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Qualitative study on the perceived enablers and barriers to interprofessional education in primary care in Singapore

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Abstract

Background There is a need to strengthen interprofessional collaborative practice (IPCP) through interprofessional education (IPE) to improve patient outcomes. To contextualise IPE in primary care, there is a need to understand the factors associated with IPE. This study aims to identify the perceived enablers and barriers of IPE, taking diabetes care as an example, among practising professionals, educators, and institution leaders in primary care.

Methods A qualitative study was conducted in primary care clinics in Singapore. The maximum variation purposive sampling approach was employed and a total of 20 participants were recruited, comprising of 14 healthcare professionals (HCPs), 3 educators, and 3 leaders. Basic demographics data were collected followed by individual semi-structured interviews using a topic guide. Conceptual framework by D'amour and Oandasan was adopted as the underpinning framework to evaluate factors associated to micro (learners and educators), meso (instituitions) and macro (policy and professional bodies) level. Thematic analysis method was adopted for data analysis.

Results Ten themes were identified in this study. For HCPs at the micro level, the themes illustrated interprofessional interactions influenced by learning and work environments, and receptiveness towards IPE shaped by HCPs' attitudes. Additionally, interprofessional collaboration was enhanced through increased interprofessional knowledgeability and overcoming interprofessional hierarchy, while effective communication was fostered by establishing trust, respect, and overcoming psychological barriers. For educators at the micro level, the key themes included the attitudes of educators and the importance of professional development, as well as curriculum development. At the meso level, institutions focused on themes such as resource allocation, system changes, and outcome measurements in the implementation of the IPE programme, along with leadership support for IPE. At the macro level, the emphases were on the roles of policymakers in funding and defining national strategy, as well as the roles of professional bodies in providing educational resources.

Conclusions This study demonstrated the complexity and interrelation of the factors associated with IPE in primary care. A multi-pronged approach needs to be adopted to address all the barriers in the future implementation of the IPE model in primary care and to design an IPE curriculum that integrates well with clinical practice.

Clinical Trial Number Not Applicable.

Keywords Interprofessional education, Primary care, Barriers, Enablers

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Introduction

Interprofessional education (IPE) refers to learning or teaching activities that involve learners and educators from two or more health professions, with the aim of fostering a collaborative learning environment [1]. The primary goal of IPE is to promote group learning by cultivating mutual awareness, trust, and respect, while simultaneously building knowledge and skills that enhance interprofessional collaborative practice (IPCP) and patient care [2]. A recent systematic review has demonstrated that IPE significantly improves students' understanding of collaboration and resulted in positive attitudes towards interprofessional teamwork [3]. Hence, IPE emerges as an innovative solution to support the global health workforce by fostering a collaborative ready workforce. Interprofessional healthcare teams formed through IPE can optimise the skills of their members leading to improved case management and providing better health services for communities [4]. Recognising its significance, the World Health Organization (WHO) has published the Framework for Action on Interprofessional Education and Collaborative Practice, highlighting the mechanisms of successful collaborative teamwork to guide policymakers in the implementation of IPE and IPCP [4]. Furthermore, although IPE places significant emphasis on collaboration through practice-based intervention, it is imperative to acknowledge and tackle issues concerning workplace systems and structures [5].

Meanwhile, the prevalence of diabetes mellitus is rising globally across all age groups, with an estimated projection to be 4.4% in 2030 [6]. Among Singaporean adults aged 18–69, the forecasted prevalence is expected to double from 7.3% in 1990 to 15% in 2050 [7]. The WHO has recently reported that diabetes is among the top ten leading causes of death worldwide and is contributing to an increasing global economic burden [8, 9]. With that, there is an urgent need for care transformation in improving how we manage diabetes. Some workable solutions including strengthening preventive strategies, tapping into information technology, and investing in building collaborative team-based care [10]. Specifically, IPCP in primary care has demonstrated noteworthy improvements in clinical outcomes, including blood pressure control, diabetes control, lipid control, and depression scores, as published in a recent scoping review [11]. In addition, IPCP was also associated with better patient experience [12].

The current healthcare delivery in primary care settings is often fragmented, with limited collaboration among healthcare professionals due to a lack of understanding of each person's role [13, 14]. This issue may stem from the traditional uni-professional nature of education and development, which has not adequately emphasised on the importance of interprofessional collaboration and prepared the learners with the necessary skills, knowledge, and attitudes to practice collaboratively with other professionals in patient care [15, 16]. This is exemplified by a recent study conducted in the primary care setting of Singapore, which revealed that physicians' attitudes toward IPCP were poorer compared to nurses [17]. Furthermore, a literature review found that physicians, who were traditionally trained to focus on disease management, expressed greater satisfaction in practising independently. In contrast, nurses were trained to develop interpersonal skills with patients and colleagues, providing holistic care and making decisions interdependently with physicians [18]. Therefore, physicians tend to perceive IPCP as less important than nurses, even though both professions value collaboration and recognize that effective IPCP leads to improved quality of care and health outcomes [18]. The existence of an "interprofessional hierarchy' within the interprofessional team is also often perceives the physician as the leader, resulting to feelings of marginalization or stereotyping among other professions [19]. Furthermore, in a high collectivist society like Singapore, maintaining harmony within the team and working within a hierarchical environment where supervisees are expected to listen to the supervisor may be more emphasized. This may lead to unintended power differences and obstacles to effective communication [20].

