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Barriers to implementing asthma self-management in Malaysian primary care

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1 **Barriers to implementing asthma self-management in Malaysian primary care:**

2 **qualitative study exploring the perspectives of healthcare professionals**

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35   **Abstract**

36

37   Asthma self-management is a crucial component of asthma management. We sought to

38   explore healthcare professionals' (HCPs) perceptions on barriers to asthma self-management

39   implementation in primary care. We recruited 26 HCPs from six public primary care clinics

40   in a semi-urban district of Malaysia in 2019. The analysis was done inductively. HCPs

41   described barriers that resonated with the 'COM-B' Behaviour change framework.

42   Capability-related issues stemmed from a need for specific self-management skills training.

43   Opportunity-related barriers included the need to balance competing tasks, and limited

44   poorly-tailored resources. Motivation-related barriers included lack of awareness about self-

45   management benefits, which was not prioritised in consultations with perceived lack of

46   receptiveness from patients. These were compounded by contextual barriers of the healthcare

47   organisation and multilingual society. The approach to implementation of asthma self-

48   management needs to be comprehensive, addressing system, professional and patient barriers,

49   and tailored to the local language, health literacy and societal context.

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Introduction

Supported self-management is a crucial component of long-term asthma management[1,2] in adults that improves clinical outcomes and reduces healthcare costs.[3] Patient-centred, collaborative care that permits effective patient-practitioner communication improves adherence to treatment and outcomes.[4,5] However, studies have shown that globally, support for asthma self-management is not embedded in routine practice and only a minority of people with asthma have an action plan.[6–8]

In Malaysia, the prevalence of adult asthma was estimated at 5% with asthma-related deaths responsible for 1.2% of all deaths in the 2006 National Health and Morbidity survey.[9] This survey also reported that 20% of adult asthma patients visited the emergency department for acute exacerbations, 10% were admitted, 27% reported school/work days' loss with a mean duration of 6 (4-8) days in the past 12 months.[9] Less than half of adult asthma patients had regular long term follow-up.[9–11] In addition, studies have reported under-utilisation of controller medications,[10,11] while the use of oral short-acting beta-agonist was common among adults with poor asthma control in Malaysia.[10–12]

A wide range of barriers to implementing supported self-management were described in a recent systematic review – these include, poor patient-professional partnership, lack of patient education and concerns regarding medication safety, insufficient professional training and negative views regarding asthma self-management; compounded by competing priorities and limited time in consultations.[13] Underpinning many of these barriers are challenges to effective communication.[13,14] All but one of the 56 papers included in this review were from high-income healthcare systems; reflecting a gap in the understanding of barriers faced in the socio-cultural context of low- and middle-income countries (LMICs), such as Malaysia.

81   Malaysia's multicultural and multilingual society may also present different barriers to the

82   implementation and delivery of asthma self-management education in primary care settings.

83   As the country is composed of three major ethnicities, Malay (70%), Chinese (22%), and

84   Indian (7%), as well as several minority ethnicities (1%)[15], a significant proportion of the

85   population reads, writes, and converses in their respective native tongues, and exhibit varying

86   levels of fluency in English and the country's national language, Malay.[16–19] Additionally, the

87   populations' predominantly 'low' to borderline 'sufficient' health literacy[20] and low general

88   literacy skills among the elderly[21] may have some influence in the barriers experienced. We

89   therefore aimed to explore healthcare professionals' views of the barriers faced in

90   implementing supported self-management for asthma in adults in a primary care setting in

91   Malaysia, taking into consideration the country's cultural and socioeconomical contexts. .

92
93

94   **Results**

95   <u>Participants</u>

96   We recruited 26 participants. Six focus group discussions (4–6 HCPs in each group) were

97   conducted between July and August 2019 at the Klang District Health Office (5 family

98   physicians, 5 medical officers, 4 each of assistant medical officers, pharmacists, assistant

99   pharmacists, and nurses). Table 1 outlines the demographic data of the participants. There

100   was only 1 mixed sex focus group among the pharmacists (1 male, 3 females). Other focus

101   groups were all-female (Family physicians, medical officers, nurses, assistant pharmacists),

102   or all-male (Assistant medical officers).

