Assessing a national policy on strengthening chronic care in primary care settings of a low-resource country using patients' perspectives.

Paibul Suriyawongpaisal
Mahidol University Faculty of Medicine Ramathibodi Hospital
Wichai Aekplakorn
Mahidol University Faculty of Medicine Ramathibodi Hospital
Samrit Srithamrongsawadi
Mahidol University Faculty of Medicine Ramathibodi Hospital
Phanuwich Kaewkamjonchai (phanuwich.kae@mahidol.ac.th)
Mahidol University Faculty of Medicine Ramathibodi Hospital https://orcid.org/0000-0003-3591-7401

Research article

Keywords: PACIC, chronic care, NCD, policy, patients' perspective

Posted Date: August 24th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-57447/v1

Version of Record: A version of this preprint was published on March 12th, 2021. See the published version at https://doi.org/10.1186/s12913-021-06220-x.

Abstract

Background To improve care for patients with chronic diseases, a recent policy initiative in Thailand focuses on strengthening primary care including training of the team to deliver healthcare based on the concept of Chronic Care Model(CCM). This study conducted a cross-sectional survey of 4,071 patients with hypertension and/or diabetes registered to 25 primary care units and 16 hospital NCD clinics in 11 provinces (76 in total) to examine the effects of provider training and local health systems settings on patients' perception of the chronic care quality.

Methods A home-based interview with questionnaire was conducted on the patients in primary care settings. The questionnaire was adopted from the Thai version of the Patient Assessment of Chronic Illness Care (PACIC+) developed by the MacColl Institute for Healthcare Innovation. The questionnaire contains 20 items from the original PACIC, which measure different parts of the CCM, and an additional 6 items assess the 5A Model.

Mixed effect models were employed to compare subscale of patient perception of the care quality between trained upgraded PCUs, upgraded PCUs, ordinary PCUs and NCD clinics. Upgraded PCUs were ordinary PCUs with the multiprofessional team including a physician. Trained upgraded PCUs were upgraded PCUs with the training input.

Results Mixed effect models depicted an independent association between every PACIC subscale (as a measure of CCM) and facility type with the maximum likelihood for patients of ordinary PCU reporting high to highest scores (ORs: 1.52-1.76; $p<0.05$) compared to hospital NCD clinics. This is also the case for patients: seeing the same doctor on repeated visits (ORs: 1.66-1.87; $p<0.05$) or having phone contacts of the providers (ORs:1.42-1.63; $p<0.05$). Similarly, across all of the 5A model subscales, ORs for patients attending ordinary PCU responded with high to highest scores were 1.4-2.0 times compared to those for patients attending hospital NCD clinics($p<0.05$).

Conclusions We could not find evidence to support effectiveness of the training approach. The training failure might indicate a need to address mismatch between health workforce and workload. It also indicates a need to incorporate fidelity check into any training program for chronic care addressing the complex healthcare needs.

Background

Low- and middle-income countries (LMICs) do not only face a disproportionately heavy burden of chronic non-communicable diseases (NCD) but also have difficulties in scaling-up service delivery models such as the Chronic Care Model (CCM) proven effective in high-income countries. [9,15] So far, empirical data on the application of CCM or other strategies to address healthcare needs of patients with NCD in primary care settings of LMICs primarily confines to pilot scale or individual studies.

To meet the needs, studies have shown that financial and infrastructural resources alone are insufficient. LMIC health systems also require human and institutional capacity strengthening to improve the effectiveness, quality, distribution, and continuity of care through smart designs and use of technology. [4] In low-resource settings, adapting disease guidelines requires non-physician clinicians to deliver care and to ensure effective implementation of standardized protocols for diagnosis, treatment and monitoring.[7]

Despite the presence of universal healthcare coverage (UHC) in Thailand over the past two decades, provision of chronic care for patients with hypertension and/or diabetes in primary care settings has faced a challenge of shortage of health workforce especially nurses.[17] To address this limitation, the Ministry of Public Health has taken a policy initiative with a two-pronged strategy: a) allocation of a physician with family medicine training and multidisciplinary health professional as a team to primary care settings at subdistrict of a well-defined population of approximately 10,000; b) training of the team to deliver healthcare based on the concept of CCM. Our study made use of this policy initiative as an opportunity to address the knowledge gap of up-scaling the service delivery based on CCM in low-resource settings. To do so, we adopted the validated Thai version of the Patient Assessment of Chronic Illness Care (PACIC+)[10] to assess the effects of the policy implementation.