In Singapore, public primary care clinics (polyclinics) provide care for the majority of patients with chronic diseases and have adopted a team-based care approach [21]. HCPs such as physicians, nurses, and allied health professionals, including pharmacists, dietitians, podiatrists, physiotherapists, and medical social workers, are situated under one roof. Allied health professionals provide services such as diet counselling, medication counselling, financial counselling, and diabetic foot screening or treatment. Traditionally, continuing professional development (CPD) is primarily conducted through internally organised meetings, such as journal clubs within the individual professions, and external events such as courses or conferences. To address the issue, there is a need to emphasise the use of IPE in CPD. This involves focusing on the design and delivery of IPE, placing emphasis on providing holistic care, enabling learners to reflect on their experiences of working inter-professionally, deploying multi-modal learning formats and activities, and encouraging team-based learning [13].

Essentially, adopting and strengthening IPCP is crucial for healthcare reform [22]. Further upstream, IPE plays a pivotal role in building a collaborative-ready healthcare workforce [23]. However, to contextualise IPE and IPCP, policymakers must agree on the benefits and be willing

to invest, educators need to be equipped with necessary skills in IPE, and healthcare professionals must be open to learning and working together as a team. To deliver IPE effectively, it is important to understand the enablers and barriers, in order to mitigate factors that can influence the outcome and success of IPE [24]. In a systematic review conducted by Lawlis et al., the authors identified the enablers and barriers to IPE, which were classified into three primary levels: government and professional level, institutional level, and individual level [24]. However, this review focused solely on IPE within higher education institutions' curricula, and its findings may not directly apply to the implementation of IPE as CPD among practising professionals in a primary care setting. Therefore, this study aims to gain an understanding of the perceived enablers and barriers to IPE as CPD, taking diabetes care as an example, among practising healthcare professionals, educators, and leaders in the primary care setting. This study plays an essential role as part of the pre-implementation readiness assessment, evaluating factors such as knowledge, attitude, practice, and readiness of IPE among the stakeholders in primary care. With the knowledge gained, the implementation of IPE can be carefully designed to best suit the current practice.

Materials and methods

Conceptual framework

A conceptual framework by D'amour and Oandasan was adopted to guide this study and is illustrated in Figure 1 [25]. This framework provides a summary of the process, and outcomes associated with IPE. The process of IPE involves stakeholders from three main levels, classified into micro (individual level), meso (institutional or organisational level), and macro (socio-cultural and political level) [26]. At the micro level, the profession's socialization plays a vital role in how the learners' approach interprofessional collaboration. Each profession has its distinct professional culture, knowledge, attitudes, and behaviours, which form stereotypes of their own professional identities [27]. Such professional stereotypes potentially contribute to challenges for IPE. For example, one study found that the presence of an 'interprofessional hierarchy' existed as early as undergraduate school, where nursing students perceived themselves to be of lower academic status and less 'prestigious' than medical students [28]. Conversely, when it comes to educators as role models, they wield a direct influence on the learners and play a pivotal role in creating a supportive environment for IPE [29]. To fulfil the role effectively, they require to undergo faculty development to be equipped with the skills in preparing and facilitating IPE. At the meso level, overcoming the obstacles in the administrative process and garnering support from institutional leadership are the key factors in the success of IPE. Lastly, at the macro level, governmental (political) support for IPE can drive incentives and operationalize IPE activities [30]. After analysing the micro, meso and macro factors to IPE, this framework also proposes

