

# Perceived facilitators and barriers to chronic disease management in primary care networks: a qualitative study

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## Research article

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# Abstract

**Objective:** The increasing chronic disease burden has placed tremendous strain on tertiary healthcare resources in most countries, necessitating a shift in chronic disease management from tertiary to primary care providers. Therefore, the Primary Care Network (PCN) policy was promulgated as a model of care to organise private general practitioners (GPs) into groups to provide GPs with resources to anchor patients with chronic conditions with them in the community. As the PCN is still in its embryonic stages, there is a void in research regarding its ability to empower GPs to manage chronic patients effectively. This qualitative study aims to explore the facilitators and barriers for the management of chronic patients by GPs enrolled in the PCN.

**Design:** We conducted 30 semi-structured interviews with GPs enrolled in a PCN followed by a thematic analysis of audio transcripts until data saturation was achieved.

**Setting:** Singapore

**Results:** Our results suggest that PCNs facilitated GPs to more effectively manage chronic patients through 1) provision of ancillary services such as diabetic foot screening, diabetic retinal photography and nurse counselling to permit a “one-stop-shop”, 2) systematic monitoring of process and clinical outcome indicators through a chronic disease registry (CDR) to promote accountability for patients’ health outcomes and 3) funding streams for PCNs to hire additional manpower to oversee operations and to reimburse GPs for extended consultations. Barriers include high administrative load in maintaining the CDR due to the lack of a smart electronic clinic management system and financial gradient faced by patients seeking services from private GPs which incur higher out-of-pocket expenses than public primary healthcare institutions.

**Conclusion:** PCNs demonstrate great promise in empowering enrolled GPs to manage chronic patients. However, barriers will need to be addressed to ensure the viability of PCNs in managing more chronic patients in the face of an ageing population.

## Introduction

As the global population ages at an alarming pace, the number of patients with chronic conditions is set to rise in tandem. This unparalleled surge in demand for healthcare culminates into higher bed occupancy rates and emergency department presentations, which impose substantial expenditures on the healthcare system [1–3]. Singapore, a developed city-state with a healthcare system accessible through an extensive network of hospital, step-down and primary care providers, is no exception. Singapore’s primary care sector is divided between privately and publicly run entities. Public primary healthcare institutions called polyclinics are multi-doctor practices. Public healthcare institutions (polyclinics and hospital specialist outpatient clinics (SOCs)) are government-funded, with subsidised consultations, medications and diagnostic investigations available for eligible patients.

As polyclinics and SOCs are inundated with high patient loads, there is an impetus to shift stable chronic patients away from these public healthcare institutions to the private primary care space. The private primary care sector managed by private general practitioners (GPs) accounts for 80% of all primary care utilisation, yet only 20% of patients turn to them for chronic disease management [4]. To more effectively harness this pool of untapped resources and lessen the burden afflicting public healthcare institutions, a model of care that promotes the anchorage of chronic patients with private GPs is imperative.

This augmentation came in the form of the Primary Care Network (PCN) which organises private GPs into groups de novo, a move touted by Singapore's Ministry of Health (MOH) and its statutory board the Agency of Integrated Care (AIC) as a vehicle to enhance chronic disease management for enrolled GPs. The migration of chronic disease management to primary care contexts necessitates a team-based approach whereby a multidisciplinary group of professionals coordinate with the GP to accomplish shared goals within and across settings to achieve higher quality care [5,6]. Hence, the PCN is a model of care that enshrines the delivery of team-based primary health services, through a team of physicians, nurses, care coordinators, and administrative assistants [7]. Such networks have been established in Canada, New Zealand and Germany since the early 2000s, and have produced improved patient access to primary care and quality of care [8–10]. In Germany, PCNs have displayed positive results in the management of chronic diseases such as diabetes by serving as a conduit of care that focuses on improving access to care and chronic disease self-management practices through the use of multidisciplinary teams [10,11]. PCNs in Alberta had also demonstrated their capacities in reducing presentations to emergency departments and hospital days for non-elective acute care, further emphasising the significance of team-based care at the primary care interface [12,13]. Furthermore, PCNs facilitate sharing of resources, allowing for greater bargaining power when tendering for services, sharing expertise between parties and reducing the organisational workload of practices [14].