103

104   We identified practice-based and contextual barriers to implementing asthma self-

105   management in primary care practice. Practice-based barriers related to healthcare

106   professionals' capability, opportunity, and motivation, and how these factors influenced their

107   behaviour (COM-B framework). In addition, implementation barriers were influenced by

108   external themes related to societal and healthcare organisational contexts. The interaction of

109   these barriers is illustrated in Figure 1.

110

111   ***Practice-based barriers experienced by healthcare professionals (HCPs)***

112   HCPs described a number of barriers to provision of supported self-management that

113   resonated with the COM-B model of behaviour change.[22] Capability barriers included the

114   need for specific skills-based training. Opportunity-related barriers described difficulty in

115   completing tasks due to complex workloads, limited availability and often poorly tailored

116   resources (e.g. action plans), and poor documentation of previous consultations. Motivational

117   barriers included a lack of awareness of the benefits of supported self-management, hesitancy

118   to stray from their defined roles in the care of people with asthma, and perceptions that

119   patients are not receptive to counselling.

120

121   *Capability: Need for specific skills-based training*

122   The participants acknowledged that without training they would not have the necessary skills

123   to support asthma self-management. Comprehensive training was not provided for all HCPs

124   involved in the management of asthma which led to knowledge gaps and training

125   inconsistencies among HCPs. Conversely, some participants felt that while the routine

126   training provided was adequate, the motivation to incorporate into practice was lacking (see

127   below).

128

129   *"We need more hands-on teaching [of asthma self-management counselling].*

130   *Sometimes even the medical officers don't know how to use the MDI (Metered*

131   *Dose Inhaler). Some pharmacists don't know [how to use MDIs] as well."* – A1,

132   Medical Officer, 30–35 years old, 6 years of experience.

133

"Only a few of our nurses are trained in asthma [self-management counselling].

If they go on maternity leave, and they don't teach their colleagues... I feel that

maybe a class or a course on asthma [self-management counselling] that is

detailed and more frequent is necessary to train more nurses." – A5, Medical

Officer, 35–40 years old, 13 years of experience.

Opportunity: Competing tasks

The HCPs acknowledged that their heavy workload and the multi-condition nature of primary

care limited their ability to educate patients on their asthma. The absence of protected time

for asthma patient education classes meant fewer opportunities for HCPs to provide self-

management counselling as HCPs had to balance their time seeing a very broad range of

other patients, as well as addressing other medical conditions in people with asthma.

"We didn't have any specific dates for asthma [patient education classes], so we

have to educate the asthma patients in addition to seeing other patients ... [So, the

time] to advise patients [is] limited." – A6, Medical Officer, 30–35 years old, 8

years of experience.

Opportunity: Limited availability of resources (asthma action plans) in consultation rooms

Another barrier identified by HCPs was that asthma action plans were not readily available in

the consultation rooms. This is related to contextual organisational barriers at the district

health office level due to budget constraints and lack of prioritisation which affected the

availability of asthma action plans.

159   *"Sometimes, when we want to print out the asthma action plan, we have run out of*

160   *paper, and we do not have enough money to buy more paper."* – A1, Medical

161   Officer, 30–35 years old, 6 years of experience.

162

163   *"They will photocopy only a few asthma action plans, only 20 every time. If it*

164   *runs out, that is it."* – A3, Medical Officer, 25–30 years old, 4 years of

165   experience.

166

167 *Opportunity: Poorly tailored resources (asthma action plans) available for the patients*

168

169 The HCPs felt that currently available written asthma action plans were unsuitable for their

170 Malaysian patients as they were too wordy for them to understand, especially considering the

171 high rates of limited health literacy in the population.[20] The HCPs also attributed this dislike

172 towards reading to be a prominent Asian cultural trait. Some suggested that a more visual

173 format of asthma action plans (e.g. pictures or animation) may help patients to understand

174 better.