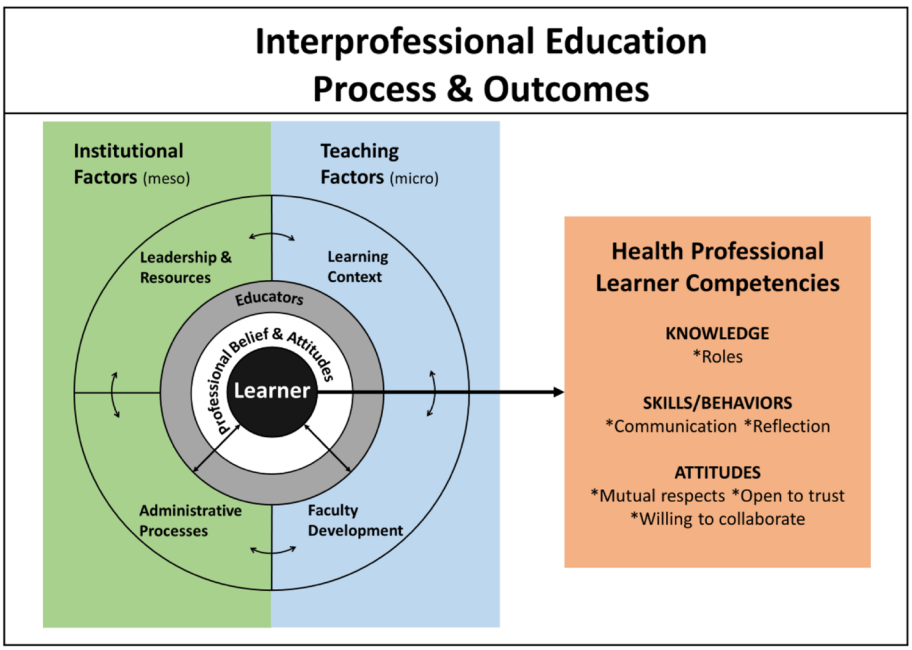

Fig 1. Interprofessional education process and outcomes

evaluating the learners' competencies or outcomes in terms of knowledge (understanding their own roles and the roles of other professions), skills (cultivation of effective communication and reflection), and attitudes (fostering mutual respect, openness to trust, and willingness to collaborate).

Study design

Using a qualitative study method, this study was conducted with semi-structured interviews using a topic guide (Supplementary Appendix 1), which was developed with the conceptual framework by D'amour and Oandasan as the underpinning framework [25]. The questions formulated in the interview guide aimed to identify factors that could impact the growth of knowledge, attitude, skills, and behaviour in IPC among HCPs, serving as the central component of the framework. Additionally, the interview also aimed to explore how factors associated with educators, learning context, leadership, policy, and professional bodies could affect the learners. The maximum variation purposive sampling method was adopted to improve the transferability of the study findings (detailed demographic data of each participant is provided in Supplementary Appendix 2). Healthcare professionals, including physicians (senior and junior), nurses (advanced practice nurse, staff nurse, and enrolled nurse), and allied health professionals such as pharmacists, medical social workers, and podiatrists, were recruited. Educators and leaders from nursing, medical, and allied health were approached for participation in this study.

Study setting and data collection

The study took place in a primary care setting in Singapore. All participants were required to have a minimum of 1-year of experience practising in the primary care setting. Additional eligibility criteria for educators included educators with current involvement in CPD, such as planning, teaching, or organising CPD. Additional eligibility criteria for institution leaders included leaders from various departments, such as education, clinical services, nursing, or allied health, who may have an influence on the implementation of the IPE. Eligible participants were contacted via email or approached face to face. Participants who indicated interest in joining the study were briefed on the objectives and study's procedures before signing the informed consent form. Once the participants completed the informed consent, they were asked to complete a self-administered questionnaire consisting of basic demographics and background data (Supplementary Appendix 3). Prior to the interviews, all participants were briefed on the aims of the study and were asked to reflect on the roles they played in providing diabetes care during the interviews. Individual interviews were then conducted by the research coordinator (PM) at the clinic setting or administrative office for approximately 45 to 60 minutes, either virtually through the Zoom^{TM} platform [31] or face-to-face. The interviews were audio-recorded and transcribed for data analysis. Interview notes were taken by another investigator (JHCE, CSL, BGQL, or CPXY) during the interviews. The process continued until thematic saturation was reached. Personal data collected from the participants was kept confidential and de-identified for analysis.

Data analysis

Audio recordings were transcribed by two professional transcribers, which were engaged through institution-approved transcribing service. A total of 6 transcribed texts were randomly selected for audit to ensure dependability of the data. Transcribed texts were emailed to the participants to confirm the credibility of the data. Data analysis followed the method of thematic analysis described by Braun and Clarke [32]. Transcribed text was first familiarised by investigators to generate initial ideas. The data were systematically coded using the deductive approach by 2 study team members (CSL and PZM). Referring to the conceptual framework, the codes were then grouped into themes using an inductive approach to identify the relationships within and between the themes. Lastly, the themes were named and defined. The data analysis adopted an iterative process between the investigators (CSL, PZM and JN), with attention paid to recognising the enablers and barriers related to IPE.

Researcher characteristics and reflexivity

The research team consists of members from different professions. CSL (lead author) is a female family physician with 12 years of experience practising in primary settings in Singapore and holds a teaching role (undergraduate and postgraduate) in the institution. She was mentored by JN, who is her research supervisor for the Master in Health Professions Education. The study team members also include TEG, who is a senior family physician, direct supervisor of CSL, and holds an education leadership position; PZM and JHCE, who are family physicians; BGHQL, who is a pharmacist; CPXY, who is a senior staff nurse; and PM, who is a senior research coordinator with past experience in conducting interviews for qualitative studies.