Methods

Policy interventions

To improve care for patients with chronic diseases, a recent policy initiative in Thailand focuses on strengthening primary care with the two-pronged strategy. Since 2016, the first strategy had been applied to an accumulated number of 1137 primary care units (PCU) or 11.6% of the total of 9777 in 74 provinces. [http://pcc.moph.go.th/pcc/dashboard/?p=teamCount_rpt]. A physician trained in family medicine and new medical equipment (such as ultrasonography, ECG monitor) were distributed to each of the upgraded PCUs. The physician is assigned to provide full-time clinical services of 3–5 days a week to the upgraded PCU in addition to outpatient care services in the referral hospital of the PCU. In contrast, patients seeking care at ordinary PCUs have only one day per week to receive care from the team and a physician with or without training in family medicine.

The training strategy was applied to 21 of the upgraded PCUs in July 2019. From each of the 21 upgraded PCUs, the head and 2–3 clinicians attended two consecutive training workshops (1 and a half days each). The first one started with a didactic lecture addressing the concepts of the strategy and tools for translating the concepts into practices i.e., system thinking and design thinking. Two small group sessions followed the lecture to discuss experiences and ideas related to the translation of the knowledge tailored to specific settings. Reading materials focusing on WHO’s Integrated People-centered Health Service (IPCHS) and CCM were shared with the participants. The second workshop followed one month after the first to explore the feasibility and barriers of implementing the strategy making use of the participant experiences. The participants were expected to transfer the knowledge and skills to the rest of the team members in each upgraded PCU. To ensure fidelity of the implementation theory, follow up

support and encouragement throughout the study period were carried out by two implementation support practitioners. They paid a visit to each team of the participants aiming at activating implementation-relevant knowledge, skills, and attitudes, and to operationalize and apply these in the context of the participants. In doing so, they aimed to trigger both relational and behavioral outcomes. For instance, the application of the concept of risk stratification of the patients was encouraged in order to customized clinical transactions according to the needs of specific patients instead of treating all patients similarly which usually results in superficial provider-patient dialogue and refilling medications over a period of just 3–5 minutes for each patient. Nevertheless, there was no systematic check of the fidelity.

Patient survey

Population and samples

In order to examine the effects of provider training and local health systems settings (using facility type as proxy), the following number of PCUs and hospital NCD clinics in the same district agreed to participate: 7 trained upgraded PCUs, 6 untrained upgraded PCU, 6 ordinary PCU and 13 hospital NCD clinics (Fig. 1). The hospital NCD clinics were included since they were supposed to care for complicated patients referred from PCUs. Patients with the chronic conditions attended the participating facilities on their regular visits were asked to take part in the study. In total, 4071 patients gave informed consent and were interviewed at home using the PACIC + questionnaire by trained field workers during September 2019.

Data collection

The PACIC + questionnaire was adopted from Thai version of the Patient Assessment of Chronic Illness Care (PACIC) validated in outpatient clinic of a university hospital in Thailand with high reliability (Cronbach's alpha per subscale varied from 0.58 to 0.81 and that of the summary scores were 0.89 and 0.91). The PACIC + contains 26 items. Twenty items are from the original PACIC, which measure different parts of the CCM, and an additional 6 items assess the 5A Model. Each item asks the patient to evaluate the care they have received in the past 6 months on a 5-point scale: 1 (Almost never), 2 (Usually not), 3 (Sometimes), 4 (Mostly) and 5 (Almost always). It takes approximately 5–10 min to complete. The items of the PACIC + are grouped into CCM subscales and 5A Model subscales. The CCM subscales constitute: Patient Activation (items 1–3); Delivery System (items 4–6); Goal Setting (items 7–11); Problem solving (items 12–15); Follow-up (items 16–20). The 5A Model consists: Assess (items 1,11, 15, 20, 21); Advise (items 4, 6, 9, 19, 24); Agree (items 2, 3, 7, 8, 25); Assist (items 10, 12, 13, 14, 26); and Arrange (items 16, 17, 18, 22, 23). Furthermore, summary scores can be calculated for the PACIC (items 1–20) and the items related to the 5A Model (items 1–4, 6–26). Each subscale is scored by averaging the answers of each item in the subscale. Subscales take values between 1 (Almost never) and 5 (Almost always).

