

Assessment of Implementation of Pre-pregnancy care services in Negeri Sembilan, Malaysia

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ABSTRACT

Introduction: Pre-pregnancy care (PPC) is an established health care program for women of reproductive age that has been widely implemented globally. The implementation of these services varies between countries based on the guidelines advocated. Thus, a standard level of assessment on measuring the performance of the service was difficult. This study aimed to measure the status of implementation PPC services among health workers using the transtheoretical model framework.

Methods: A cross-sectional study was conducted among 445 healthcare workers using a validated questionnaire based on local PPC guideline published by the Ministry of Health Malaysia (MOH).

Results: The results showed that many respondents were in the implementation action stage (57%), followed by the maintenance stage (20%), preparation stage (19%), contemplation stage (4%) and pre-contemplation stage (<1%). Further categorisation showed that only 43% of the respondents are successfully implementing PPC according to the standard of MOH. Clinics lead by the Family Medicine Specialist (Adjusted Odds Ratio, AOR 2.845; 95% Confidence Interval, 95%CI: 1.839, 4.40), daily usage of teleprimary care system (TPC) in the clinic (AOR 1.563; 95%CI: 1.019, 2.397), and attended TPC training (AOR 3.358; 95%CI: 2.221, 5.075) were significantly determining the success of PPC implementation.

Conclusion: The emphasis on motivation and rewards among the healthcare workers, provision of good internet connection at health clinics and developing a comprehensive model of PPC training targeting the specific healthcare workers are mandatory to enhance the PPC services implementation.

KEYWORDS:

Pregnancy, healthcare, telehealth, competencies, transtheoretical

INTRODUCTION

Pre-pregnancy care (PPC) is a health care programme that utilises the concept of disease prevention management targeting women of reproductive age to achieve a good health status before they embark on pregnancy. Various organisations and countries have issued PPC services

guidelines for global and local use, such as the World Health Organization, Australia, and New Zealand, Canada, the United States of America, Scotland, India, and China.¹⁻⁷ However, the content of the guidelines and implementation methods vary according to the country.^{8,9} PPC was introduced to Malaysia in 2002 and has expanded throughout its public health facilities, clinics, and hospitals by 2012. The Ministry of Health Malaysia (MOH) began developing guidelines and standard operating procedure protocol for these services since 2011.¹⁰ Currently, these services are freely available whereby the patients were recruited from the various entry points, and further health screening was done before specific counselling treatments were provided to prepare them for their subsequent pregnancies. In line with the improvement of services, the PPC guidelines in the first section of the Perinatal Care Manual have undergone several revisions. The latest policies used are in the third edition published in 2013, and it has been used as the standard reference for healthcare workers in Malaysia.¹¹

The parameter to evaluate the implementation of the PPC services should be incorporated as a process indicator since the beginning of the programme. Although PPC was globally practiced, studies on the assessment of PPC services are still insufficient.^{12,13} Comparative analysis of the PPC guideline available showed that evaluating the implementation of the services is not being emphasised.¹⁴ Factors such as the difference in service policies and procedures make the evaluation process challenging to be implemented.^{15,16} A different method of PPC delivery used at the clinic level also contributes to the difficulty of the evaluation process. There are no specific procedures for measuring the implemented services as the guidelines provided do not include measurement components or indicators in performing these services. The Malaysian government had difficulty implementing assessments due to complexity among the programme user and not having appropriate tools to assist the process.^{17,18} The absence of guidelines to evaluate the performance of this service not only occurs in Malaysia but also reported in other countries.^{13,19}

A behavioural model called the Transtheoretical Model (TTM) was developed in the last three decades.²⁰ TTM explains that behaviour change is a different process that everyone goes through, leading to a particular stage of change. Therefore, the TTM model used as a domain in this study, and the stage of change is the domain used to

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represent the status of the implementation of PPC services. The stage of change was constructed based on three main domains: change, self-efficacy, and decision-making.²¹ Studies showing interventions using the TTM used previously in smoking cessation intervention, controlling obesity, physical activity intervention, chronic illness monitoring and drug addiction recovery.²²⁻²⁶ TTM also measures six individual's stages of change during program implementation. However, we only used five stages of change for this study as the PPC services should be sustained in the system and not end to the termination stage.²⁷

As there are various issues and differences in PPC programmes, the implementation of this service needs to be reviewed as no specific indicators are specified in the reference manual. Moreover, different effectiveness evaluations done between facilities cause the actual level of achievement to be questioned. Therefore, this study aimed to measure status of implementation of the PPC services among health workers using the TTM to improve service quality.

