

Feasibility of Implementing Chronic Care Model in the Malaysian Public Primary Care Setting

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ABSTRACT

Introduction: Non-communicable diseases (NCD) is a global health threat. The Chronic Care Model (CCM) was proven effective in improving NCD management and outcomes in developed countries. Evidence from developing countries including Malaysia is limited and feasibility of CCM implementation has not been assessed. This study intends to assess the feasibility of public primary health care clinics (PHC) in providing care according to the CCM.

Methodology: A cross-sectional survey was conducted to assess the public PHC ability to implement the components of CCM. All public PHC with Family Medicine Specialist in Selangor and Kuala Lumpur were invited to participate. A site feasibility questionnaire was distributed to collect site investigator and clinic information as well as delivery of care for diabetes and hypertension.

Results: There were a total of 34 public PHC invited to participate with a response rate of 100%. There were 20 urban and 14 suburban clinics. The average number of patients seen per day ranged between 250-1000 patients. The clinic has a good mix of multidisciplinary team members. All clinics had a diabetic registry and 73.5% had a hypertensive registry. 23.5% had a dedicated diabetes and 26.5% had a dedicated hypertension clinic with most clinic implementing integrated care of acute and NCD cases.

Discussion: The implementation of the essential components of CCM is feasible in public PHCs, despite various constraints. Although variations in delivery of care exists, majority of the clinics have adequate staff that were willing to be trained and are committed to improving patient care.

KEY WORDS:

Chronic care model; chronic disease; non-communicable disease; feasibility; multifaceted intervention; Primary Healthcare clinic; Malaysia

INTRODUCTION

Non-communicable diseases (NCD) in Malaysia are becoming an epidemic, particularly Type-2 Diabetes Mellitus (T2DM) and Hypertension (HPT). The latest National Health and Morbidity Survey (NHMS) showed a rising trend of the prevalence of T2DM and HPT among Malaysian adults reaching an epidemic proportion of 15.2% and 32.7% respectively.¹ The majority of these NCD patients are being managed at primary healthcare level. NCD management and follow up are one of the main activities and challenges in public primary healthcare clinics (PHC) in Malaysia.

The primary healthcare system in Malaysia consists of a dual system of public and private primary healthcare sectors. The Malaysian public primary healthcare service has developed significantly since the early 1950s with the establishment of PHC. The PHC provide an easy access of health care to the community with each clinic serving an approximately 15,000-20,000 population.² To date, there are 1061 PHC including maternal and child health (MCH) clinics.³ Initially, the PHC provide acute episodic care to the local population as well as MCH catering for the main causes of mortality and morbidity at the time. However, due to the epidemiological transition and funding mechanism, the PHC has become a major player in treating and combating the rise in NCD burden in the country. Although there are six times more primary care clinics and doctors in the private sector compared to the public sector (2.37 doctors per 10,000 population in the private sector compared to 0.52 doctors per 10,000 population in the public sector),⁴ majority of patients with chronic NCD seek treatment from the public sector. This is because the public sector receives heavy subsidisation from the government who bears the costs of patient care and treatment, unlike in the private sector where patients, employers or private insurance companies bear the healthcare cost.⁵ The government subsidisation within the public sector ensures that patient only pays a minimal sum for treatment and this has led to over-subscription of the public PHC.⁵ As a result, public PHC becomes over-loaded in its capacity to provide adequate care to the overwhelming number of patients.^{5,6}

The Ministry of Health has introduced various programs to transform NCD care including the 'Reviewed Approach' in 2007⁷ which incorporated chronic disease screening as well as the introduction of a National Diabetes Registry (NDR) in the public primary healthcare system. Another initiative was the NCD Prevention-1Malaysia (NCDP-1M), which has introduced positive changes at the ground level to improve chronic disease delivery of care including PHC dedicated clinics specifically for T2DM and HPT.⁷ Despite struggles and attempts by the policy makers and public healthcare providers to provide the best care for NCD patients, many fall short due to the high workload and constraints in resources.⁵ Shortages in trained personnel impedes the implementation of a multidisciplinary team to manage NCD.^{5,8} Limited access to newer pharmacological agents and increasing burden in the prevalence of NCD result in sub-optimal management, poor clinical outcomes and high complication rates.^{4,9} A study conducted in the Malaysian public primary healthcare setting demonstrated that 52.6% of T2DM patients received sub-optimal management of related cardiovascular risk factors and these patients had poor glycaemic control.⁸ With regards to treatment of HPT, a report from the 2006 NHMS III found that only 32.4% of patients were taking their antihypertensive medication and from that group, only 26.8% had their blood pressure controlled.⁹