In our study, there were 3 sections in the questionnaire: 1) personal information of the respondents; 2) perceptions of the interactions with providers, and 3) PACIC + items. Supplement provided details of the 3 sections. In brief, the personal information consists of demographic profile, type of chronic conditions,

duration of the conditions and health insurance status. Section 2 explored perception about: channel of contact with providers, receiving care from the same provider on repeated visits.

Statistical analysis

We constructed 2 set of latent variables as subscale from the PACIC + items to reflect the components of chronic care model and 5 A model. The subscales for components of chronic care model (CCM) included patient activation, delivery system, goal setting, problem solving and follow-up and for the 5 A model components included assess, advise, agree, assist, and arrange[9]. Confirmatory factor analysis was performed using structural equation modeling to evaluate the fitness of the data to the PACIC + scale structure. The extent to which the items loaded on to the hypothesized variables and the correlation (Table A1, A2 in supplement) were examined. For CCM subscales, almost all the factors have factor loadings of 0.60 or greater, only 4 items had standardized factor loadings less than 0.6. The goodness of fit for the overall model was moderate, and the value of RMSEA and CFI were 0.092 and 0.863, respectively. For 5A the overall goodness of fit was slightly lower than that of CCM.

To examine the individual factor and type of primary care setting that associated with patient perception measures, PACIC, each subscale was categorized in to binary variable cut at percentile 75th (0 = low score, and 1 = high score) and treated as the outcome variable. Chi-square's test was performed to explore the association between each independent variable and each outcome and variables that provided p-value of less than 0.10 were included in the multivariable regression analysis. The multilevel regression analysis was considered, as the first level was individual and the second level was the primary care cluster. Mixed effects logistic regression model was used to examine the association between each subscale and the explanatory variables with a random intercept for "primary care unit (PCU)" level to take into account the correlation among patients in the same PCU. Independent variables that were in the multivariable regression analysis included individual level: sex, age, education (primary, secondary and bachelor), chronic diseases (DM, HT, and both), duration of the chronic disease condition, know about family doctor (yes/no) know health care provider's name (yes/no), type of contact channel (no, mobile phone, Line application, and others), seeing same doctor on repeated visits, (yes/no) and insurance scheme (universal health, social security, civil servant, and others) and type of primary care setting (trained PCU, upgraded PCU, ordinary PCU, and NCD clinic in hospital). Odds ratio and 95% CI were calculated and reported. Stata version 16 (StataCorp. 2019. College Station, TX) was used for the statistical analysis.

Results

Most of the 4071 respondents were: female (73%) aged 59 on average with primary level of education (81%). Almost half (49%) of them were hypertensive and 38% had both hypertension and diabetes with average duration of 7–10 years. Eighty two percent was covered with universal coverage scheme, public health insurance with the largest population coverage.

Using mixed effect modeling adjusted for age, sex, education and duration of the chronic conditions; we found association between CCM subscales and individual patient characteristics or health facility type as

follows.

Across the 5 subscales of CCM, ORs for patients attending OPCU responded with high to highest scores were 2–4 times compared to those for patients attending hospital NCD clinics (Table 2). This is also the case for patients: seeing the same doctor on repeated visits (ORs: 1.66–1.87) or having phone contacts of the providers (ORs: 1.42–1.63). Patients with hypertension were less likely to do so as compared to those with diabetes for 2 subscales: goal setting (OR 0.78) or follow-up (OR 0.66). Patients with both diabetes and hypertension were more likely than those with diabetes to make such a report in 2 subscales: patient activation (OR 1.25) and problem solving/contextual counseling (OR 1.26). In contrast, there was no statistically significant association between health insurance status and patients' reports of any subscale.