MATERIALS AND METHODS

Design and Data Collection

The is a cross-sectional study conducted from January to June 2019 involving 445 healthcare workers (HCW). The sample frame was HCW from the categories of doctors, nurses, and assistant medical officers engaged in PPC services in public health clinics. The list of members involved was obtained from the State and District Health Offices according to the type of clinic and position. Two health districts in Negeri Sembilan were randomly selected. All clinics in these two districts (16 clinics) were included. The HCW from the three categories were universally included in the study. The inclusion criteria are that the HCW who are permanent staff working at the selected public health clinics for at least six months and can communicate either in Malay or English. The exclusion criteria are that HCW who worked as a replacement staff in the chosen clinic, doing practical training or on maternity leave or on prolonged medical leave of >1-month duration. Implementation status of PPC services is the dependent variable of this study, and age, gender, education, occupational type, working experience, active PPC service providers, head of the clinic, clinic operation system, frequency of PPC services delivery, perception, knowledge, attitude, decisional balance, self-efficacy, the process of change and PPC training are the independent variables.

Study Instrument

Data was collected using a validated structured self-administered instrument named the Pre-pregnancy care services questionnaire (PPCQuest). Total items in the questionnaire are 59, divided into six sections; background (10-item), perception on PPC (4-item), knowledge on PPC (5-item), attitude on PPC (2-item), PPC training (7-item) and TTM (stage of change, 18-item, process of change, 5-item, self-efficacy, 5-item, and decisional balance, 3-item). The composite content validity index (CVI) was 95% and was tested among 200 samples with the Cronbach alpha range from 0.749 to 0.928 for the exploratory factor analysis (EFA). The reliability measurements in the confirmatory factor analysis (CFA) where composite reliability (CR) values range

between 0.606 and 0.915. The average variance extracted (AVE) value range between 0.501 and 0.754. There are 18 items in the domain stage of change (SOC) comprising four subdomains named service delivery (6-item), clinic set up (5-item), standard operating procedure (SOP) (5-item) and agency cooperation (2-item). Each item uses a range of scores between 1 and 5, giving a minimum score of 18 and a maximum of 90. Based on the cumulative scores obtained, the HCWs were divided into five groups. The groups were categorised as pre-contemplation, contemplation, preparation, action, and maintenance. The pre-contemplation stage is defined as HCW who never performed PPC services with cumulative scores range from 1 to 18. The HCW who intended to implement the PPC services and scores between 19 to 36 was grouped as the contemplation stage. HCW who scores from 37 to 54 were categorised as a preparation group. The action stage group was defined as HCW, who practiced the PPC services and scored between 55 and 72. The maintenance stage group was defined as HCW who implement the PPC services into their daily work with a cumulative score of 73 to 90.

The HCWs were categorised into two groups based on items recorded in the stage of change domain. First, an item with a scale of 1 (never) and 2 (will consider) encoded to 0. Second, items with scale 3 (in preparation), 4 (in practice), and 5 (routine) coded to 1. This coding was decided based on Prochaska's suggestion that the respondent in the category of being prepared (equivalent to score 3) needs to be in an action-oriented group (Prochaska et al., 2015). For the present study, action-oriented groups were defined as respondents who successfully implemented PPC services. Therefore, based on the new code for items within the change domain, the minimum score for all 18 items is 0, and the maximum score is 18.

Percentages converted from the cumulative scores made by re-categorisation of HCWs to the successful implementation group (score >80) and unsuccessful implementation groups (score ≤80). The cut-off score of 80 was chosen as advised by the ten expert panels. The expert panel consisted of Family Medicine Specialist, a Public Health Specialist, a medical officer in charge of the clinic, a medical officer, matrons, nurses, assistant medical officer, and community nurse.

Data Analysis

Data was entered and cleaned using the SPSS version 21. First, bivariate analysis was done using the Chi-square test and simple logistic regression resulting in the p-value and the crude odds ratio (COR) with 95% confidence intervals (95%CI). Subsequently, multivariate analysis was done by performing multiple logistic regression analysis to determine adjusted odds ratio (AOR). Variables from simple logistic regression with a value of $p < 0.20$ were included in the multivariate logistic regression analysis.