175

176   *"The [patient's] understanding of the asthma action plan is the problem because*

177   *[it has] a lot of wording here and there."* – F1, Family Physician, 50–55 years

178   old, 26 years of experience.

179

180   *"Some of them [prefer] visual [formats] to aid them. [If it's] too wordy [it] is also*

181   *quite difficult because [in] our culture, they don't want to… don't like to read,*

182   *right?"* – F7, Family Physician, 45–50 years old, 21 years of experience.

183

184   *Opportunity: Poor documentation*

185

186   In addition, some HCPs stated that due to poor medical record documentation it was unclear

187   whether counselling of asthma action plan had previously been provided.

188

189   *"…also, the documentation is very poor, so we don't know whether [asthma*

190   *action plan counselling] is done or not by our MOs, that's the thing."* – F4,

191   Family Physician, 40–45 years old, 16 years of experience.

192

193   *Motivation: Lack of awareness and poor attitude*

194

195   Some HCPs felt that their colleagues were not motivated to empower patients for self-

196   management even if they had been trained in delivery of action plans which led to poor

197   attitude towards implementing it.

198

199   *"We send our medical officers for district training (of asthma self-management*

200   *counselling). For every session of the CME [Continuing Medical Education], we*

201   *will ask those who attend the course to go back to their clinic and brief other*

202   *medical officers who did not have the opportunity to attend. That's why I believe*

203   *their training is not too lacking. The issue is just whether they have the motivation*

204   *to practice it."* – F1, Family Physician, 50–55 years old, 26 years of experience.

205

206   This is because counselling of asthma self-management may need extra initiative and time

207   spent by the HCPs, an interrelating systemic issue. Reasons for low motivation overlapped

208   with other barriers, such as the limited provision of training. For example, a pharmacist of 25

209   years standing had *'not heard of'* asthma self-management'. Limited training on asthma self-

210   management not only affected knowledge of current guidelines but also reduced awareness of

211   the potential benefits for people with asthma having an action plan, and thus affected the

212   HCPs motivation to improve their practice in empowering patients for asthma self-

213   management.

214

215   *Motivation: Unclear healthcare professional roles.*

216   Several HCP's described their lack of motivation as a result of the feeling that supporting

217   self-management was not a responsibility under the clearly defined roles of their job position.

218   Instead, they would refer them to a healthcare professional whose role included self-

219   management counselling. This may represent a lack of awareness and motivation at

220   management level as most job positions within the clinic's dedicated asthma team did not

221   include contributing to supporting the self-management.

222

223   *"New [patients] who need counselling will be directed to the pharmacists. I am*

224   *a... I am an assistant pharmacist. I don't counsel them."* – E2, Assistant

225   Pharmacist, 50–55 years old, 25 years of experience.

226

227   *Motivation: Perceived patients' lack of interest in managing their asthma*

228

229   Another important challenge that reduced HCPs' motivation was that they felt asthma

230   patients did not prioritise their self-management and were reluctant to document their

231   symptoms in asthma diaries. The HCPs thought that this problem was more common among

232   patients who were of lower education level, citing examples of patients who were illiterate

233   and were not able to write their symptoms in an asthma diary. It was felt that it would be

234 difficult to empower them to self-manage their asthma without clear record-keeping of their

235 asthma symptom and control monitoring.

236

237   *"For adults, I feel that they do not care. They do not use their action plans. If*

238   *you ask them whether they have received a copy of it in their last consultation,*

239   *[they will reply] 'I do not remember, Doctor. Maybe it's at home.'"* – A1,

240   Medical Officer, 30–35 years old, 6 years of experience.

241

242 **Contextual barriers experienced by healthcare professionals (HCPs)**
243
244 HCPs listed a number of wider contextual barriers that limited provision of supported self-

245 management. At a societal level, the high prevalence of limited health literacy combined with

246 a multilingual society resulted in major barriers in understanding the Malay/English action

247 plans. Healthcare organisations struggled with limited manpower and a lack of priority for

248 asthma self-management.