Table 1
Health facility types and individual patients' characteristics (N = 4071)

Health facility types and individual patients' characteristics		N	%
Health facility type(number, average number of patients)			
	Hospital NCD clinic(11, 119)	1,160	28.5
	Trained upgraded PCU(13, 132)	1,822	44.8
	Upgraded PCU(8, 102)	757	18.6
	Ordinary PCU(6, 36)	332	8.1
Females		2,980	73.2
Mean age (SD, years)		58.67 (21.246)	
Educational attainment			
	Primary school or lower	3,311	81.3
	Secondary to high school	633	15.6
	Bachelor degree or higher	127	3.1
Occupation for main income			
	None	1,480	36.4
	Agriculture	826	20.3
	Wage worker	572	14.1
	Self employed	726	17.8
	Civil servant	69	1.7
	Others	398	9.8
Chronic conditions			
	Diabetes	553	13.6
	Hypertension	1,988	48.8
	Both	1,529	37.6
	Not specified	1	0
Duration of the chronic conditions(mean(SD), years)			
	Diabetes	8.0 (7.0)	
	Hypertension	7.0 (6.6)	
	Both	10.2 (7.6)	

Health facility types and individual patients' characteristics		N	%
Health insurance status			
	Universal coverage scheme	3,353	82.4
	Social security scheme	174	4.3
	Civil servant medical benefit scheme	379	9.3
	Cash payment	24	0.6
	Other health insurance	141	3.5

Table 2
Association between predictors and CCM subscales according to mixed effect modeling adjusted for age, sex, education, duration of chronic conditions

Predictors	**Patient activation**		**Delivery System**		**Goal setting**		**problem solving/contextual counseling**		**follow-up/ coordination**	
	OR	Std. Err.	OR	Std. Err.	OR	Std. Err.	OR	Std. Err.	OR	Std. Err.
Facility type										
Trained upgraded PCU	0.99	0.10	1.07	0.10	1.07	0.11	0.98	0.09	1.28*	0.13
Upgraded PCU	1.24	0.16	1.15	0.15	1.17	0.16	1.12	0.14	1.00	0.13
Ordinary PCU	1.62*	0.26	1.52*	0.24	1.76*	0.28	1.56*	0.25	1.36	0.22
Hospital NCD clinic as reference	1.00		1.00		1.00		1.00		1.00	
Disease status										
Hypertension	0.85	0.09	0.94	0.10	0.84	0.09	0.96	0.10	0.69*	0.08
Hypertension & diabetes	1.20	0.14	1.20	0.14	1.14	0.13	1.21	0.13	1.05	0.12
Diabetes as reference	1.00		1.00		1.00		1.00		1.00	
Type of contact channel										
Mobile phone	1.56*	0.15	1.46*	0.14	1.52*	0.15	1.49*	0.14	1.20	0.12
Line application	0.74	0.24	0.87	0.28	0.97	0.31	0.81	0.26	1.03	0.33
Not available as reference	1.00		1.00		1.00		1.00		1.00	
Seeing the same doctor on repeated visits vs the opposite	1.73*	0.15	1.62*	0.13	1.74*	0.15	1.63*	0.13	1.97*	0.17

* $P < 0.05$; CSMBS: Civil Servant Medical Benefit Scheme

Predictors	Patient activation		Delivery System		Goal setting		problem solving/contextual counseling		follow-up/ coordination	
Health insurance status										
Social security scheme	1.21	0.22	1.26	0.22	1.10	0.20	1.28	0.22	1.00	0.19
CSMBS	0.94	0.13	1.01	0.14	0.97	0.13	0.90	0.12	0.95	0.13
Cash payment	1.70	0.80	2.00	0.93	1.43	0.70	2.12	0.96	1.45	0.71
Other health insurance	0.98	0.19	1.02	0.20	1.07	0.21	0.96	0.18	0.91	0.19
Universal Coverage Scheme as reference	1.00		1.00		1.00		1.00		1.00	
* P < 0.05; CSMBS: Civil Servant Medical Benefit Scheme										

Similarly, the analysis revealed association between the 5A model subscales and individual patient characteristics or health facility type as follows. Across the 5 subscales, ORs for patients attending OPCU responded with high to highest scores were 1.40-2.00 times compared to those for patients attending hospital NCD clinics (Table 3). This is also the case for patients: seeing the same doctor on repeated visits (OR: almost 2) or having mobile phone contacts of the providers (ORs: 1.39–1.62) as compared to those without any contacts.