RESULTS

A total of 445 HCWs aged between 22 and 59 years old participated in the study, with a response rate of 92.7%. About 84% of the participants were women, and 77% had either a diploma or degree. Half were from the nursing

Table I: Sociodemographic characteristic of study respondents (n=445)

Characteristic	n (%)	Mean (S.D)	Min, Max
Age (years)		36 (7.41)	22, 59
Gender			
Male	71 (16.0)		
Female	374 (84.0)		
Education			
Secondary school	101 (22.7)		
Diploma	168 (37.7)		
Degree/master	176 (39.6)		
Occupation			
Family Medicine Specialist	8 (1.8)		
Medical Officer	161 (36.2)		
Matrons	21 (4.7)		
Nurses	111 (24.9)		
Community Health Nurses	101 (22.7)		
Assistant medical officer	43 (9.7)		
Working experience(years)		8 (6.47)	0.5, 39
< 2 years	94 (21)		
2 to 5 years	107 (24)		
> 5 years	244 (55)		
Head of the clinic			
Medical officer	193 (43.4)		
Family Medicine Specialist	252 (56.6)		
Clinic Operation system			
Manual	235 (52.8)		
Tele-primary care (TPC)	210 (47.2)		
Active PPC service			
None	151 (33.9)		
Present	294 (66.1)		
Frequency of PPC services delivery			
More than once a week	84 (18.9)		
Once a week	82 (18.4)		
Once a month	180 (40.4)		
Less than once a month	99 (22.2)		

Table II: Description of HCW based on the stages of change for the Implementation of PPC Services

Factors	Stage of Change n (%)				
	Pre-contemplation n (%)	Contemplation n (%)	Preparation n (%)	Action n (%)	Maintenance n (%)
Age					
<45 years (n=379)	1 (0.2)	15 (3.4)	76 (17.1)	219 (49.2)	68 (15.3)
≥45 years (n=66)	1 (0.2)	2 (0.4)	8 (1.8)	33 (7.4)	22 (4.9)
Gender					
Male (n=71)	1 (0.2)	10 (2.2)	11 (2.5)	38 (8.5)	11 (2.5)
Female(n=374)	1 (0.2)	7 (1.6)	73 (16.4)	214 (48.1)	79 (17.8)
Education					
Secondary level (n=101)	0 (0.0)	2 (0.4)	20 (4.5)	59 (13.3)	20 (4.5)
Tertiary level(n=344)	2 (0.4)	15 (3.4)	64 (14.4)	193 (43.4)	70 (15.7)
Service group					
Support (n=255)	2 (0.4)	12 (2.7)	38 (8.5)	141 (31.7)	62 (13.9)
Management and professional (n=190)	0 (0.0)	5 (1.1)	46 (10.3)	111 (24.9)	28 (6.3)
Working experience					
< 5 year (n=201)	0 (0.0)	8 (1.8)	46 (10.3)	117 (26.3)	30 (6.7)
> 5 year (n=244)	2 (0.4)	9 (2.0)	38 (8.5)	135 (30.3)	60 (13.5)

category (52.3%), while doctors were 44.2%, and only 9.7% hold the position as an assistant medical officer. The length of the service period was between 6 months and 39 years. However, most of them have served in their current place for more than five years (55%). More than half (56.6%) of the HCW works in health clinics led by Family Medicine Specialists (FMS).

Slightly more than half (52.8%) used manual services. The rest used the Tele primary care system (TPC), a type of digital

health services. Our study found that 66.1% of the respondents are working in health clinics that actively provide PPC services. About 37% of delivered the PPC services for a minimum of at least once a week. Table I shows the sociodemographic characteristics of study respondents.

Assessment of the stage of change among the HCW for implementing PPC services was presented in Table II. Most respondents were in the action stage (57%), followed by the maintenance stage (20%), preparation stage (19%),

