41.3	1.77	2.36
2017	1	19.34	23.23	41.56	1.69	2.44
2017	2	19.79	22.44	41.23	1.68	2.5
2017	3	19.75	22.8	41.26	1.74	2.47
2017	4	19.99	22.65	41.49	1.74	2.43
2017	5	19.7	22.77	41.17	1.76	2.48
2017	6	20.37	22.73	41.81	1.7	2.46
2017	7	20	22.75	41.6	1.76	2.42
2017	8	20.14	22.82	41.62	1.66	2.41
2017	9	20.12	22.67	41.64	1.74	2.4
2017	10	20.03	22.98	41.69	1.71	2.4
2017	11	20.19	22.7	41.72	1.8	2.44
2017	12	20.06	22.83	41.48	1.72	2.41
2018	1	20.16	22.69	41.77	1.94	2.39
2018	2	20.23	22.91	42	1.69	2.4
2018	3	20.23	22.73	41.7	1.81	2.33
2018	4	20.72	21.96	41.6	1.76	2.27
2018	5	20.74	22.24	41.75	1.79	2.38
2018	6	21.31	22.21	42.24	1.69	2.36
2018	7	21.12	22.04	41.95	1.74	2.26
2018	8	21.31	21.77	41.72	1.65	2.33
2018	9	20.99	22.28	41.95	1.67	2.27
2018	10	21.69	21.75	42.28	1.76	2.27
2018	11	21.49	21.64	41.91	2.06	2.31
2018	12	21.43	21.7	41.98	1.79	2.32
2019	1	21.05	22.18	41.96	1.87	2.27
2019	2	21.89	21.33	42.1	1.66	2.26
2019	3	21.81	21.62	42.15	1.69	2.17
2019	4	22.25	20.91	42.15	1.73	2.2

Trends in the cost of medicines, consultation fees and clinic visits in Malaysia's private primary healthcare system:  
 employer health insurance coverage

<b>2019</b>	5	22.72	20.9	42.43	1.68	2.24
<b>2019</b>	6	22.52	20.88	42.33	1.53	2.2
<b>2019</b>	7	22.49	20.96	42.39	1.69	2.17
<b>2019</b>	8	22.78	20.85	42.47	1.65	2.23

628 Note: No=number, RM=Ringgit Malaysia

629

630 **List of Figures**

631

632 Figure 1 Cohort flow chart

633 Figure 2 Number of clinic visits and number of drugs per patient per clinic visit

634 Figure 3 Mean drug charges, consultation fees, total charges and number of tablets

635 prescribed per patient per clinic visit.

636 Figure 4 Recommendation to employer to reduce costs and improve quality care