Table 3
Association between predictors and the 5 A model subscales according to mixed effect modeling adjusted for age, sex, education, duration of chronic conditions

Predictor	**assess**		**advise**		**agree**		**assist**		**arrange**	
	Odds Ratio	Std. Err.	Odds Ratio	Std. Err.	Odds Ratio	Std. Err.	Odds Ratio	Std. Err.	Odds Ratio	Std. Err.
Facility type										
Trained upgraded PCU	1.06	0.10	1.00	0.10	1.14	0.11	1.18	0.12	1.20	0.12
Upgraded PCU	0.98	0.13	1.14	0.15	1.29	0.17	1.38*	0.19	1.27	0.17
Ordinary PCU	1.40*	0.22	1.75*	0.28	1.77*	0.28	1.72*	0.28	2.00*	0.32
Hospital NCD clinic as reference	1.00		1.00		1.00		1.00		1.00	
Disease status										
Hypertension	0.87	0.10	0.85	0.09	0.92	0.10	0.81	0.09	0.87	0.10
Hypertension & diabetes	1.17	0.13	1.15	0.13	1.23	0.14	1.11	0.13	1.15	0.13
Diabetes as reference	1.00		1.00		1.00		1.00		1.00	
Type of contact channel										
Mobile phone	1.62*	0.16	1.50*	0.14	1.39*	0.13	1.50*	0.15	1.60*	0.16
Line application	0.86	0.28	0.90	0.29	0.95	0.30	0.90	0.29	0.94	0.30
Not available	1.00		1.00		1.00		1.00		1.00	
Seeing the same doctor on repeated visits vs the opposite	1.82*	0.15	1.72*	0.14	1.64*	0.14	1.72*	0.15	1.64*	0.14

* $P < 0.05$; CSMBS: Civil Servant Medical Benefit Scheme

Predictor	assess		advise		agree		assist		arrange	
Health insurance status										
Social security scheme	1.02	0.19	1.27	0.23	1.32	0.23	1.14	0.21	1.04	0.19
CSMBS	1.03	0.14	0.97	0.13	1.12	0.15	1.05	0.15	1.03	0.14
Cash payment	1.61	0.78	1.36	0.67	1.74	0.82	1.50	0.74	1.41	0.70
Other health insurance	0.76	0.15	0.90	0.18	0.94	0.19	0.98	0.20	0.86	0.17
Universal Coverage Scheme as reference	1.00		1.00		1.00		1.00		1.00	
* P < 0.05; CSMBS: Civil Servant Medical Benefit Scheme										

In the opposite, patients with other contact channels were less likely to do so (ORs: 0.55–0.62). There was no statistically significant association between health insurance status and patients' reports of any subscale.

Discussion

In contrast to other studies in developed country settings, our findings did not support the training benefits of primary care providers on caring for patients with the chronic conditions using CCM. Thom et al, using RCT, demonstrated improved PACIC scores at 12 months from baseline (mean score: 3.82 vs 3.13; $P < .001$) and a significant difference in total PACIC score against usual care among low-income patients with poorly controlled diabetes, hypertension or dyslipidemia receiving care from trained health coaches in a US healthcare setting. Their training was more intensive in terms of duration (40 hours over 6 weeks) and specificity of clinical skills such as active listening and nonjudgmental communication; helping with self-management skills as compared to that of our study context. Likewise, a upgraded study of clinical trial involving 57 patients with uncontrolled diabetes in a primary care setting in Brazil, showed outcome improvement over six months including PACIC score(33 to 68,$p < 0.001$) after repeated motivational interviews(MI) delivered by trained community health agents(CHA) on top of usual care. In comparison to the training in our study, a distinctive feature of the training in this Brazilian study is ongoing assessment and feedback on MI skills of the CHA using a standardized tools (a fidelity checklist adapted from the "1-Pass Coding System for Motivational Interviewing"). The lack of fidelity check and feedback in our study

settings might contribute to inconsistency of the implementation among trained upgraded PCUs hence diluted the magnitude of associations.

Apart from the seemingly limitations in the training approach identified by our study, imbalance of health workforce against workload could be a major barrier to scaling-up quality improvement of chronic care. Using a multi-professional projection approach for Thailand, Pagaiya N et al highlighted a severe shortage of nurses in 2026 whereas the supply of doctors, pharmacists, and physiotherapists is likely to be surplus. In primary care settings, the study identified the proportion of workload as 100% for nurses and 20% for doctors or other health professionals. Hence, the shortage of nurses might explain difficulty to improve quality of care for chronic diseases especially for those upgraded PCUs with higher number of registered population (10,000 per PCU) than that of ordinary PCUs(< 10,000 per PCU). This notion is supported by bigger ORs for the PACIC scores or 5A-model scores reported by the patients seeking care at ordinary PCUs than those at other facilities (Tables 2 & 3).