For a more efficient and effective management of T2DM and HPT, adoption of the Innovative Care for Chronic Conditions (ICCC) Framework¹⁰⁻¹² is necessary. This framework took its reference from the Chronic Care Model (CCM), an evidence based model developed by Wagner and colleagues which offers solution that shifts the paradigm from the acute care model to a comprehensive, patient-centred model of care.¹¹⁻¹³ It consists of six elements which are the delivery system, decision support tool, patient self-management, clinical information system, healthcare organisation and community resources.¹²⁻¹⁴ This model has been proven to improve clinical outcomes of chronic diseases in many developed countries.¹⁴

Evidence on the ability of the public PHC in providing chronic disease care according to the CCM is still lacking. There is a need to assess the adequacy of resources and the feasibility of these clinics in implementing interventions based on the CCM. Therefore, the objective of this study was to assess the adequacy of resources and the feasibility of public PHC in providing chronic disease care according to the CCM. This paper reports the findings from the site feasibility assessment of the EMPOWER-Participatory Action Research (EMPOWER-PAR) which assess the feasibility of these clinics in implementing the interventions designed based on the CCM.

MATERIALS AND METHODS

Study settings

This was a site feasibility study which was part of the EMPOWER-PAR project. The EMPOWER-PAR was a pragmatic, cluster-randomised, parallel, matched pair, controlled trial in public primary care clinics from two states in Malaysia. The study protocol was registered with the clinicaltrial.gov (NCT01545401) and was published in 2014.¹⁵

A cross-sectional survey was conducted between August and December 2011 to assess the resources and public PHC ability to implement the obligatory components of CCM as adopted by the EMPOWER-PAR.

All 34 public PHC led by Family Medicine Specialists (FMS) in Selangor (SEL) and Wilayah Persekutuan Kuala Lumpur (WPKL) were invited to participate in the study. During the period of this study, only these 34 PHCs had resident FMS. The FMS were invited to attend a briefing session on the study objectives and methodology. Detail explanations were given regarding the pragmatic nature of the study design, as well as the concept of participatory action research (PAR) approach¹⁶ in designing and implementing the EMPOWER-PAR intervention.

Site feasibility questionnaire (SFQ) was then distributed to all FMS who attended the briefing session. SFQ was also sent via email to all FMS who did not attend the briefing session. In cases where there were more than one FMS in the clinic, all were approached. If only one FMS was willing then the clinic would be eligible to participate in the study. If more than one FMS was willing then the FMS were given the liberty to decide who would lead the intervention in the clinic. All questionnaires distributed to the invited clinics were then returned to the investigators after two weeks, either by post or email. The response rate was 100%, 20% were returned via post and 80% via email.

The CCM components adopted by The EMPOWER-PAR intervention

The EMPOWER-PAR intervention was designed based on the six interrelated elements of the CCM. Its development process has been described in detail in the EMPOWER-PAR study protocol.¹⁵ In order for the clinic to be included in the study, it had to fulfil the feasibility criteria for EMPOWER-PAR intervention which consist of three obligatory components and two optional components utilising readily available and existing resources in the Malaysian public primary healthcare setting. Table 1 summarizes the components of the EMPOWER-PAR intervention according to their respective CCM elements.

The aim of the EMPOWER-PAR intervention was to have a productive interaction between the CDM team and the informed, empowered T2DM patients.¹⁵ The PAR approach¹⁶ which was applied in implementing the EMPOWER-PAR interventions ensured that the primary care providers who were involved in this study were empowered to make the choice of actions within their constraints to improve their patients' health outcomes. The CDM team from each clinic was empowered to prepare a proposed intervention plan which considered their constraints and how to overcome those barriers. The process of PAR gave the autonomy to the health care providers to determine how best to improve the quality of their patient care.¹⁶

The site feasibility questionnaire (SFQ)

The SFQ was designed to assess the resources and feasibility of the PHC in implementing the components of CCM as adapted by the EMPOWER-PAR study. It was divided into four sections which included site investigator's information, clinic

information, the method of T2DM and HPT delivery of care, and site investigator's interest in participating in the research.