249

250 *Societal context: Limited health literacy, and language barriers*

251

252 There was a widespread belief amongst HCPs that patients with low educational status and

253 limited health literacy could not understand explanations of an asthma action plan and self-

254 management. This was thought to be a particular problem among older patients. Language

255 was an additional barrier to communication for patients who only understood Mandarin or

256 Tamil as most HCPs could only speak English or Malay. One experienced family physician

257 observed that such patients *'might not be able to understand whatever is written in the*

258 *asthma action plan'*. Hence, extra effort in repeated counselling and explanation was needed

259 to enhance the patient's understanding of an asthma action plan.

260

261   *"[When explaining self-management to patients], not everyone will [follow] our*

262   *advice… The more highly educated patients will follow our advice [to regularly*

263   *take controller medication]. The less educated ones [will only take it] when they*

264   *feel like it."* – D2, Assistant Medical Officer, 25–30 years old, 6 years of

265   experience.

266

267   *"In order to deliver your knowledge to your patient, for them to actually be able*

268   *to understand what you are trying to say, it takes effort and many repetitions*

269   *(repeated sessions)."* – C2, Pharmacist, 30–35 years old, 9 years of experience.

270

271 *Organisational priorities: Lack of awareness of asthma, and resource constraints*

272

273 The lack of prioritisation at healthcare service level was highlighted in two ways. First, time,

274 budget, and manpower were limited, with many different health programmes to run, and high

275 patient load constraining opportunities for chronic disease management (as opposed to acute

276 management) and even with good team work there was insufficient manpower to support

277 self-management. It was suggested that management level prioritisation was needed to

278 allocate the resources needed to allow them to spend more time with patients who needed

279 counselling to encourage self-management.

280

281   *"…time is a big constraint, so if they [ministry management] can intervene and*

282   *have more staff then they [can] really help us greatly in order for us to spend*

283   *more time with patient who needs it [counselling of asthma self-management]."* –

284   C2, Pharmacist, 30–35 years old, 9 years of experience.

285

286   *"We all don't have time to clerk each patient one-by-one. Just to fill the first page*

287   *[of the clerking sheet] is already difficult. So, we [hoped] the nurses would help*

288   *us, but the nurses say that they also have a lot of work to do."* – A5, Medical

289   Officer, 35–40 years old, 13 years of experience.

290

291   Second, a recurring theme that appeared in HCP discussions was a lack of prioritisation of

292   asthma (self)-management in favour of other conditions and topics. For example, some

293   campaigns (such as 'Know Your Drugs') had been on-going for a decade without updating

294   their education materials, but it was also noted that the campaign did not include '*how to use'*

295   asthma inhalers in their materials. The HCPs attributed the lack of priority to limited

296   awareness on asthma and suggested rotating the focus of the campaign regularly to raise

297   awareness and prioritise asthma from time to time.

298

299   *"There's a Diabetes [Awareness] Month, but an Asthma [Awareness Month], I feel that*

300   *I've never seen before."* – F5, 41-year-old Family Physician, 17 years of experience.

301

302

303   **Discussions**

304   *Summary of key findings*

305   This study identifies some significant challenges in the implementation of supported asthma

306   self-management in primary care practice in Malaysia. Barriers that hindered implementation

307   in routine practice were multifactorial, encompassing factors related to capability and

308   motivation of the professionals, as well as practical barriers of resource and time that reduced

309   the opportunity in day-to-day practice. A number of contextual factors external to the clinic

310   in which the HCPs practiced were highlighted: the priorities and resources of the healthcare

311   organisation and the multi-ethnic, multilingual societal context. Many of these challenges

312   could be improved or at least modified with a comprehensive approach to an intervention,

313   which will be further elaborated in the subsequent sections.