Self-management support in chronic care could be enhanced by mobile ICT tools such as telephone or online applications as indicated by accumulated evidence from RCTs or systematic reviews. Our study provided evidence indicating the benefit of mobile telephone to support self-management of chronic care in a large scale (Tables 2 & 3). Compared to patients without any mobile contact channels, those with mobile phone contacts were more likely to give a high to highest PACIC scores or 5A model scores, ORs ranging from 1.4–1.7, $p < 0.05$. In developed countries reported figures of citizens lacking basic digital skills in terms of digital literacy were around 40% in Europe and the U.S. Based on our findings, it is implicated that mobile phone should be the first choice for the application of mobile ICT to support self-management in chronic care.

With ORs close to 2 for the patients seeing the same doctors on repeated visits as compared to those without ($p < 0.05$) based on PACIC scores or 5A model scores, our study supported the importance of continuity of care viewing from patients' perspective.

Finally, with regard to equitable access to quality chronic care, our study findings of no association between health insurance status and the scores on PACIC or 5A model scale (ORs: 0.70–1.93; $p > 0.05$) render support of the effect of universal healthcare coverage in filling the inequity gaps. Nonetheless, concern about inadequacy in the power of tests could not be excluded.

Conclusions

Limitations

With female patients over represented in our study, the results could hardly be applied to male patients. Causal inference is problematic given the cross-sectional design of our study. We did not account for conventional patient outcomes such as blood pressure, HbA1c, adherence to medications. Despite the limitations, the sampling design involving primary care facilities in vast areas and the large number of respondents enable us to assess the possibility of scaling-up policy interventions on quality improvement

of chronic care using the validated standardized tools (the PACIC+) in a middle-income country with UHC. Given the paucity of evidence like this in low-resource settings, our study has made an important contribution to fill the knowledge gaps in scaling-up evidence-based approaches to strengthen chronic care model in primary care setting of middle-income countries with UHC.

Policy and practice implications

Policymakers might find the training approach insufficient for strengthening chronic care at primary care setting with overburdened service load. The failure might also indicate a need to incorporate fidelity check into any training program dealing with chronic care aimed at addressing the complex healthcare needs. In addition, PACIC + might be useful to assess and monitor the progress in nationwide implementation of the chronic care development in primary care settings. Further studies with more rigorous designs such as effectiveness trials or real world implementation trials are needed to ascertain the effectiveness of training or other approaches using both patient assessment and conventional patient outcomes as indicators.

Abbreviations

CCM: Chronic care model; NCD: Non-communicable disease; PCU: Primary care unit; LMICs: Low- and middle-income countries; UHC: Universal healthcare coverage

Declarations

Authors' contributions

PB and SS designed and conducted the study. WA performed data analysis. PB prepared the first draft for all the authors to comment and edit until the final draft was completed.

Funding

This study was funded by the Health Systems Research Institute of Thailand. The funder had no role in the collection, analysis, or interpretation of data; or in writing the manuscript.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available as they contain sensitive information and data could potentially identify participants.

Ethics approval and consent to participate

The present study was approved by the Institutional Ethical Review Board of the Faculty of Medicine, Ramathibodi Hospital (ID: COA. MURA2019/1018)

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Author details

[1]Department of Community Medicine, Faculty of Medicine, Ramathibodi Hospital, Mahidol University,Ratchathewi, Bangkok 10400, Thailand