We adopted a constructivist stance in the data analysis, focusing on understanding the experiences of individuals and interactions of the data. Investigators practised reflexivity to ensure the confirmability of the data by keeping personal journals to consciously reflect on how our backgrounds and personal perspectives

may have influenced the data interpretations (examples are provided in Supplementary Appendix 4). CSL and PZM met regularly to discuss the analysis of the data and challenge the assumptions made during the process.

Results

Of the 29 eligible participants approached, 20 agreed to participate in the study and completed the interview. The 20 interviews included 6 participants from medical, 7 from nursing, 4 from pharmacy, and 3 from allied health. Table 1 illustrated the participant demographics, educational background, professional background, current role in primary care, and previous participation in IPE. The paragraphs below illustrate the ten themes (summarised in Figure 2) that are classified into micro (healthcare professionals and educators), meso (institution or organisation), and macro (policy or professional bodies) levels. The details of the codes classified into enablers and barriers for each theme, along with example quotes, are in Supplementary Appendix 5.

Table 1. Characteristics of study participants

	Total (N=20)
Age in years (min – max)	42.3 (28-62)
Years (mean) of practice in primary care	7.0
Gender	
Male	6
Female	14
Ethnicity	
Chinese	17
Indian	2
Malay	1
Professional background	
Medical	6
Nursing	7
Pharmacy	4
Allied health	3
Role in primary care	
Healthcare professional	14
Educator	3
Leader	3
Education background	
O level or Nursing certificate	2
Degree level	11
Master level	7
Past participation in IPE	
Yes	5
No	15

Micro Level - Healthcare professionals

Interprofessional Interactions influenced by learning and work environments

IPE was perceived to be influenced by both the learning and work environment, which affect interprofessional interactions. Some participants expressed that a learning environment facilitating active participation would allow team members to share, learn, and interact, while team dynamics could be shaped through trust and openness. However, differences in medical knowledge and past training among HCPs may hinder effective team learning.

> *'Let's say everybody has (differences in) their experience, their knowledge, their level of training. Because there is a disparity in knowledge, you cannot contribute actively to the work (team learning).' (62-year-old, female, Nurse)*

Negative sentiments were predominantly shared regarding to the work environment and how it may have influenced the perception among the HCPs as an obstacle to participation in IPE and reduced opportunity to interact at work. To overcome this issue, one participant proposed the idea of arranging team bonding activities to allow interactions.

> *'Different domains come together to know each other, like a team bonding event where you come together to think of something to do the same thing (together)." (42-year-old, Male, Doctor)*

Receptiveness towards IPE shaped by HCPs' attitudes

Participants perceived that HCPs who understand and appreciate IPE's goals—such as enhancing professional skills, improving patient outcomes, and fostering team roles—are more committed to participating IPE activities.

> *'What would motivate the learner is that there is a team learning and they (HCPs) see the success factor of caring for the patient. They see the value of how the team comes together to look after the patient as compared to the provider seeing a patient individually.' (62-year-old, Female, Nurse)*

Conversely, some participants felt that a lack of understanding or belief in IPE's benefits can hinder participation, with some seeing it as an additional burden. Motivation to participate was perceived to be dependent on how IPE was viewed as integral to CPD; one educator suggested using IPE participation for portfolio building as motivation.

> *'Maybe it's more for portfolio and personal development. So, we will have to go along that line to moti-*