314

315   *Interpretation with reference to other published studies*

316   As highlighted by a systematic review[13], our findings of professionals' barriers related to the

317   COM-B framework overlapped with similar themes identified in other studies. Lack of

318   training and poor patient-HCP partnerships limited capability; opportunity was reduced

319   because of pressure of time, and lack of awareness regarding guideline recommendations and

320   action plans, and perceived poor patient receptiveness all reduced motivation have all been

321   described in other (typically high-income country) settings.[13,23–26] Our study noted that

322   opportunity was further reduced by limited supplies of poorly-tailored self-management

323   resources, and poor documentation of whether (or not) self-management had previously been

324   discussed. Lack of awareness about self-management benefits and a hesitancy to work

325   beyond their defined role were additional barriers to motivation.

326

327   Healthcare and societal contextual factors are identified in other studies,[13,23–25,27,28] but the

328   Malaysian context of a multi-ethnic multilingual LMIC compounded some of these barriers.

329   Lack of awareness about asthma self-management at the level of healthcare management and

330   lack of prioritisation of asthma self-management meant that initiatives did not address the

331   heavy workloads and manpower constraints, for example, by enhancing teamwork.

332

333   *Implications for delivery of healthcare services*

334   An issue identified in this study was the differing views and expectations on the adequacy of

335   training for HCPs in supporting asthma self-management, a situation that is not limited to a

336   developing country like Malaysia.[6,13,23] Furthermore, we noted a marked separation of roles

337   in the current healthcare provider system, where only doctors and pharmacists were given the

338   responsibility of self-management counselling, which promoted silo-working, poor

339   teamwork, and hesitancy of healthcare providers to support self-management as it was

340   outside their job description. Study participants were recruited from attendees of an asthma

341   training workshop, who had been selected to attend because of their direct involvement in the

342   care of patients with asthma. Any negativity elicited within this study may be more

343   pronounced in HCPs less involved (and thus less confident) in asthma care. All these are

344   modifiable barriers. Team-based, comprehensive training of HCPs including nurses, assistant

345   medical officers, assistant pharmacists in performing – or supporting – asthma self-

346   management counselling may not only facilitate asthma self-management,[13,29–32] but also help

347   overcome the resource limitations.

348

349   Only some HCPs were able to attend the structured training relating to asthma self-

350   management in the hope that they would share their learning with their peers who had stayed

351   back to carry out clinic duties. Dependence on opportunistic peer training may have led to

352   inconsistent skills and knowledge gaps among some groups of HCPs. Among our study

353   population none of the four assistant pharmacists (10-25 years of experience) had heard

354   asthma self-management, highlighting how they were not involved in the asthma team and

355   had received minimal training regarding asthma. Their main roles were to dispense

356   medication and check inhaler technique. Training and extending assistant pharmacist and

357   nurse roles within the team may alleviate HCP capability- and opportunity-related barriers.

358   Better training can improve motivation.[33–35] Blended learning using web-based mobile

359 applications can be considered as an option for training delivery as it provides HCPs with

360 increased accessibility to and interactivity with training material and allows for scheduling

361 flexibility for HCPs with heavy workloads.[36] In addition, the use of motivational

362 interviewing, training of lay educators and group consultations may help to overcome some

363 of the barriers in the delivery of asthma self-management support and care.[37-39]

364

365 *Implications for overcoming societal barriers*

366 Low levels of literacy and language barriers were perceived as major barriers preventing

367 patients from understanding asthma self-management. Similarly, studies from other countries

368 have reported poor understanding of asthma in South Asian patients and those with low

369 literacy,[40-43] and language barriers prevented HCPs in educating ethnic minority patients on

370 asthma management.[23,44] In addition, the asthma action plan was perceived to be too wordy

371 and information was not available in all the languages widely used in Malaysia. This, in

372 addition to lack of interpretation services, compromised the effective delivery of supported

373 self-management in a multiethnic Asian country. However, the perception that literacy is a

374 barrier to self-management may represent a subconscious justification on the part of the

375 HCPs for not offering self-management advice. The use of pictures or videos and the

376 provision of multilingual resources are potential ways to overcome both language and literacy

377 barriers as perceived by HCPs. As reported in other studies, pictorial format tools which

378 offered information in literacy sensitive manner have been shown to enhance consultations

379 and facilitate understanding of management plan[45-46] including in Malaysia[47], and can

380 improve asthma outcomes.[48] In addition, all material should be checked for reading age and

381 readability. Within this programme of work, we are exploring the perspective of patients, and

382 co-developing asthma self-management support materials (including paper and mobile format

383 of pictorial asthma action plan) with users.