The clinic information section attempted to uncover the types of clinic, clinic location which was urban versus sub-urban, patient workload and the number of staffing. The types of clinics were divided into four types according to the number of patients attending the clinics per day.

The delivery of care section explored the six elements of the CCM¹⁰⁻¹² which may already exist in these clinics. These included a registry for T2DM or HPT, methods of delivery of care i.e., dedicated clinic versus integrated clinic, staffing involved in the delivery of care, training for staff in using the clinical practice guidelines (CPG) for T2DM or HPT, the use of patient hand-held booklets, the medical record systems and clinical audit of T2DM or HPT performed in the clinics over the last one year.

Information collected from the SFQ was utilised to assess the feasibility of the PHC to implement the components of CCM according to the following criteria:

1. had ≥500 patients with T2DM in the registry.
2. had an FMS who were keen to participate and willing to lead the team.
3. had the capacity and willing to implement the obligatory components of the EMPOWER-PAR intervention.
4. was located within 70 km from the central laboratory as the blood samples were transported back to the centre for analysis.

These criteria were developed by the investigators based on expert opinion and consensus. The first criterion was formulated in order to ensure adequate sampling for T2DM participants. The second and third criteria were developed due to its importance in ensuring that the intervention could be implemented and the fourth criterion was developed due to practical reasons.

Definition and description of terms

The definition of an urban area was an area located within a major city, while a suburban area was the surrounding area located within commuting distance to a major city. Staffing was defined as the number of doctors and allied health personnel (FMS, medical officers, assistant medical officers, staff nurses, dieticians/pharmacists) working in the clinic. Workload was defined as the average number of patients seen in the clinic per day.¹⁵

In the delivery of care for T2DM or HPT section, 'integrated care in general outpatients' referred to the general outpatient clinic (also known as OPD care) that is set up to provide services for all patients attending the clinic regardless of their complaints whether it is acute or chronic and this is based on the 'episodic' care approach. On the other hand, a 'dedicated clinic' referred to a clinic that provides a particular service e.g., a dedicated T2DM clinic with a dedicated space, timing, appointment and multidisciplinary team members allocated in providing care to a specific type of condition.

The 'Green Book' referred to the T2DM patients' booklets which are widely used in the majority of the public PHC in Malaysia. It consists of two books, an A5-size medical record booklet which is kept by the clinic and a smaller A6-size 'mini green book' which is kept by the patient. The Green Books contain the record of T2DM symptoms, evidence of complications, vital signs, investigations including blood results and medications. As for HPT patients, the 'Hi-trax booklet' is part of the clinic medical record and the '555' book is a small booklet which can be purchased in stationary shops in Malaysia. This '555' booklet is widely used as a patient-held record for HPT patients in the majority of the public PHC in Malaysia. It contains the record of clinic visit's blood pressure readings and the date of the next follow-up appointments.

The 'yellow outpatient card' referred to the paper-based patient medical record system, which is compiled into patient's medical notes and kept safely in the medical records room. The Tele Primary Care (TPC) system referred to the electronic medical record system which was developed by the Ministry of Health. The 'clinic advisory panel' referred to the community resource consisting of patient representatives and community leaders, as well as representatives from the clinic staff including doctors and nurses.

Statistical analysis

Analyses were performed using IBM SPSS version 20.0 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.) and Stata Statistical Software: Release 13.0 (College Station, TX: Stata Corporation LP). Continuous variables were summarised using means and standard errors, while categorical variables were summarised using counts and percentages. For all analyses, P values of less than 0.05 were considered statistically significant.

Ethical considerations

The Ethics Committee of the university research management institute and the Medical Research Ethics Committee of the Ministry of Health (MOH) approved the study protocol. Permission from the Family Health Development Division of the MOH and the respective Health District Offices was also obtained prior to the conduct of the study.

RESULTS

There were 34 public PHC in SEL and WPKL which were led by FMS and all of them were invited to participate in the study. All 34 clinics returned the SFQ to the investigators giving 100% response rate. Table II shows the characteristics of the public primary care clinics. There were 20 clinics in the urban area and 14 clinics in the sub-urban areas. The highest proportion (44.1%) was of type 3 clinic with a total of 301-500 patients attending per day. Majority of the clinics (52.9%) had a moderate workload of 251-500 patients seen per day.