As of August 2020, a total of 527 private GP practices have been enrolled in the ten existing PCNs in Singapore, each helmed by two GP leaders and furnished with a certain level of resources which will be further elaborated in the results section [7]. To our knowledge, only two quantitative studies were conducted to evaluate the effectiveness of PCN in Singapore, both exclusively for diabetes management [15,16]. However, there are no qualitative studies investigating how the PCN facilitates or challenges the management of chronic diseases from the providers' perspective, which is a crucial step to undertake to explore its scalability as a viable model of primary care. Therefore, this study aims to understand the experiences of GPs enrolled in PCNs and explore the facilitators and barriers of PCN in helping GPs manage patients with chronic diseases.

## Method

### Study Design

Our study employed a qualitative research design [17] using data collected from semi-structured in-depth interviews conducted with participants who met the inclusion criteria of being a private GP enrolled in a

PCN at the time of the interview. The consolidated criteria for reporting qualitative research (COREQ) criteria was applied throughout the research process (research checklist) [18].

## **Recruitment**

Purposive and snowball sampling strategies were used to recruit eligible participants. Participants were contacted via email or telephone, as most contact details were available on publicly accessible websites. Snowball sampling was used in reaching out to eligible participants whose contact details were not made available on public domains. A total of 30 eligible participants took part in the study (81% response rate) while seven declined participation, citing insufficient time to be interviewed.

## **Data collection**

The semi-structured in-depth interviews were conducted at a place of the participants' convenience. The interviews ranged from 40 to 90 minutes and occurred from January 2019 to January 2020. The team was trained in qualitative research, had no prior relationship with the participants and had a profound knowledge of the Singapore healthcare system.

The topic guide used was designed with questions on the primary care landscape and how the PCN had shaped the way GPs manage patients with chronic conditions. The questions created starting points to dive deeper into aspects salient to the research questions by further probing participants based on their initial responses. The topic guide was pilot tested with four GPs before implementation. As the interviews were semi-structured, there were no restrictions to conversation flow, but the interviewers facilitated the conversation to elicit responses that could answer the research question. Fieldnotes were also collected to provide contextual information during data analysis. After the interviews, the audio recordings and subsequently, audio transcripts were de-identified to ensure anonymity.

## **Data analysis**

All audio recordings were transcribed verbatim, and the transcripts were analysed thematically with QSR NVivo software (version 12) following an iterative six-step process outlined by Braun and Clarke [19]. As such, we first familiarised ourselves with the transcripts, coded aspects that were salient to our research question and organised the codes into themes, while simultaneously referring back to the fieldnotes to enhance the reflexive process. Subsequently, the research team discussed the definitions assigned for each theme to ensure that the themes accurately represented the experiences of the participants. Final themes were agreed among all the authors after multiple iterative rounds of feedback. Additionally, to ensure inter-rater reliability, we followed a similar protocol when analysing the data until the agreement was high on the comparison of codes. Data analysis ended after achieving thematic saturation, whereby no new themes emerged. All themes and subthemes, along with the number of data units, are reported in our coding tree below.

## **Patient and public involvement**

There was no patient involvement, and all participants were private GPs who had provided us with informed consent before participating in our study. The chance to edit their transcript as a form of member checking was also offered but not taken up by any participant.

## Results

A total of 30 interviews were conducted. We interviewed participants from a total of eight out of ten PCNs, and all participants recruited at that point of time were involved in the delivery of chronic care in a PCN.

### Participant characteristics

During the recruitment process, 28 participants were recruited by purposive sampling while two were recruited by snowball sampling. The average age of our participants was 49 years of age (range 31-68 years old), and their average duration spent in primary care was 18 years (range 3-35 years). In fact, most participants had been in their own practice for a relatively long duration averaging 14 years (range 1-35 years). Our sample comprised of 27 male and three female private GPs.

### Main findings

Three themes were identified as facilitators and two themes as barriers to the management of chronic conditions. The facilitators are 1) ancillary services to provide a “one-stop-shop”, 2) chronic disease registry (CDR) to monitor care indicators and 3) funding for the network. The barriers are 1) administrative burden of maintaining the CDR and 2) loss of patients due to financial gradient in favour of public healthcare institutions.