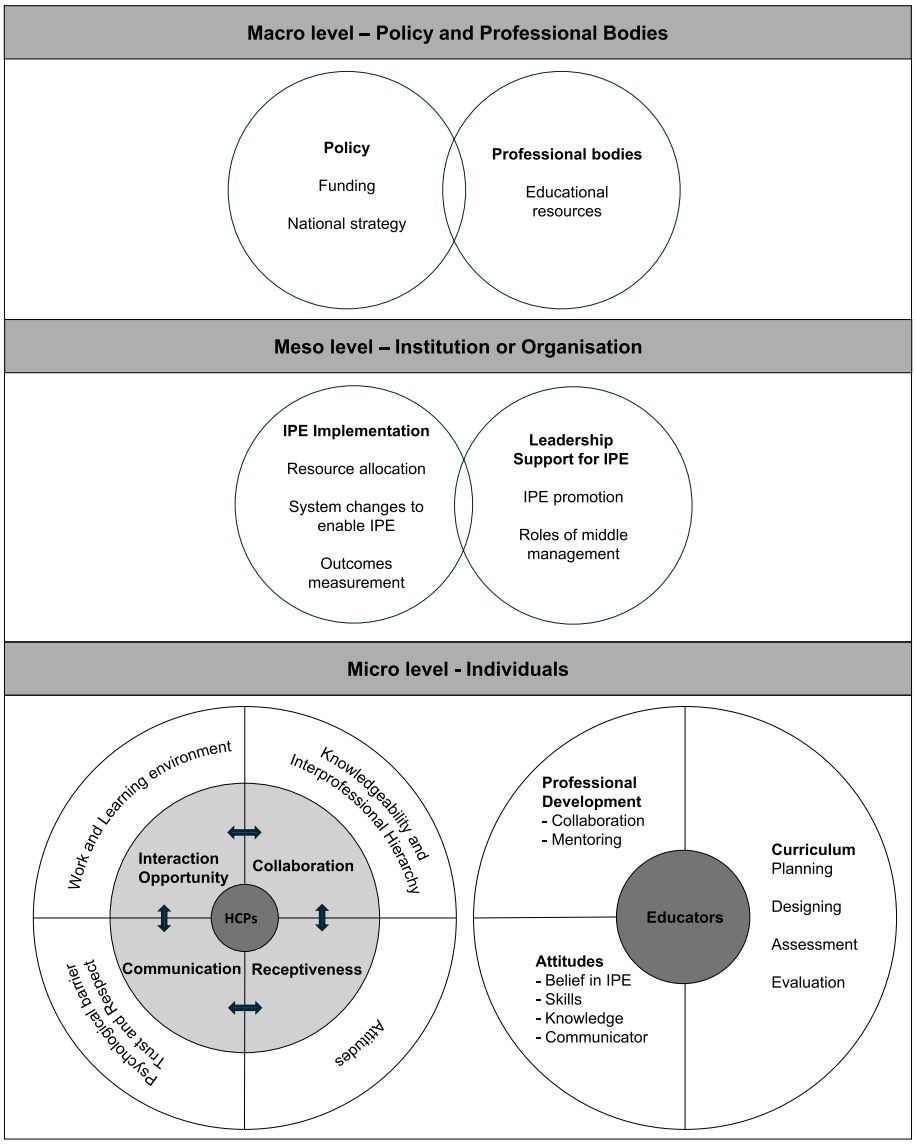

Fig 2. Summary of the findings classified into micro, meso and macro levels

vate learners.' (50-year-old, female, Pharmacist)

Factors shaping attitudes towards IPE were noted to be influenced by past experiences and self-perception. For example, participants expressed that positive attitudes possibly arise from pre-existing good rapport with colleagues, while negative attitudes stem from a desire to maintain the status quo, resistance to change, self-consciousness about one's own gaps, and preconceived ideas about others, leading to impediments to effective team learning.

'I think there's always the mindset that's, like example, the doctors are very unapproachable, or the nurses are always too busy, we have all these preconceived mindsets, so we may not really want to open up and you really learn from each other.' (32-year-old, Female, Pharmacist)

Interprofessional collaboration through enhancing interprofessional knowledgeability and overcoming interprofessional hierarchy

Participants suggested that enhancing interprofessional knowledgeability of the roles provided by other HCPs and overcoming hierarchy in IPE may help to improve interprofessional collaboration. Some suggestions provided by participants involve collaborative efforts, such as observing colleagues at work and learning from each other, as a possible solution.

'Maybe we could spend some time in the (other) department to see what is being done there, what is the processes they do, what sort of counselling, how they advise the patients, and so on. And how different is it from us? Or what sort of advice that they could give to the patients that are very different from what we are giving to patients.' (60-year-old, Male Pharmacist)

However, participants expressed that barriers such as time constraints, busy schedules, and infrastructure limitations impede this understanding; for example, HCPs often need to prioritise their tasks over learning about the roles of other professions. Additionally, hierarchical perceptions as shared by participants, where doctors are seen as decision-makers and more knowledgeable, discourage open communication among team members.

"I think that there is this very deep-seated, entrenched that doctors are higher above everyone else. It doesn't facilitate good working relationships. It also makes communication between the different professions more difficult. Because like that the nurses do not really like raise things to you." (29-year-old, Female, Doctor)

Effective communication fostered by establishing trust and respect, and addressing psychological barriers

Participants expressed that effective communication can be achieved if HCPs are willing to show respect, be professional, and to build trust, which involves using appropriate words and non-verbal language.

'Well, I guess communication will be very important. The way we communicate each other, how we show respect, and still professional at the same time. I mean not just the verbal, the way things are said, the choice of words and then of course the non-verbal, the body language and all that.' (44-year-old, Female, Doctor)

On the other hand, participants described psychological barriers that may impede effective communication, including fear of speaking and hesitancy to approach other members. This is observed in HCPs who are more junior when they compared themselves to their seniors or when they need to talk to the staff that one is not familiar with.

'Imagine I'm just two years old (referring to the level of experience) comparing to the 20-year-old guru (referring to staff with more experience), I'm fearful of what I say, whether it makes sense, or whether you know, is it something useful in terms of my ideas or suggestions? So that may be a hindrance to the communication.' (50-year-old, female, Pharmacist)

Micro level - Educators

Attitudes of educators and importance of professional development

Educators' attitudes were perceived to significantly influence the quality of IPE. Participants felt that educators must believe in and embrace IPE to facilitate sessions effectively. Some participants shared that HCPs value educators who are knowledgeable, up-to-date with research, skilled in teaching, friendly, and good communicators.