The location, workload and staffing of the public PHC is described in supplementary file 1. There were 20 urban clinics and 14 suburban clinics. The average numbers of patients seen per day ranged between 250-1000 patients. Clinic no. 33 managed the most number of patients with an average of

Table I: The obligatory and the optional components of the EMPOWER-PAR intervention and the related CCM elements^{10,11,12}

CCM ELEMENTS	OBLIGATORY EMPOWER PAR INTERVENTION	TARGET LEVEL
Organization of Health Care	Creating/ Strengthening a Chronic Disease Management (CDM Team) – a multidisciplinary team led by FMS to improve coordination of care for T2DM and co-existing CV risk factors	Primary Care Providers
Delivery System Design	Utilising the national Clinical Practice Guidelines (CPG) for T2DM to aid management and prescribing	Primary Care Providers
Decision Support	Utilising the Global CV Risks Self-Management Booklet to support patients self-management	T2DM Patients
CCM ELEMENTS	OPTIONAL EMPOWER PAR INTERVENTION	TARGET LEVEL
Clinical Information System	Utilising clinical information system and conducting clinical audits to track progress through reporting outcomes to patients and providers	Primary Care Providers
Community Resources and Policy	Utilising community resources to support and sustain care	Primary Care Providers

Table II: Characteristics of the 34 public primary care clinics in Selangor and Wilayah Persekutuan

Characteristics	Public Primary Care Clinics n (%)
Location	
• Urban	20 (58.8%)
• Sub-urban	14 (41.2%)
Types of Clinic	
• Type 1: >800 patients attendances per day	3 (8.8%)
• Type 2: 501-800 patients attendances per day	9 (26.5%)
• Type 3: 301-500 patients attendances per day	15 (44.1%)
• Type 4: 150-300 patients attendances per day	7 (20.6%)
Workload (average number of patients seen per day)	
• 0 – 250	4 (11.8%)
• 251 – 500	18 (52.9%)
• 501 – 750	7 (20.6%)
• 750 – 1000	5 (14.7%)

Table III: Delivery of care for T2DM and HPT in the 34 public primary care clinics in Selangor and Wilayah Persekutuan (year)

Delivery of Care	T2DM n (%)	HPT n (%)
Registry for T2DM or HPT	34 (100%)	25 (73.5%)
Delivery method for T2DM and HPT Care		
• Integrated care in general outpatients	26 (76.5%)	25 (73.5%)
• Dedicated T2DM or HPT Clinic	7 (23.5%)	9 (26.5%)
Team members involved in T2DM or HPT Clinics		
• Doctors	34 (100%)	34 (100%)
• Nurses/ AMO	30 (88.2%)	28 (82.4%)
• Dietitian/ Nutritionist	15 (44.1%)	14 (41.2%)
• Pharmacist	29 (85.3%)	23 (67.6%)
Conducted CPG (T2DM or HPT) Training over the last 1 year	30 (88.2%)	26 (76.5%)
Using the patient-held booklet (Mini Green Book for T2DM, '555' Book for HPT)	34 (100%)	25 (73.5%)
Types of medical record system (each clinic may use more than one system)		
• Green Book (T2DM), Hi-Trax Booklet (HPT)	30 (88.2%)	7 (20.6%)
• Tele Primary Care (TPC) System	15 (44.1%)	15 (44.1%)
• Yellow outpatient card	13 (38.2%)	30 (88.2%)
• Others	3 (8.8%)	4 (11.8%)
Performed clinical audit for T2DM or HPT over the last 1 year	32 (94.2%)	18 (52.9%)
Type of community resources to support T2DM or HPT care		
• Clinic Advisory Panel	21 (61.8%)	17 (50%)
• Non-Governmental Organisation	3 (8.8%)	1 (2.9%)
• Others	3 (8.8%)	10 (29.4%)
• None	7 (23.5%)	23 (17.7%)

Table IV: Feasibility assessment of the public primary care clinics, n = 34 to implement the CCM components as adopted by the EMPOWER-PAR intervention