**Table. 1** Facilitators developed based on results

Facilitator themes	Subthemes	Sample quotes
Theme 1: Ancillary services provide a “one-stop-shop”	Subtheme 1.1. Convenience of having the ancillary services arranged for patients	<i>“[...] eye screening and nurse education [services available at polyclinics], but whereas in primary GP clinics, we are unable to offer that. So, the current workflow is that we need to refer patients back to even polyclinic or back to other service centres for eye screenings. These extra referrals or extra effort for the patient is not an optimal workflow for the patient and that will reduce the uptake on a lot of services. So PCN with our own ancillary and even mobile services, hopefully, will provide more convenience to the patient.” (R26)</i>
	Subtheme 1.2. Additional manpower provided for conducting and coordinating ancillary services	<i>“[...] CAs [clinic assistants] or my doctors will just have to register the patient, and then the PCCs will then follow up with patients on their appointments, and then they will book, and then they will then get their appointments, work with the patients to get their appointments and then bring the provider [roving ancillary services team] to provide their service in our clinic.” (R46)</i>  <i>“The DRP, DFS I believe is done by Diabetic Society [external vendor]. Their nurses will be running the services inside the van. [Name of PCN] has their own roving nurse, so I understand that they will be providing the nurse counselling and also maybe helping with some of the DRP, DFS.” (R21)</i>
Theme 2: Chronic disease registry to monitor care indicators	Subtheme 2.1. Cross accountability to ensure practices meet specific standards of care	<i>“[...] my understanding of the CDR, is that they want to benchmark, they want to benchmark the care of the patient, that means, for example, within the PCN, let's say, everybody [PCN GPs] HbA1c for diabetic, you know is let's say 8, and for my clinic, all my patients are 9, then they will say that I am below average. So there is a benchmarking [...]” (R39)</i>
	Subtheme	<i>“Alright, so I guess in a way it [CDR] reminds especially the private doctors,</i>

	2.2. Reminder to fulfil care processes	<i>especially when your clinic so busy. A lot of times we will overlook, or we will forget certain things [...] So this, in a way, it is a constant reminder to making sure that this is done for the patient." (R26)</i>
Theme 3: Funding for the network	Subtheme 3.1. Care Plus Fee for extended consultation time	<i>"The Care Plus Fees are incentives for all members of the PCN [...] who are managing complex chronic cases. They will receive a financial incentive per patient because it takes longer and more time resource to manage these patients. So per year, they are given a quantum of 100 dollars [per chronic patient], but of course, you must satisfy all the criteria [CDR requirements] stipulated to prove that you are managing a complex patient." (R15)</i>
	Subtheme 3.2. Funding for additional manpower for backend office duties	<i>"Primary care coordinators if I am not mistaken [...] is one FTE [full-time equivalent] to 3000 patients [...]" (R36)</i>
	Subtheme 3.3. Funding for locums for GPs to attend continuing medical education sessions	<i>"[...] I know that specifically there is funding for them to employ locum, so if they have to employ locum to go for this [CME sessions], there is funding to pay for their locum." (R48)</i>
	Subtheme 3.4. Funding for GP leads to perform	<i>"[...] PCN leads are given 0.4 FTE [full-time equivalent] [...] for a GP because it is an opportunity cost to be taken away from his clinic. That money goes directly into his pocket. That is to compensate him for the time lost because he could be otherwise seeing his patients." (R36)</i>

## **Theme 1: Ancillary services to provide a “one-stop-shop”**

Every PCN is outfitted with wrap-around ancillary services which included diabetic retinal photography (DRP), diabetic foot screening (DFS) and nurse counselling (NC). These ancillary services enabled private practices which were traditionally too small to sustain or arrange for such services an opportunity to provide more holistic and preventive care for their patients. The individual practices are also supported by a team of nurses and care coordinators, expanding the time for patient care by the entire primary care team.

### **Subtheme 1.1. Convenience of having the ancillary services arranged for patients**

Traditionally, private GPs would have to refer their patients to the polyclinics or government hospitals for ancillary services. However, the PCN enables each clinic to provide ancillary services to their patients when the services of a roving team are employed. Therefore, patients will not only be able to see the same doctor but also have the ancillary services conducted at the same location. As most patients reside near the clinic, this “one-stop-shop” enables a higher level of convenience and lowers the perceived barriers to attend ancillary services.