References

1. Walley J, Graham K, Wei X, Kain K, Weston R. Getting research into practice: primary care management of noncommunicable diseases in low- and middle-income countries. Bull World Health Organ. 2012;90(6):402. doi:10.2471/BLT.12.106674
2. Webster R, Parker G, Heritier S, et al. Strategic, Successful, and Sustained Synergy: The Global Alliance for Chronic Diseases Hypertension Program. Glob Heart. 2019;14(4):391-394. doi:10.1016/j.gheart.2019.09.003
3. Ali MK, Rabadán-Diehl C, Flanigan J, Blanchard C, Narayan KM, Engelgau M. Systems and capacity to address noncommunicable diseases in low- and middle-income countries. Sci Transl Med. 2013;5(181):181cm4. doi:10.1126/scitranslmed.3005121
4. Maher D, Ford N, Unwin N. Priorities for developing countries in the global response to non-communicable diseases. Glob Health. 2012;8(1):1–8.
5. Bischoff A, Ekoe T, Perone N, Slama S, Loutan L. Chronic disease management in Sub-Saharan Africa: whose business is it? Int J Environ Res Public Health. 2009;6(8):2258–70.
6. Aboumatar HJ, Thompson D, Wu A, et al Development and evaluation of a 3-day patient safety curriculum to advance knowledge, self-efficacy and system thinking among medical students. BMJ Quality & Safety 2012;21:416-422.
7. Altman M, Huang TT, Breland JY. Design Thinking in Health Care. Prev Chronic Dis 2018;15:180128. DOI: http://dx.doi.org/10.5888/pcd15.180128
8. World Health Organization (WHO). WHO Global Strategy on People-Centred and Integrated Health Services. Geneva: WHO; 2015. http://apps.who.int/iris/bitstream/10665/155002/1/WHO_HIS_SDS_2015.6_eng.pdf?ua=1&ua=1. Accessed May 7, 2020.Google Scholar
9. Bodenheimer T., Willard-Grace R. (2016) The Chronic Care Model and the Transformation of Primary Care. In: Mechanick J., Kushner R. (eds) Lifestyle Medicine. Springer, Cham
10. Zeugfang D, Wisetborisut A, Angkurawaranon C, et al. Translation and validation of the PACIC+ questionnaire: the Thai version. BMC Fam Pract. 2018;19(1):123. Published 2018 Jul 19. doi:10.1186/s12875-018-0801-y

11. Glasgow RE, Wagner EH, Schaefer J, Mahoney LD, Reid RJ, Greene SM. Development and validation of the Patient Assessment of Chronic Illness Care (PACIC). Med Care. 2005;43(5):436-444. doi:10.1097/01.mlr.0000160375.47920.8c
12. Whitlock EP, Orleans CT, Pender N, Allan J. Evaluating primary care behavioral counseling interventions: an evidence-based approach. Am J Prev Med. 2002;22(4):267-284. doi:10.1016/s0749-3797(02)00415-4
13. Thom DH, Hessler D, Willard-Grace R, et al. Health coaching by medical assistants improves patients' chronic care experience. Am J Manag Care. 2015;21(10):685-691.
14. do Valle Nascimento, T.M.R., Resnicow, K., Nery, M. et al. A pilot study of a Community Health Agent-led type 2 diabetes self-management program using Motivational Interviewing-based approaches in a public primary care center in São Paulo, Brazil. BMC Health Serv Res 17, 32 (2017). https://doi.org/10.1186/s12913-016-1968-3
15. Beaglehole R, Epping-Jordan J, Patel V, et al. . Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary health care. Lancet 2008;372:940–9.
16. SC Anyangwe, C MtongaInequities in the global health workforce: the greatest impediment to health in sub-Saharan Africa Int J Environ Res Public Health, 4 (2007), pp. 93-100
17. Pagaiya, N., Phanthunane, P., Bamrung, A. et al. Forecasting imbalances of human resources for health in the Thailand health service system: application of a health demand method. Hum Resour Health 17, 4 (2019). https://doi.org/10.1186/s12960-018-0336-2
18. MacPherson MM, Merry KJ, Locke SR, Jung ME. Effects of Mobile Health Prompts on Self-Monitoring and Exercise Behaviors Following a Diabetes Prevention Program: Secondary Analysis From a Randomized Controlled Trial. JMIR Mhealth Uhealth. 2019;7(9):e12956. Published 2019 Sep 5.
19. de Jongh T, Gurol-Urganci I, Vodopivec-Jamsek V, Car J, Atun R. Mobile phone messaging for facilitating self-management of long-term illnesses. Cochrane Database Syst Rev. 2012;12(12):CD007459. Published 2012 Dec 12. doi:10.1002/14651858.CD007459.pub2
20. Blažič, B.J., Blažič, A.J. Overcoming the digital divide with a modern approach to learning digital skills for the elderly adults. Educ Inf Technol 25, 259–279 (2020). https://doi.org/10.1007/s10639-019-09961-9
21. Daivadanam M, Ingram M, Sidney Annerstedt K, et al. The role of context in implementation research for non-communicable diseases: Answering the 'how-to' dilemma. PLoS One. 2019;14(4):e0214454. Published 2019 Apr 8. doi:10.1371/journal.pone.0214454