Clinic	T2DM patients in the registry (> 500)	Capacity to implement the obligatory component					
		FMS willing to participate and lead the intervention	Delivery System Design: MDT	Self-Management Support	Decision Support	Distance to central lab (km)	Feasibility
1	1800	Yes	Yes	Yes	Yes	55	✓
2	550	Yes	Yes	Yes	Yes	39	✓
3	2480	Unsure	No	Yes	Yes	50	✗
4	2114	Yes	Yes	Yes	Yes	34	✓
5	2000	Yes	Yes	Yes	Yes	28	✓
6	2060	Yes	Yes	Yes	Yes	34	✓
7	850	Unsure	No	No	No	31	✗
8	2639	Yes	Yes	Yes	Yes	23	✓
9	2400	Unsure	No	No	Yes	12	✗
10	1500	No	Yes	Yes	Yes	33	✗
11	1500	Yes	Yes	Yes	Yes	35	✓
12	3000	Unsure	No	No	Yes	29	✗
13	4900	No	Yes	Yes	Yes	20	✗
14	2000	Yes	Yes	Yes	Yes	26	✓
15	4400	Yes	Yes	Yes	Yes	4	✓
16	1878	Yes	Yes	Yes	Yes	50	✓
17	1788	Yes	Yes	Yes	Yes	18	✓
18	2000	Unsure	No	No	Yes	38	✗
19	2000	Yes	Yes	Yes	Yes	20	✓
20	4473	Unsure	No	Yes	Yes	46	✗
21	1149	Unsure	No	No	No	77	✗
22	5521	Yes	Yes	Yes	Yes	33	✓
23	1840	Unsure	No	No	No	42	✗
24	2500	No	Yes	Yes	Yes	28	✗
25	3400	Unsure	No	Yes	Yes	32	✗
26	3200	Yes	Yes	Yes	Yes	28	✓
27	1800	Unsure	No	Yes	Yes	34	✗
28	4000	Yes	Yes	Yes	Yes	30	✓
29	2582	Yes	Yes	Yes	Yes	26	✓
30	5720	Yes	Yes	Yes	Yes	28	✓
31	3100	Yes	Yes	Yes	Yes	55	✓
32	2686	Yes	Yes	Yes	Yes	32	✓
33	1000	Yes	Yes	Yes	Yes	51	✓
34	4000	Unsure	No	Yes	Yes	14	✗

1000 patients per day. This was an urban clinic with 1000 T2DM patients and 2000 HPT patients in the registry. Clinic no. 24 managed the least number of patients per day (250) but has a high number of T2DM patients (2500) on its registry. In clinics with registry for both T2DM and HPT, there were more patients in the HPT registry. All suburban clinics have one FMS whereas some of the urban clinics have more than one FMS with a maximum number of three FMS in clinic no. 33. The total number of staff ranged from 19-119 with clinic no. 11 has the least total number of staff (19) and clinic number 33 has the most (119).

Table III shows that all clinics had a registry for T2DM but only 73.5% of the clinics had a registry for HPT. There were only 23.5% of the clinics that had a dedicated T2DM clinic and 26.5% had a dedicated clinic for HPT. Majority of the clinics delivered their T2DM and HPT care as part of the integrated care (with acute cases) in general outpatient clinics. CPG training was conducted in 88.2% and 76.5% for T2DM and HPT, respectively. With regards to utilisation of the patient-held booklet, all clinics were using the T2DM 'mini green book' but only 73.5% were using the '555' booklet for HPT patients. Majority of the clinics (88.2%) were

using the Green Book as the medical record keeping system for T2DM; while for HPT, majority of the clinics (88.2%) were using the 'Yellow outpatient card'. Clinical audits were performed mainly for T2DM in 94.2% of the clinics. With regards to community resources to support T2DM or HPT care, 61.8% of the clinics had the resources to support T2DM care and 50% had the resources for HPT.

Table IV shows the results of the site feasibility assessment of the public primary care clinics to implement the components of the CCM as adopted by the EMPOWER-PAR. Out of the 34 clinics, only 20 had adequate resources and fulfilled the site feasibility criteria and deemed feasible in implementing the intervention.