### **Subtheme 1.2. Additional manpower provided for conducting and coordinating ancillary services**

The lack of ancillary service support and busy clinic hours raise the challenge of counselling patients on disease-modifying behaviours, diabetic eye and foot examinations for independent GPs. Having additional manpower in the form of nurses hired by the PCN contributes towards the practices in carrying out these essential ancillary services to prevent avoidable complications in patients. PCNs can either employ and train their own nurses or outsource the services to external vendors that provide a roving team of nurses to conduct ancillary services at their clinics.

Furthermore, PCNs are provided with additional manpower to arrange for ancillary services and remind patients to attend the arranged services which alleviate the workload for clinic assistants and improve patient attendance. This task is fulfilled by primary care coordinators (PCCs), but PCCs can also be assigned other PCN related tasks such as the consolidation of patient data for maintenance of the CDR (elaborated in theme 2).

## **Theme 2: Chronic disease registry to monitor care indicators**

The CDR is a platform that enables the systematic tracking of care components for patients. Data is tabulated into an excel spreadsheet which comprises over 200 fields, from basic sociodemographic data, date of clinical diagnosis and screening attendances to clinical parameters for chronic conditions in accordance with local clinical practice guidelines. CDR data is submitted to AIC to ensure required care

components are fulfilled before Care Plus Fee (CPF, elaborated in subtheme 3.1) is dispersed by AIC to the PCN. Thus, the CDR gives GPs and AIC a dashboard view of the quality of care provided, allowing for the identification of opportunities to refine existing management practices using quantitative parameters by improving processes and outcomes.

### **Subtheme 2.1. Cross accountability to ensure practices meet specific standards of care**

Most solo GP practices work in silos, and a certain level of accountability is needed to ensure that practices not only follow guidelines but provide the best care for their patients. Therefore, anonymised results of performance indicators from the CDR of all practices are made available during implementation and review sessions every quarter to perform benchmarking to reduce the variation in performance and improve quality of care for patients.

### **Subtheme 2.2. Reminder to fulfil care processes**

The CDR platform allows practices to follow-up with patients when required and ensure judicious completion of necessary procedures in their care management plans.

## **Theme 3: Funding for the network**

Every PCN is entitled to funding from the government. A commitment of \$45 million per annum by the government [30] will equip the network with more resources to better manage chronic patients than what could be harnessed as an individual private practice. This funding is mainly disbursed on a reimbursement basis through AIC.

### **Subtheme 3.1. Care Plus Fee for extended consultation time**

Private practices are business entities that generate revenue mainly through consultation fee and the sale of medicines. As a result, the revenue generated is volume-based, making it more profitable for GPs to see to more acute cases. However, complex chronic patients require a lengthened consultation. Hence, the CPF was introduced to reimburse clinics for extended consultation time. However, process and clinical outcome indicators stipulated in the CDR must be completed before the CPF is disbursed by AIC.

### **Subtheme 3.2. Funding for additional manpower for backend office duties**

Funding is provided for PCNs to employ PCCs to coordinate ancillary services, track patients, remind patients to attend ancillary services and to consolidate data for the CDR as most solo practices do not have the manpower to conduct non-clinical duties. Funding for PCCs come in the form of full-time equivalents which is furnished by AIC based on the PCN's chronic patient load.

### **Subtheme 3.3. Funding for locums for GPs to attend continuing medical education sessions**

Funding is provided for PCN GPs to hire locums when they attend continuing medical education (CME) sessions. The availability of locums motivated GPs to attend CME sessions while maintaining clinic

services in the interim.

### **Subtheme 3.4. Funding for GP leads to perform PCN-related duties**

Funding for PCN leaders is used to backfill time lost at their practice when performing PCN-related duties. Duties include developing working relationships with leaders of other PCNs, providing strategic and clinical leadership and spearheading quality improvement over member practices.