Table III: Statistical analysis of the PPC services implementation status

Factors	Implementation Status			
	Not Successful n (%)	Successful n (%)	X ²	P-value
Age				
< 45 years	224 (88)	155 (81)	4.274	0.039
≥ 45years	30 (12)	36 (19)		
Gender				
Men	39 (15)	32 (17)	0.159	0.69
Women	215 (85)	159 (83)		
Education				
Secondary level	60 (24)	41 (22)	0.289	0.591
Tertiary level	194 (76)	150 (79)		
Service Group				
Support group	141 (56)	114 (60)	0.776	0.378
Management & professional	113 (45)	77 (40)		
Working experience				
< 5 years	119 (47)	82 (43)	0.676	0.411
≥ 5 years	135 (53)	109 (57)		
Active PPC service presenters				
None	87 (34)	64 (34)	0.270	0.87
Present	167 (66)	127 (67)		
Head of the clinic				
Medical officer	141 (56)	52 (27)	35.517	<0.001
Family Medicine Specialist	113 (46)	119 (73)		
Clinic Operation system				
Manual	151 (59)	84 (44)	10.469	0.001
Tele-primary care (TPC)	103 (41)	107 (56)		
Frequency of PPC services delivery				
less than once in a month	165 (65)	114 (60)	1.297	0.255
more than once in a month	89 (35)	77 (40)		
Perception				
poor	147 (58)	80 (42)	11.150	0.001
good	107 (42)	111 (58)		
Knowledge				
low level	151 (59)	102 (53)	1.378	0.202
high level	103 (41)	89 (47)		
Attitude				
poor	145 (57)	84 (44)	7.499	0.006
good	109 (43)	107 (56)		
Decisional balance				
poor	146 (58)	94 (49)	2.998	0.083
good	108 (42)	97 (51)		
Self-efficacy				
poor	146 (58)	107 (56)	0.095	0.758
good	108 (43)	84 (44)		
Process of change				
poor	141 (56)	91 (48)	2.704	0.100
good	113 (45)	100 (52)		
PPC Training				
poor	168 (66)	71 (37)	36.798	<0.001
good	86 (34)	120 (63)		
TOTAL	254(100)	191(100)		

contemplation stage (4%) and pre-contemplation stage (<1%). The HCW who achieved action stage and above were those aged less than 45 years old, received education up to the tertiary level (diploma and degree), and worked as a support group (health matrons, nurses, and assistant medical officer) with working experience of more than five years. We further categorised the HCWs into two groups. The result shows that 43% of the HCWs successfully implemented the PPC group as tabulated in Table III. Bivariate analysis from the Chi-square shows the relationship between the independent variable and the dependent variables. The age factors ($p=0.039$), HCW's perception ($p=0.001$) and HCW's attitude ($p=0.006$) showed significant relationships with the

implementation status of PPC services. In terms of organisational behaviour, the type of the clinic's leader ($p<0.001$), the clinic mode operation system ($p=0.001$) and the training on PPC services ($p<0.001$) are significant factors found associated with the implementation of PPC services.

Table IV shows that the clinic led by the Family Medicine Specialist (AOR 2.845; 95%CI: 1.839, 4.40), daily usage of TPC system in the clinic (AOR 1.563; 95%CI: 1.019, 2.397) and attended PPC training (AOR 3.358; 95%CI: 2.221, 5.075) were significantly determining the success of PPC implementation.

Table IV: Simple and multiple logistic regression analysis on the PPC services implementation status

Factors	Simple Logistic		Regression Multiple Logistic Regression		
	Crude OR (95%CI)	P-value	Adjusted OR (95%CI)	Wald	P-value
Clinic head	1	<0.001	1	22.057	<0.001
Medical officer	3.335				
Family Medicine Specialist	(2.228, 4.993)		2.845 (1.839,4.40)		
Operation system					
Manual	1	0.001	1	4.182	0.041
TPC system	1.867		1.563		
	(1.277, 2.731)		(1.019, 2.397)		
PPC Training					
Poor PPC training	1	<0.001	1	33.026	<0.001
attended a good PPC training	3.302		3.358		
	(2.231, 4.886)		(2.221, 5.075)		
Age					
<45 years	1	0.040	-	-	-
≥45 years	1.734		-		
	(1.025, 2.935)				
Perception of PPC services					
Low perception	1	0.001	-	-	-
Good perception	1.906		-		
	(1.303, 2.788)				
Attitude towards PPC service					
Poor Attitude	1	0.006	-	-	-
Good Attitude	1.695		-		
	(1.16, 2.475)				

DISCUSSION

The study found that PPC implementation among the HCWs can be assessed using the validated PPCQuest questionnaire. They were categorised into five groups as action stage (57%), followed by maintenance stage (20%), preparation stage (19%), contemplation stage (4%) and pre-contemplation stage (<1%). Successful implementation of PPC was noted highest among the nursing staff (84%), who act as the primary gatekeeper of PPC services. On the other hand, the percentage of successful PPC implementation was reported lower among the doctors (71%) and assistant medical officers (63%).