DISCUSSION

This study shows that there were variations in the existing delivery of clinical service for patients with NCD in the public PHC. Most clinics were found to provide general outpatients (popularly known as OPD care) integrated care approach (76.5%) and only 23.5% and 26.5% providing dedicated clinics for T2DM and HPT respectively. The shift from OPD

care to dedicated clinic approach involving multidisciplinary team is one of the CCM elements and is important in order to provide better care for chronic disease patients and to improve outcome.¹⁷⁻¹⁹

There were good provisions for CPG training in most clinics. However, this study found a lack of comprehensive support tool for patient self-management. The existing 'mini green book' for T2DM and the '555' booklet for HPT were not designed as educational resource materials for patients and therefore, contained clinical data which may not be readily understood by them. These booklets serve as communication tools between doctors when patients seek treatment in the various clinical settings. Under the CCM, patient self-management support is an essential element in the management of NCD.¹⁷⁻¹⁹ Hence, there was a pressing need to design a comprehensive combined booklet to serve as an educational resource material for both T2DM and HPT patients to understand their conditions, risk factors, potential complications, control targets and self-management. This was addressed in the EMPOWER-PAR study.¹⁵

This study suggests that despite the challenges faced by the PHC, most of the clinics were already equipped with core resources needed to implement the CCM components which included multi professional staffing and decision support tool i.e., the local CPG. The challenges include necessary training in order to maximise the utilisation of these resources including reorganisation of the staff to form a multidisciplinary team dedicated for chronic disease and to improve access to these local CPGs. The EMPOWER-PAR intervention emphasised the need to utilise readily available resources in the clinic, given the existing constraints in the public PHC system. Moreover, there is a need to change the mindset that adding expensive resources may not improve outcome; but providing the training to optimise utilisation of the people who provide the care, improve self-management skills of those who receive it as well as the community, have been proven to be effective.^{20,21}

Despite various constraints such as heavy workload and lack of multidisciplinary team management of T2DM and HPT in these clinics, this study shows that it was feasible to implement the obligatory CCM components of the EMPOWER-PAR intervention. An advantage of the PHC is that it has adequate staff that were willing to be trained, to organise their time and commitment for change despite their busy schedule in order to improve patient care. The presence of committed leadership, good relationship and collaboration among staff as well as positive support to change have been recognized as successful factors for organisational change to implement CCM in primary care.²⁰

In comparison to other countries, the implementation of the CCM has been successful in various parts of the world especially in the European countries¹⁷⁻¹⁹ and in those countries nearer to us, such as Singapore.^{22,23} Many countries in the World Health Organization South East Asian Region have started introducing an integrated prevention and control program for NCD; such as the Philippines²⁴, Sri Lanka and Bhutan where World Health Organization has introduced pilot projects to integrate chronic disease care into the primary care system.²⁵ However, the success of the

implementation of this model depends on the willingness of the participants to adapt to the change in view point of the way in which care is delivered. The CCM advocates a multidisciplinary coordinated care rather than the acute episodic type care. Countries that do not have a formal structure and integrated chronic disease management model or those with healthcare services that are sporadic and unorganised will face several barriers in improving chronic disease care.

This study also highlights certain improvements that need to be in place. There is a need for a better centralised National Diabetes Registry which can incorporate the private healthcare facilities as well as reviving the national HPT registry. Currently, information of T2DM and HPT patients attending private healthcare facilities are not linked to the Ministry of Health and therefore, are not included in the national registries. The conversion from hand-held records to electronic medical records with registration system could improve data availability to improve health outcomes and save health care costs.²⁶ Having comprehensive national registries for various chronic conditions, including T2DM and HPT would provide better database for service and outcome monitoring, as well as expansion for future research.

Strength and limitations of the study

The strength of this study includes its excellent response rate and complete SFQ information. However, the study contains several limitations. The geographical limitation meant that the results may not be representative of other public PHCs in other parts of the country which may have different resource constraints. Further research which includes public PHC in other parts of Malaysia, which may consist of different resource constraints, is also needed to provide more evidence on the effectiveness of the CCM intervention. The results from this study presents estimate of clinic resources and workload as the data was collected via self-filled questionnaire by the FMS. It presents quantitative data of the site feasibility assessment. There is also a need for qualitative analysis to explore barriers and facilitators to implement CCM which is beyond the scope of this paper. Findings from the qualitative study will be reported in a separate paper.

CONCLUSION

In conclusion, this study has found that the implementation of the essential components of CCM is feasible in some public PHCs, despite various constraints. Although there were variations in the existing delivery of care for T2DM and HPT, majority of the clinics have adequate staff that were willing to be trained, to organise their time and commitment for change in order to improve patient care.

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