### **Table 2. Barriers developed based on results**

Carrier themes	Subthemes	Sample quotes
Theme 4: Administrative burden of maintaining the CDR		<p><i>"Fortunately, our staff are understanding, but you cannot say it's the same for other solo practices. The technical staff may not actually want to do paperwork, and if it falls on the onus of the doctors to do it, I don't think they have the time also beyond their clinical time." (R18)</i></p> <p><i>"For those clinics using Clinic Assist [CMS] with the CMS that is linked to PCN yes, that will be easier. You just need to key in your numbers and click submit [smart extraction tool function], but for a lot of other clinics not using Clinic Assist and integrated with PCN, what do we do? We need to manually write it down or manually key in individual patient clinical indicators for both MOH and PCN. With the busy clinic, the doctor has no time to do it, the staff has no time to do it, so we need to OT [overtime] to submit all these." (R26)</i></p>
Theme 5: Loss of patients due to financial gradient in favour of public healthcare institutions	<p>Subtheme 5.1. Insufficient CHAS quantum</p> <p>Subtheme 5.2. Heavily subsidised government-funded polyclinics</p>	<p><i>"The CHAS subsidies help, but it is for simple chronic illness, for simple cases [...] But when it comes to more medication [...] it makes it very difficult, even with the CHAS subsidy." (R48)</i></p> <p><i>"You cannot fight with the polyclinic because they are subsidised, so you cannot compare. We have no subsidies for drugs. We have no subsidies for consultation." (R48)</i></p> <p><i>"I would say that we have been able to keep a certain number of chronic patients within the registry. But of course, the challenge is keeping them in [...] they did not come back after one visit since last year. So for this group of patients, I would assume that they have kind of withdrawn themselves from the system [...] Sometimes, they are, for example, going back to the polyclinic. Most of the time it is cost issues." (R20)</i></p>

## **Theme 4: Administrative burden of maintaining the CDR**

The maintenance of the CDR requires consolidation of data regarding the process and clinical indicators by both GPs and clinic assistants. Despite having additional administrative support from PCCs to consolidate registry data, routine documentation proved highly laborious for practices overstretched by other administrative duties and lean manpower structure, leading to more man-hours or overtime duties. Clinics also face difficulty in extracting data from their clinical management system (CMS) due to the lack of a smart extraction tool that aligns with CDR requirements.

## **Theme 5: Loss of patients due to financial gradient in favour of public healthcare institutions**

Perceptions of the affordability of healthcare affect the uptake of medical services. The high levels of government subsidies offered at public healthcare institutions such as the polyclinics and SOCs are highly attractive to price-conscious patients. Thus, the Community Health Assist Scheme (CHAS), a portable medical subsidy that enables patients to enjoy a finite quantum by the government to offset medical expenses when seeking treatment at private primary care facilities was launched [20]. CHAS is poised to alleviate the stress placed on the public healthcare sector resulting from the huge volume of patients drawn to their subsidised services and medicines.

### **Subtheme 5.1. Insufficient CHAS quantum**

Complex chronic conditions require multiple visits to the clinic and long-term medication. Participants reflected that the quantum is usually sufficient for patients with simple chronic conditions but insufficient for patients with complex chronic conditions, as more medications need to be prescribed. Therein lies the possibility that care for multimorbid patients provided by their private GP might discontinue after the finite CHAS quantum has been exhausted.

### **Subtheme 5.2. Heavily subsidised government-funded polyclinics**

The adverse financial gradient between private primary care and polyclinics promotes specific health-seeking behaviour. Being price-sensitive, patients turn to the largely government-funded polyclinics to obtain subsidised medications and enjoy lower consultation fees, promoting the severance in care continuity with their private GP.

## **Discussion**

The provision of human and financial resources to upkeep the day to day operations of the PCN which includes the wrap-around ancillary services increase the accessibility of team-based care to patients with chronic conditions and the use of the CDR to optimise care components are central in driving this care model forward. Ironically, the CDR, which is an enabler, also poses an administrative challenge for practices. Legacy issues regarding the financial gradient between private GP practices and polyclinics is another complex policy dilemma that requires further examination. Hereinafter the facilitators and barriers will be discussed in detail.

Ancillary services not traditionally offered by solo practices are now available through the PCN. The roving services provide DRP, DFS and NC, which are proven to be catalysts for preventing avoidable amputations and blindness [21–23]. The inconvenience caused to patients in making extra trips to polyclinics where ancillary services are offered, which resulted in missed attendances, was alleviated through roving teams that conduct the services at clinics [24]. A study by Schäfer et al. (2017) indicated that one-stop-services provided at GP clinics improved accessibility, continuity and comprehensiveness of care [25]. As GPs are usually burdened by assuming organisational and administrative tasks while providing medical care, assigning the responsibility of arranging and conducting ancillary services to designated staff allowed GPs to focus on the medical care for their patients [26–28]. This team-based care approach as studied through a meta-analysis by Levngood et al. (2019) established that team-based diabetes management improved overall clinical indicators for diabetes patients, health services utilisation, diabetes-related morbidity and mortality [29].