'You (educator) must have a good facilitation skills or coaching skills because you want to ensure that the professionals learn from each other.' (51-year-old, Female, Nurse)

Educators were viewed as playing a crucial role beyond curriculum design, and their teaching competency depends on proper training. Some suggestions include mentoring and collaboration with other educators.

'I think they (educators) have to really learn from the other departments. For example, in hospitals, they have ward rounds, and they learn from each other before they can even teach people how to do things, in a more collaborative way.' (32-year-old, Female, Pharmacist)

Like HCPs, participants shared that educators may also struggle to find time for training due to their dual roles as practitioners.

Curriculum (planning, designing, assessment, and evaluation)

Participants expressed the key role played by IPE curriculum, and its design may differ from those customised for higher education institutions (HEIs); some suggestions provided include incorporating IPE into CPD requires an understanding of the learning needs among HCPs and whether it is relevant and applicable to daily clinical practices. Other factors mentioned to be considered for IPE curriculum include the identification of learning objectives, instructional design, assessment, and evaluation. One leader emphasized the need for proper planning and framework, while another educator stressed the importance of having clear learning objectives.

'…is there a method of doing or framework (planning of IPE activities) where… Team learning has to be planned.' (42-year-old, Male, Doctor)
'If we are given the goals and objectives of the programme, I think we will draw from one another's strengths…' (50-year-old, Female, Pharmacist)

When designing an IPE programme, participants suggested that factors to be considered include incorporating communication elements into the design, embedding IPE principles, using relevant content, and ensuring its sustainability. A leader suggested that a good programme includes both understanding IPE and hands-on team activities. Participants described that HCPs value learning methods such as case-based discussions, problem-based learning, and role plays. One participant suggested ensuring the relevance of content through constant review. To translate knowledge into practice and ensure long-term sustainability, one participant suggested regular team discussions incorporating IPE skills:

'I would say the ideal situation, more discussions. I mean when we have difficult patients, I think it'll be good to share. So monthly meetings may be good, to just highlight a few cases to help to improve communication between the different (members within the) teams, and then this could be an avenue for us to discuss anything that we feel that we can improve in terms of processes." (34-year-old, Female, Pharmacist)

Lastly, participants reported that a good programme requires robust assessment and evaluation, which can be achieved by scheduling follow-up sessions, reviewing the progress of learners, and gathering feedback to evaluate the programme.

Meso Level – Institution or organisation

Resource allocation, system changes and outcome measurements in the implementation of IPE program

At the institution level, participants viewed that that securing necessary resources (such as protected time or manpower) during the pre-implementation stage is crucial for developing a customised IPE programme for HCPs, as the healthcare environment differs from HEIs:

'You need to allocate resources. I think this must come from the top. Sufficient resources must be given and then an effective IPE programme must be developed. Co-developed, co-created.' (56-year-old, Male, Pharmacist)

Suggestions for system changes to enable IPE include modifying infrastructure to facilitate communication, integrating electronic medical records (EMR) for better communications, and utilizing online platforms to share HCP roles are some key proposals.

'Ideally, I look at it for the new polyclinic, the structure must be there to facilitate the IPE kind of model approach. Meaning that you have a team, the infrastructure must be built to encourage the team. To have an ease in communication, talking to one another.' (62-year-old, Female, Nurse)

However, participants also verbalised that the limitations within the healthcare system, such as prioritising clinical services over educational needs and providing limited access to MDT meetings for junior HCPs, pose challenges.

'It's more of a senior (who) shared with me (on) who is involved in MDT. But for myself I'm not involved in it, so I don't really know what other professionals are doing.' (28-year-old, Female, Nurse)

However, some leaders expressed concerns about the difficulty of measuring IPE outcomes from an institution point of view, making programme evaluation challenging and complicating efforts to convince senior leadership to invest resources:

'But the problem again, as I said, the KPI (key performance index) cannot be measured. Then that makes it difficult to even budget or even propose a budget. So, the senior leadership or the management, has to be very open-minded in this.' (42-year-old, Male, Doctor)

Leadership support for IPE

For IPE to be sustainable, participants viewed the importance of leaders to see its value and support it, which includes raising awareness and promoting the IPE programme.

"'I think the leaders need to be aware and need to encourage IPE, IPCP. In terms of role- modelling, I was saying that they should maybe encourage these entities to happen." (44-year-old, Female, Doctor)

Participants also believed that the support from middle management is essential, as HCPs report to their supervisors, who influence their performance.