384

385   Our participants highlighted that engaging patients in maintaining asthma diaries (as

386   recommended by Malaysian asthma guidelines)[49] is challenging. This is not unexpected;

387   patients tend to be motivated to manage their asthma when symptoms cause discomfort,

388   affect their daily activities, or if they believe asthma may cause serious consequences.[40,50–52]

389   Some HCPs in this study suggested internet or mobile monitoring interventions might

390   support monitoring for those interested and able to use such platforms. An example of such

391   intervention is as a mobile application with graphic icons representing asthma symptoms as

392   visual aid to log daily symptoms.[30,44,53–59] Globally, however this may not as effective as

393   hoped, as despite prioritising symptom and peak flow diaries as core components of asthma

394   apps, in reality few patients engage regularly with monitoring tasks.[60] Future studies will

395   need to explore the feasibility of using digital support for self-management for asthma in

396   Malaysia. In addition, interventions on a larger contextual scale to promote awareness and

397   understanding of guideline-recommended care include policy changes that support social

398   movements, such as through online health communities that involve patient and public

399   participation may be the way forward.[61-62] Furthermore, the literacy and language barriers,

400   and the lack of training enabling HCPs to overcome these barriers may mean that some

401   patients may not understand the implications of a diagnosis of asthma. Hence, comprehensive

402   education, culturally appropriate and tailored to the education and literacy level while taking

403   universal health literacy precautions,[63] about asthma and promotion of self-management is

404   necessary.

405

406   The factors that contributed to the challenges of implementing asthma self-management in a

407   Malaysian primary care setting were multifactorial, but most are potentially modifiable.

408   Interventions will need to adopt a comprehensive approach tailored to the local healthcare

409   system and address the societal context of multiple languages and limited health literacy.

410   Prioritisation of asthma, and supported self-management is needed at policy, management,

411   practice, community, and individual levels to enhance access to training, address flexibility of

412   roles, increase awareness, and explore innovative digital approaches to improve supported

413   self-management for asthma.

414

415   *Strengths and limitations*

416   This study included the views of all groups of healthcare professionals in the management of

417   asthma in Malaysian primary care, and our recruitment strategy during an asthma training

418   event achieved a good response. The qualitative study design enabled an in-depth exploration

419   of the barriers that hindered the delivery of supported self-management for asthma among the

420   healthcare professionals. We did not approach professionals who are not involved in asthma

421   care; this could have limited the perspectives heard though we considered that they would

422   have been unlikely to be aware of the issues we wished to explore. Focus groups were

423   organised flexibly, and most of the professionals we invited participated. However, some

424   participants may have hesitated in expressing individual reservations or concerns in the

425   context of a group. Offering the option of one-to-one interviews might have enabled the

426   recruitment of a few more participants and supported more open discussion. To mitigate this,

427   we grouped HCPs of the same role together and experienced qualitative researchers

428   facilitated the discussions to ensure everyone had a chance to contribute. We may thus have

429   missed some factors, especially from the perspective of patients who were not included as

430   participants of this study.

431

432   The researchers were all primary care physicians with an academic interest in supported self-

433   management which will have influenced the data collection and analysis. We remained aware

434   of this and discussed emerging findings with a wider group.

435

436   **Methods**

437

438   *Design*

439   This was a qualitative study using focus group discussions (FGDs) to explore HCPs'

440   perspectives on the barriers and challenges of supporting patients to self-manage their asthma

441   in their day-to-day practice.