Our participants supported the concept of the CDR, which allows for a certain level of benchmarking with other practices within the same PCN and track the process and clinical outcome indicators for their patients. A study by Luo et al. (2018) evaluated the effectiveness of diabetes management in a pilot PCN in Singapore [15]. The quantitative study briefly mentioned the use of a CDR but did not go into details as to how the CDR enabled better diabetes management. Our findings support the study by Luo et al. (2018) by elucidating how the CDR led practices to conform to clinical guidelines. As defined by Schmittiel et al. (2015), disease registries can serve to generate performance feedback reports on clinical outcomes; identify patients out of therapeutic range; create point-of-care reminders and decision support; and create "high-risk lists" that target patients who require more intensive management [30]. Other studies on electronic healthcare registries have suggested that disease documenting platforms if utilised in one or more of these ways as suggested by Schmittiel et al. (2015), can improve care delivery for patients with diabetes [31–33].

Despite the advantages brought about by CDR, some barriers hinder its implementation. As reflected by our participants, the management of CDR is administratively burdensome, particularly for practices not supported by a CMS. Even for practices with a CMS, there is no smart extraction tool devoted to the exporting of CDR mandated fields. As a result, the GPs or clinic assistants would have to key in the required CDR fields manually, resulting in additional man-hours or "overtime". In addition, the need for increased documentation of care and coordination planning for patients also reduces face-to-face time GPs have with patients [34].

A lack of adequate compensation for the coordination of tasks hinders GPs from giving optimal care to their patients [26]. Therefore, funding for manpower to complete back-office tasks such as the coordination of ancillary services and consolidation of data fields for the CDR was allocated. Extra manpower such as having PCCs perform data retrieval and entry for the CDR would also translate to more face-to-face time for GPs with patients, resulting in better patient understanding and thus treatment of the condition. However, to our knowledge, there are other challenges to this, such as providing a space

in the clinic for PCCs to work and the unwillingness of practices to grant access to patient data due to confidentiality issues.

Another facilitator that motivates GPs to manage more chronic patients is the CPF. Chronic patients typically require a longer consultation and more face-to-face time than GPs customarily expend in routine practice [27,35]. If not compensated appropriately, chronic patients might not receive adequate consultation time, resulting in the omission of important standard-of-care items, reduced attention to patients' psychosocial concerns, and limited discussion of management options [36]. As private practices are profit-oriented entities, the compensation for additional time spent on a chronic patient is appropriate to offset the potential reduction in acute cases seen. However, our participants revealed the highly contingent nature of this funding model, where CPF was disbursed only after the fulfilment of CDR requirements by religiously completing the necessary process and clinical outcome indicators. To our knowledge, CPF had only been distributed once since PCN's inception due to unspecified delays from AIC. We could only surmise that auditing of the fulfilment of CDR criteria took many man-hours at AIC's end as well. Nonetheless, the CPF is seen as augmentation for both the GP in terms of reimbursement for their time and the chronic patient who is ensured of evidence-based chronic disease care.

Given that PCNs group GPs practices together de novo, it is imperative for a strong leader to helm the network. Clinician leadership has been shown to be important in driving policy direction, strategic planning by operating across organisation boundaries, and improving the practices within the network [37–39]. However, GPs might feel a strain taking on dual capacities, both as network leader and provider in their own practice. A study by Sephar et al. (2017) emphasised the challenges that GPs face between the clinical and leadership roles and a lack of formal training and preparation to assume the role of leader [40]. Thus, the reimbursement for their time in conducting duties as a PCN leader was paid accordingly, and the lack of leadership, management and financing skills of the GPs can be nurtured through a national health leadership model embedded into CME [41,42].

CME is essential for GPs to keep abreast of the latest chronic disease management practices and serve as a platform to exchange experiences with their colleagues [43]. In addition, PCN leaders are no longer only the captain of their practice but gatekeeper of the entire network. Thus, continuing professional development in clinical, business and financial leadership should be cornerstones for the development of PCN leaders [44]. In both instances, GPs are provided with funding to hire locums to fill their duties when attending CME courses. This motivates GPs to improve pre-existing levels of competence while having the manpower to cover their duties during their clinical absence.