No similar studies are available for comparison. In this study, four subdomains were studied under the stage of change; (1) PPC service provision, (2) standard operating scope, (3) clinic provision and (4) inter-agency cooperation. The PPC services include pre-pregnancy risk factor identification activities, risk factor screening activities, and service monitoring activities. This study focuses on folic acid supplementation, optimal sugar level control, screening for complications in chronic patients, counselling and contraceptive pill administration, and referral to pre-pregnancy clinics in the subdomain standard operating scope. Subdomain clinic preparation emphasises infrastructure factors, service schedule, task rotation, service flow chart and service target group. Finally, outreach activities and cooperation with other ministries are focused on subdomain agency cooperation.

The present study has successfully measured the implementation of PPC services from the stage of clinic preparation to service implementation with collaboration planning involving other agencies to ensure service sustainability. In addition, the objectives of the study have been achieved using the stage of change in the TTM model,

which is different from measures done earlier in other programs.

A study conducted in Ethiopia recorded only 31% demonstrated a good level of PPC implementation.²⁸ Another study in Iran described PPC implementation findings into three stages: low, moderate, and adequate.²⁹ They have reported that 25% of respondents were in the middle and 64.7% at a low PPC implementation level. However, that study did not record any prevalence for adequately PPC implementation. Lower prevalence rates were recorded in Ethiopia, Africa, with the prevalence rate for successful PPC implementation was 15.3%.¹⁶ Having inadequacy of guidelines and policy to adhere by health personnel has shown relationships with the PPC implementation stage. Our study measured the prevalence rate of successful implementation of PPC services based on adherence to the MOH manual.¹¹

Three factors determined the success of the PPC implementation in our study sites: clinics led by the family medicine specialist (FMS), usage of the TPC system in the management of clinic services, and HCW who have attended PPC service training. FMS have been recognised as the primary health care coordinator and primarily deliver services to complicated cases. Clinics led by FMS have an advantage in terms of the number of health personnel and equipment over clinics led by medical officers.³⁰ The length of the service period helps them plan and monitor various types of health services and implement training or conduct continuous medical education (CME), including PPC.³¹ Having a TPC system in the clinic helps in the registration process, documentation of client databases and accessibility by other health clinics for continuity of care. TPC was first developed in Negeri Sembilan in 2014 and fully utilised by

the clinics in the district of Seremban in 2017.³² TPC system were able to identify unscreened and dropped out PPC clients as the system using the real-time data management. The effectiveness of this system has been reported elsewhere.³³ Continuous support from superiors is needed to boost staff morale to support and ensure full utilisation of TPC.³⁴

Proper PPC training is an investment to ensure the development, consolidation, and sustainability of the PPC health programmes. This study found that 46.3% of HCW at the action stage and 90% of HCW at the maintenance stage received the PPC training. Another study done in 2018 in rural India demonstrated that services performances could be increased by regular comprehensive and continuous training.³⁵

STRENGTH AND LIMITATION OF THE STUDY

This strength of this study is forming a validated instrument (PPCQuest) for measuring PPC implementation based on existing guidelines used for the services. Therefore, the PPCQuest tool can better measure the performance of the PPC services and is suitable as a quality practice indicator if used for periodic monitoring. Clinic administrative provision, PPC implementation and service delivery, involvement of other agencies, and activities implemented were essential items used in the measurement. Therefore, PPCQuest is comprehensively reflected in the PPC services' implementation of PPC services in Malaysia. The study has its limitations in relation to the selection of the study site. Variation in the PPC service implementation in other areas of Malaysia may depend on human resources and primary health care types. The type of PHC facility has been used as a factor to be measured in the assessment.

CONCLUSION

The transtheoretical model framework used in developing the PPCQuest instrument is shown to outline a comprehensive approach in measuring the implementation of PPC services among the HCW in primary healthcare clinics. In clinics led by FMS, good network connecting systems between clinics and data management, and comprehensive periodic PPC training targeting specific healthcare workers are mandatory to enhance the services.

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ETHICAL CONSIDERATION

This study obtained approval from the Research Ethics Committee of the National University of Malaysia (FF-2017-396), Medical Research and Ethics Committee Ministry of Health Malaysia (NMRR-16-2800-33618) and permission to conduct the study in the State Health Director of Negeri Sembilan.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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