'As long as it is good for your department it is also good for your institution as a whole (referring to the benefit of IPE). I think sometimes not all supervisors think the same." (50-year-old, Female, Pharmacist)

Macro level - Policy and Professional bodies

Policymakers' roles in funding and national strategy

Viewing from the policy level, the enablers to IPE described by participants include the availability of resources such as funding support given by policymakers; from the larger perspective, policymakers need to provide direction in aligning the implementation of IPE with the national strategy for primary healthcare transformation. To increase the awareness of team-based care,

participants suggested that the policymakers may utilise the media as a tool to gain the attention of the public.

> *'They (policymakers) should also collaborate with media, in order to promote this interprofessional team so that people around can share.' (28-year-old, Female, Nurse)*

Professional bodies' roles in providing educational resources

Most of the participants do not foresee any significant roles played by professional bodies in IPE. But one participant suggested that professional bodies may provide educational resources for IPE while another participant suggested using journals as the tool to disseminate information to HCPs.

> *'I mean we do read articles in their (professional bodies) journals, maybe article in there, that gets disseminated out to all the physicians." (42-year-old, Female, Doctor)*

Discussion

This study provided insights into the enablers and barriers to IPE in diabetes care, which can be classified into factors related to micro level (healthcare professionals and educators), meso level (institutions or organisation), and macro level (policy and professional bodies).

Comparison to existing literature

At the learner's level, it is notable that IPE can positively influence the undergraduate students' attitudes toward IPE and better prepare them for IPCP upon graduation [33]. However, there is a scarcity of evidence in the literature on how the working environment may potentially influence HCP's perceptions of IPE as CPD. Hence, this study managed to gain a deeper insight into how the working and learning environment of learners may construct their perception of IPE and subsequently influence their motivation, or willingness to collaborate. For example, a high workload with a demanding schedule may limit opportunities for HCPs to interact or communicate with each other. As a result, it becomes challenging for HCPs to build rapport or trust with each other and reduces their willingness to participate in IPE. This study also found that factors related to interprofessional relationship such as past interactions with other HCPs, preconceived ideas about professional identity, and perceived professional hierarchy may also influence their attitudes toward IPE. This is supported by a review paper where professional identity, professional culture, and interprofessional hierarchies can influence learners' attitudes [34]. At the institutional level, we found that crucial determining factors encompass financial resources, manpower, and infrastructure support, with leaders playing a key role in promoting IPE, overseeing its implementation, and addressing system-related barriers. The findings were interestingly consistent with a review that evaluated the factors influencing team-based care, where they were categorised into factors associated with the care team, organisation, and health system [35]. It is possible that within the clinical practice itself, attitudes towards IPCP are influenced by multiple factors, beginning with individuals' internal factors, interpersonal relationships with patients and other HCPs, and extending to organisational factors[36], all of which directly influence how HCPs perceive IPE.

This study recognised the importance of the attitudes of the educators in the primary care clinics who are involved in the CPD, including the ability to endorse IPE, possessing good teaching skills as context experts and effective communicators, and understanding the learner's needs. It is also well-established in the literature that educators are the cornerstone of success in the implementation of IPE, playing crucial roles in designing the curriculum, facilitating learning activities, assessing learners' outcomes, obtaining feedback, and evaluating the IPE programme [37]. To achieve this, educators need to be empowered with the necessary skills and knowledge through faculty development. They should also show commitment to teaching IPE and collaborate with other educators or institutions in IPE or IPCP-related initiatives [38]. Regarding curriculum planning, this study found that success factors include having an underpinning framework for curriculum planning, clear objectives, relevant learning content that is applicable for current practice, guidelines on how IPE sessions can be conducted, reviewing learners' progress, and obtaining feedback. These findings are supported by another study which emphasizes evaluating the learning context, reflecting the 'who, what, where, and when' of IPE during the implementation [39].

Implication of the findings

This study illustrates the complexity and interrelation of the various factors in primary health care, which poses greater challenges for implementing IPE programmes in healthcare settings as opposed to HEIs. Hence, multifaceted interventions might be preferable, targeting at HCPs, educators, and institution levels. Table 2 summarises the suggested components of interventions that can address different factors at various stages of implementation.

Effective stakeholder engagement at the pre-implementation stage, is crucial for identifying real-world problems, sharing opinions, and persuading stakeholders about the need for change [40]. This approach,