Perceptions of the affordability of [medical care](#) undoubtedly affect the uptake of chronic care treatment [45]. In Singapore, CHAS was introduced as a portable medical subsidy to improve access to private primary healthcare where recipients can seek subsidies for treatment at private GP clinics. In fact, the CHAS scheme was enhanced in November 2019 to motivate more patients to adhere to management plans and seek appropriate care [46]. Despite the CHAS enhancements to encourage Singaporeans to shift their care from polyclinics to private GPs, our participants reflected that the CHAS quantum is

insufficient to drive that behaviour. This is especially true for patients requiring multiple medications due to their complex conditions. All our participants had voiced that the high cost of unsubsidised medicines at private GPs had pushed patients to seek care at the heavily subsidised polyclinics. This financial gradient between private and public primary healthcare institutions had long been the reason for patients sticking to polyclinics, especially in a healthcare system where services are mainly paid out-of-pocket and patients are free to choose their primary care provider [47].

Currently, there are 20 polyclinics in Singapore, with the number set to increase to 30 by 2030 [48,49]. Despite the introduction of CHAS, polyclinics continue to be confronted with high patient volumes [50,51]. Affordability, convenience of travel and onsite laboratory facilities influence patients' choice of seeking treatment at polyclinics [47]. Increasing the convenience of onsite ancillary services at GP clinics will encourage more patients to seek services from their regular private GPs. Thus, the inconvenience resulting from the lack of co-located ancillary services was resolved through the provision of roving ancillary services teams by the PCN. However, the adverse financial gradient with polyclinics remain. With the emergence of more polyclinics, private GPs will find it increasingly difficult to compete for patients with chronic conditions who are price sensitive. This prevailing policy dilemma warrants further study. For now, we can only postulate that the increasing chronic burden might be too much for the consortia of private GPs alone to absorb, creating the need for more polyclinics.

To our knowledge, this is the first qualitative study conducted on the newly implemented PCN that explores the characteristics which make it a good model for chronic care management, in light of a growing ageing population with increased utilisation of primary care services. We also managed to recruit participants from eight out of ten PCNs. Therefore, we believe that our findings are transferrable to all PCNs in Singapore as perspectives across PCNs should be similar, given the same contractual backbone for implementation and funding. In addition, we recognise the limitations of snowball sampling in our recruitment process but feel that our study results are unaffected as only two participants were recruited by snowballing. We also recognise potential self-selection bias, whereby participants who had positive experiences with the PCN might be more inclined to be interviewed. Despite the potential one-sidedness in experiences, a range of views was demonstrated.

Moving forward, the next step is to evaluate the cost-effectiveness of PCN in managing chronic conditions compared to polyclinics and conduct studies on facilitators and barriers of PCN from the patients' perspective.

## **Conclusion**

The PCN initiative offers immense potential for the management of chronic diseases. The funding for streamlining back-office functions and increased manpower capacities to deliver a range of ancillary services to patients is a huge enabler for solo practices, who are now able to tap on more resources. Moreover, the CDR which tracks the patients' care delivery advances evidence-based care management. The challenges surrounding the administrative burden of maintaining the CDR need to be prioritised, and

financial gradient between private and public primary care systems partially surmounted through enhancements to CHAS remain to be addressed.

## Abbreviations

AIC: Agency of Integrated Care; CDR: Chronic Disease Registry; CHAS: Community Health Assistance Scheme; CME: Continuous Medical Education; CMS: Clinic Management System; COREQ: Consolidated criteria for Reporting Qualitative research; DFS: Diabetic Foot Screening; DRP: diabetic retinal photography; GP: General Practitioner; PCC: Primary Care Coordinator; PCN: Primary Care Network; MOH: Ministry of Health; MPH: Master of Public Health; NC: Nurse Counselling

## Declarations

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### Authors' contributions

GK, DM, JC, TCH, FCD, SS and EH contributed to the conception and design of the research; FCD, SS and EH carried out the literature search; FCD and SS collected and analysed the data; FCD drafted the manuscript and other authors revised it; DM acquired the grant to carry out this study. All authors read and approved the final manuscript. All authors agree to be accountable for all aspects of the work.

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### Data sharing statement

Transcripts will not be shared to protect the anonymity of the GPs. Readers who wish to gain access to the data can write to the corresponding author; data may be granted upon reasonable request.