442

443   *Healthcare context*

444   Malaysia operates a dichotomous primary care system (public and private). Public primary

445   care clinics are funded through general tax revenues and each consultation costs RM1 (USD

446   0.20) inclusive of investigations and medication. The private sector is funded by out-of-

447   pocket payments. The public sector provides 60% of outpatient care.[64] In these clinics, a

448   number of healthcare professionals (HCPs) contribute to the provision of asthma

449   management services. Their roles are summarised in Table 2.

450
451   *Study setting*

452   The study was conducted in six urban and semi-urban (three urban and three semi-urban)

453   public primary health care clinics in the district of Klang, Selangor, Malaysia that cater to the

454   lower- and middle-income populations of the country. At 22%, Selangor has the highest

455   prevalence of adults with asthma in Malaysia.[9] All the six selected clinics are headed by

456   trained family physicians. Each clinic had 11–26 medical officers, 13–55 nurses, 4–8

457   assistant medical officers, 6–10 pharmacists and 3–6 assistant pharmacists. This wide

458   variation was related to the size of the clinics and number of patients attending per day in the

459   clinics; each doctor could expect to see 50–70 patients daily. As part of routine practice, all

460   patients with asthma on follow up were given asthma dairies to record their symptoms and

461   encouraged to bring the diaries along during their follow up.

462

463   *Participants, recruitment, and sampling*

464   Participants were approached during a workshop on asthma management attended by all the

465   HCPs (30) who were involved in the care of adult patients with asthma in the six primary

466   care clinics in the Klang district. Those who agreed to be contacted about the study provided

467   telephone numbers which were used (via telephone calls or text messages) to confirm their

468   interest to participate and to arrange the focus groups. Composition of the focus groups was

469   according to the participants' profession to facilitate interaction and avoid hierarchical

470   barriers.

471
472   *Data collection*

473   We developed a semi-structured interview guide based on our reading of literature (mostly

474   from high-income countries),[13,14] our knowledge of the Malaysian socio-cultural context,[16–21]

475   and our experiences in the public health system. The topics covered asthma management and

476   the healthcare professional's perspectives on the barriers of providing supported counselling

477   on self-management for people with asthma.

478

479   We used open-ended questions in the FGDs, with prompts used when important issues did

480   not emerge spontaneously during the interview [Appendix 1]. Sessions, which lasted between

481   60 to 90 minutes, were conducted by PYL, ATC or SSG, with field notes on non-verbal cues

482   and interview dynamics taken by an assistant. All interviews were audio-recorded,

483   transcribed verbatim, and checked. Interviews and analyses were performed iteratively until

484   no new themes emerged. Recruitment was stopped after six focus group discussions when

485   researchers agreed that the analysis had reached thematic saturation.

486

487   *Data analysis and validation*

488   We used NVivo 12 software to manage the data. Thematic analysis was used.[65] Data from

489   FGDs and field notes were coded for themes and analysed inductively to identify recurring

490   themes. Comparison of themes both across and within sub-groups allowed the understanding

491   of the issues specific to each group. Two researchers (PYL and ATC) coded one transcript

492   independently and created a list of free nodes (themes). Subsequently, the themes were

493   merged to form categories. The coding was then compared for inter-rater consistency and

494   discrepancies. Any disagreements were resolved through consensus. The final framework

495   was then used to code subsequent transcripts. Any new themes that emerged were added to

496   the list with consensus of the research team. The quotes that best represent the essence of the

497   themes were extracted for inclusion in the results in this article.

498

499   *Interpretation and reflexivity*

500   The three researchers (PYL, ATC, SSG) involved in data collection and the analysis were

501   female academic primary care physicians. They had frequent open discussions enabling them

502   to reflect on themes and remained mindful of their professional views and biases about

503   asthma self-management support throughout the analysis.

504

505   *Ethics approval*

506   This study received ethical approval from the Medical Research and Ethics Committee of the

507   Ministry of Health, Malaysia (NMRR ID: NMRR-18-2683-43494) and sponsorship approval

508   from the Academic and Clinical Central Office for Research & Development (ACCORD) at

509   the University of Edinburgh. All participants provided written informed consent.