Table 2. Suggested components of interventions at various implementation stages

	Pre-Implementation	Implementation	Post-Implementation
Healthcare professionals	• Increase awareness of IPE's objectives and its relation to IPCP through stakeholder engagement [40]	• Acquire the knowledge, skills, and attitude in IPE for IPCP • Provide feedback on IPE programme [41]	• Use of IPE for portfolio building in CPD [42]
Educators	• Faculty development in IPE [43] • Learning needs assessment [44] • Curriculum planning [45]	• Facilitate IPE programme [37] • Evaluation and adjustment to IPE curriculum [37]	• Evaluation of IPE programme sustainability [46]
Institution	• Leadership support [47] • Funding, manpower, and infrastructure [48] • System-level intervention to modify working environment of HCPs	• Monitor progress of IPE implementation • Evaluation of IPE short-term outcomes such as improvement of learner's skills, knowledge, and attitudes [49]	• Evaluation of intermediate outcomes such as team effectiveness [50] • Evaluation of long-term outcomes such as patients' outcomes [51]

especially at the HCP level, enhancing the awareness of IPE objectives and its relation to IPCP can be done through engagement platform such as the departmental meetings. Consequently, HCPs will become more willing and motivated to actively participate in IPE. At the educator level, one of the factors of successful implementation is the curriculum itself [45]. Engaging the educators aims to achieve consensus on the need for change. Subsequently, educators undergo training to be competent in designing an IPE curriculum, taking into consideration the scope and complexity of the change [43]. The process also involves needs assessment to understand learners' needs and gaps [44]. At the institution level, leadership plays an important role in organisational change [47]. Leadership dialogue can be a way to gain leadership support, leading to a willingness to provide resources such as funding, manpower, and infrastructure support [48]. It also allows leaders to decide on the future direction of the implementation plan and monitoring of progress. Additionally, leaders may also consider making changes at the system level such as modification of work environment that can facilitate IPCP.

At the implementation stage, the roles of HCPs are to actively participate in the IPE programme, acquiring the knowledge, skills, and attitudes that can be translated into IPCP. Additionally, HCPs may provide valuable feedback for further improvement of the IPE programme [41]. This also enables the HCPs to reflect on their performance and make further adjustments to their IPCP. Apart from facilitating the IPE programme, educators play a crucial role in providing continuous evaluation and adjustments to the IPE curriculum [37]. Leaders, on the other hand, are responsible for monitoring the progress of IPE programme implementation and evaluating short-term outcomes, such as improvement of learners' skills, knowledge, and attitudes [49]. This evaluation helps leaders to decide on the future dissemination of the IPE programme and resource planning.

At the post-implementation stage, HCPs may use IPE for portfolio building and applied the knowledge learned from IPE in clinical practice [42]. At the educator level, after the initial implementation, the next stage is to evaluate the sustainability of the programme. This evaluation focuses on whether the core elements (desired outcomes) of the programme are recognisable, delivered with fidelity, and whether there is adequate capacity for continuation [46]. At the institution level, leaders may evaluate the intermediate (team effectiveness) and long-term outcomes of IPE (patients' outcomes). An effective team encompasses shared goals, clear roles, mutual trust, effective communication, measurable processes and outcomes, and organisational support to promote team success [50]. In the longer term, IPE followed by IPCP will ideally improve patient outcomes, which can be measured through indicators such as laboratory or clinical variables, patients' knowledge, and healthcare utilisation [51].

Limitations

This study has a few limitations. Firstly, the study was conducted in the primary care setting in Singapore, which may not be representative of the primary care setting elsewhere. The socio-cultural diversity across various primary care settings worldwide may potentially shape how different professions collaborate. Secondly, previous studies have illustrated the crucial roles played by patients and caregivers in IPCP [52–54], and another study has shown that patient involvement in IPE was beneficial in better learning outcomes and experiences [55]. However, the perception of patients or caregivers was not evaluated in this study because the involvement of patients in designing education programmes for healthcare professionals is new and may not yet be culturally acceptable in the current learning context. Thirdly, participants were told to reflect on their interprofessional

experience in providing diabetes care, which may not be generalisable to other diseases.

Conclusion

This study demonstrated the complexity and interrelation of the factors associated with IPE implementation in primary care. Individual internal factors, past experiences within the work environment, and past interprofessional encounters may influence how HCPs perceive IPE. These factors may also be interconnected with educators' factors, leadership factors and system factors. Therefore, a multipronged approach needs to be adopted to address all the barriers to the future implementation of the IPE model in primary care, considering how various stakeholders will adapt to the new changes of IPE. Lastly, the designing of IPE curriculum must be relevant to the clinical context and integrate well with clinical practice to achieve successful IPCP.

Abbreviations

CPD	Continuous professional development
HCP	Healthcare professional
HEI	Higher education institution
IPCP	Interprofessional collaborative practice
IPE	Interprofessional education
MDT	Multidisciplinary team

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

JN and TEG supervised CSL in the study. CSL and JN conceptualised and designed the study protocol. CSL secured the funding. JHCE, BGQL, CPXY were involved in the recruitment. PM who is the research coordinator interviewed all the participants. CSL, PZM, and JN analysed the data. CSL drafted the manuscript. All authors reviewed, revised, finalized, and approved before manuscript submission to journal.

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Data availability

The data that support the findings of this study are not openly available and are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Study approval was obtained from SingHealth Centralised Institutional Review Board (CIRB Ref: 2021/2655). Written consent was taken from all the participants.

Competing interests

The authors declare no competing interests.

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