### Ethics approval and consent to participate

Ethics approval was obtained from the National University of Singapore, Institutional Review Board (NUS-IRB) before starting the study. The NUS-IRB reference code is S-19-005. A full explanation of the purpose and procedure of the study was provided to participants prior to obtaining their written informed consent. All demographic data and quotes used in this study were de-identified to maintain the anonymity of participants.

### Competing interests

The authors declare that they have no competing interests.

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## Figures

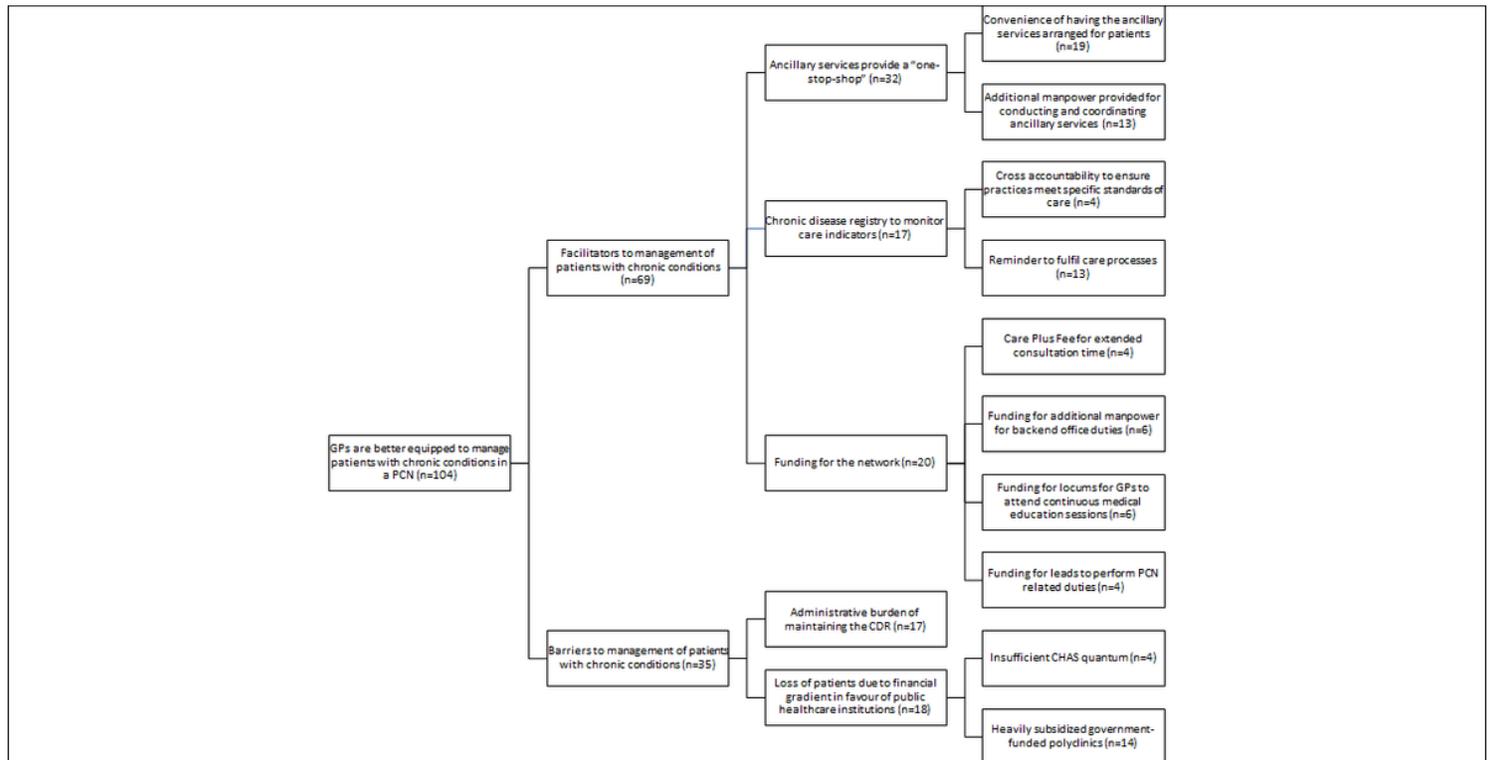


Figure 1

Coding tree developed based on the data analysis process

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