Figures

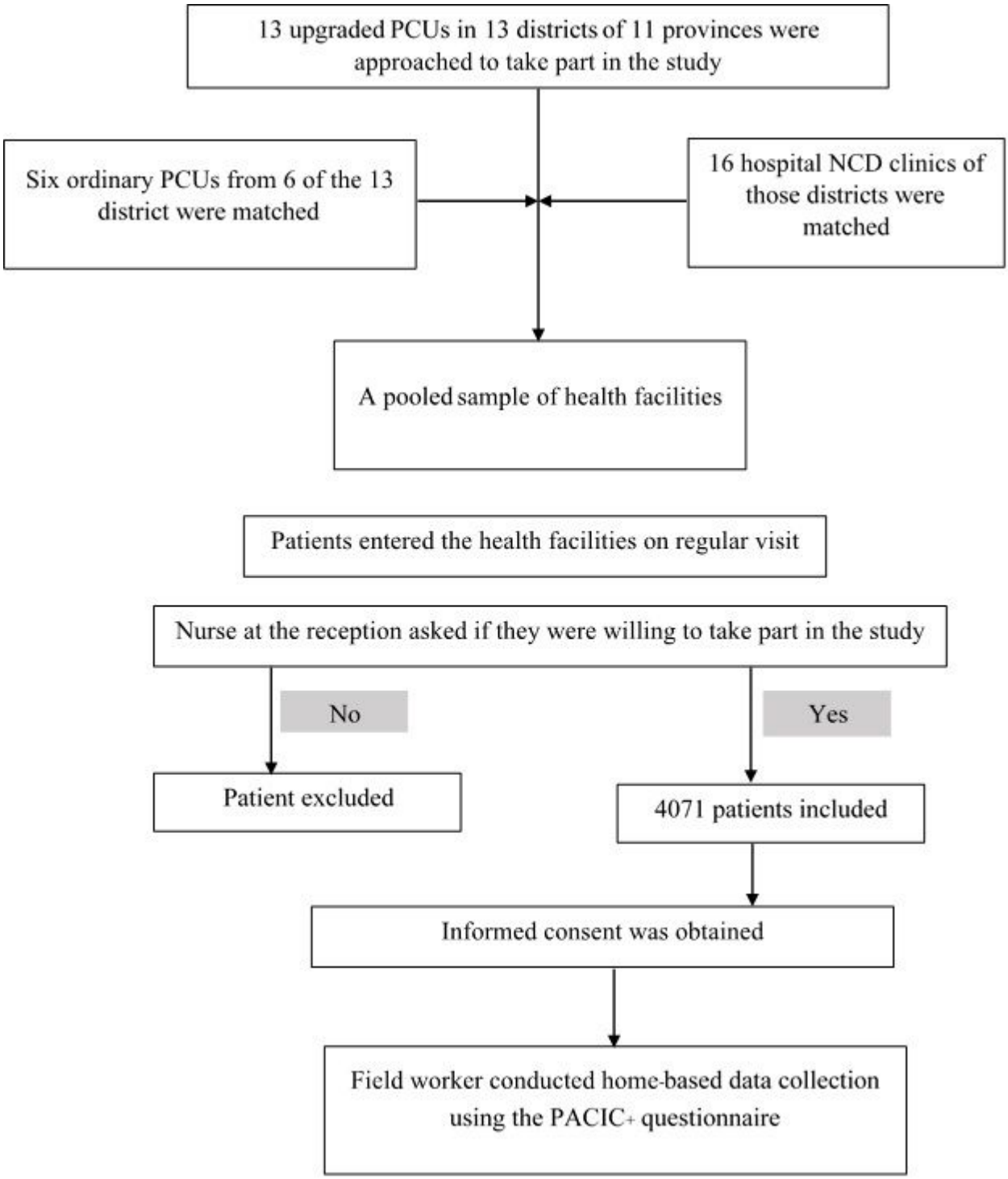

Figure 1

Flow of activities on sample selection and data collection

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- AdditionalFile1.docx

- AdditionalFile2.docx