510

511

512

513 **Data availability**

514 The data are not publicly available due to them containing information that could

515 compromise research participant privacy.

516

527

528 **Competing interests**
529
530 The authors declare no competing interests.
531
532
533
534 **Authorship contributions:**
535

536 PYL, ATC, SSG and JW were involved in data collection, analysis and writing of the original

537 draft of the manuscript. All authors contributed to the funding acquisition, conceptualization,

538 writing, editing and review of the manuscript. All authors approved the final version.

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Table 1: Demographic data of participants (N=26)

		Number
Age (years)	< 30	6
	30 – 39	12
	40 – 49	5
	50+	3
Sex	Female	21
	Male	5
Ethnicity	Malay	18
	Chinese	2
	Indian	6
Time in current clinical role (years)	< 5	6
	5 – 9	8
	10 – 14	3
	15 – 19	5
	20 – 24	1
	25+	3
Position	Medical officer	5
	Nurse	4
	Pharmacist	4
	Assistant medical officer	4
	Assistant pharmacist	4
	Family physician	5
Used asthma action plans with patients?	No	10
	Yes	16

Figure 1: Practice-based and contextual barriers to implementing asthma self-management education in primary care.

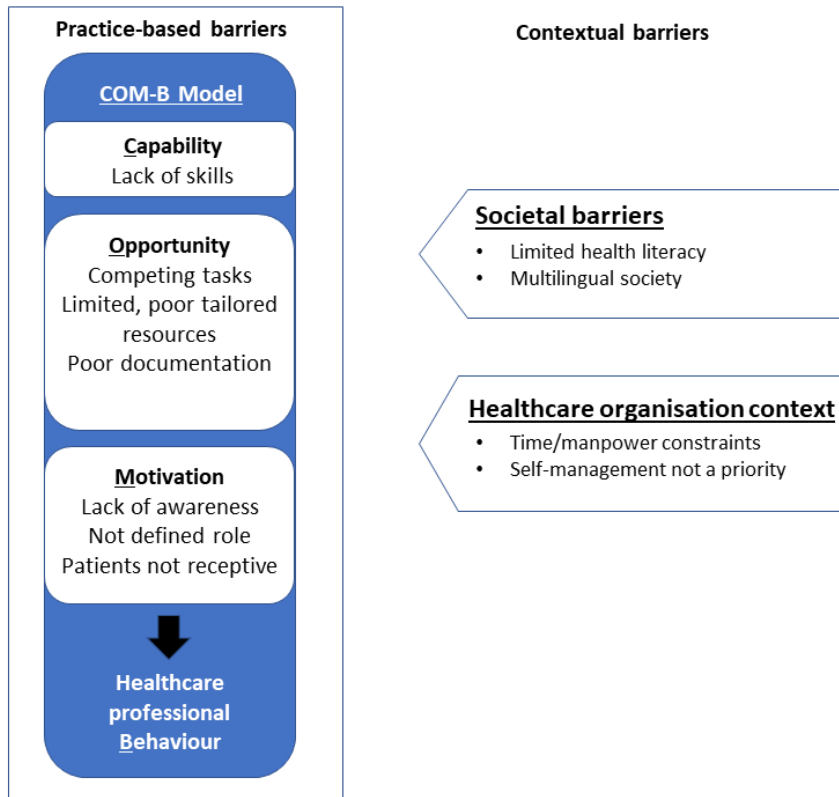**Table 2: Healthcare professional roles in the provision of asthma management services within public healthcare clinics**

Professional	Roles
Doctors (Family physicians and medical officers)	• Assess status of asthma control • Manage long-term care of asthma symptoms • Prescribe medication • Counsel on self-management
Pharmacists	• Assess medication adherence • Counsel patients on inhaler technique • Counsel on asthma action plan
Assistant pharmacists	• Dispense medication
Assistant medical officers	• Manage acute exacerbations of asthma • Refer to medical officers or family physicians for long-term care
Nurses	• Assist in assessment for acute exacerbation of asthma and follow-up care • Refer to medical officers or family physicians