Validation of Pharmaceutical Care Assessment Questionnaire (PCAQ) by Community Pharmacists - A Preliminary Study.

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***Abstract*- Background and objectives**: Pharmaceutical care is characterized as the direct, responsible provision of medication-related care for the purpose of achieving definite outcomes that enhance patient's quality of life. Pharmaceutical Care Assessment Questionnaire (PCAQ) is prepared based on Pharmaceutical Care assessment by community pharmacists which was developed and validated by Nneoma et.al (2013). This study is to validate the psychometric properties of the Pharmaceutical Care Assessment Questionnaire (PCAQ) in Malaysian Community Pharmacy. The questionnaire consists of two domains which is direct patient care/current pharmacy practice (Part A) and exploring the awareness of pharmaceutical care (Part B). **Method**: Content validity, face validity, construct validity and reliability of PCAQ are evaluated. The questionnaire was content validated by 8 experts in the field consists of hospital pharmacists and lecturer from department pharmacy management. Face validation was conducted among 10 respondents who are community pharmacists. Whereas, from construct validity phase, 30 community pharmacists from Negeri Sembilan took part and 13 of them responded for test retest. Factorial analysis used principal component analysis and Varimax rotation. Reliability of the questionnaire were established with Cronbach's Alpha and test-retest. **Results**: All the question have excellent Kappa value and only one question then with fair Kappa value. The factorial analysis showed a high correlation and communality between the questions and it proves that the questions in the instrument are able to measure the intended study topic. Cronbach's Alpha was 0.921 and 0.686 for Part A and Part B respectively. Wilcoxon non-parametric test result showed no significant difference between test and retest score for all the items. **Conclusion**: The questionnaire is a valid and reliable assessment tool to assess on pharmaceutical care provided by community pharmacists in Malaysia. Further study is required in order to make use of the questionnaire throughout the nation.

***Index Terms*-** Assessment, Community pharmacists, Community pharmacy, Pharmaceutical care, Questionnaire,

I. INTRODUCTION

Pharmaceutical care is characterized as the direct, responsible provision of medication-related care for the purpose of achieving definite outcomes that enhance patient's quality of life. It orders the professionals to dispense medications and to acknowledge responsibility for improving the quality of patients' outcomes (Hepler & Strand, 1990). The importance of pharmacists and community pharmacy for better healthcare services and good pharmacy practice is reported by International Pharmaceutical Federation (FIP). The act of pharmacists that reacts to necessities of the general population who utilizes the pharmacists' services to provide an ideal care which is evidence-based is referred as Good Pharmacy Practice (FIP- WHO Guidelines, 2011). Community pharmacists are the health professionals who are in easy contact with the general public. They legally supply medicines with a prescription or over the counter medications. Other than supplying right medication in right quantity to the right patient, counselling, providing drug information to health professionals, patients and the general public, and participation in health-promotion programmes are part of their professional activities (WHO, 1994). In Malaysia, pharmacy practice varies from one pharmacy to another. Chain-store pharmacies mostly offers a non-professional services whereas a independent pharmacies routinely focus on proficient pharmacy services (Wong, 2001). Currently

in Malaysia, there is no studies on assessment of pharmaceutical care is done. This preliminary study aimed to validate the psychometric properties of the Pharmaceutical Care Assessment Questionnaire (PCAQ) for the purpose of assessment by community pharmacists on provision of pharmaceutical care. In order for practice of pharmaceutical care to be assured for community pharmacists of Malaysia, there is a necessity for a scale to measure pharmacists' activities in their practice sites. This study will be a supportive tool to the Malaysian community pharmacists to evaluate their endeavors in the provision of pharmaceutical care.

II. METHODS AND DATA COLLECTION

1. Drafting of questionnaire

The draft of Pharmaceutical Care Assessment Questionnaire (PCAQ) were prepared based on the existing tool, Questionnaire for Assessing Pharmaceutical Care by Community Pharmacists which was developed and validated by Nneoma et al., (2013). This original questionnaire was developed based on the framework of the Behavioral Pharmaceutical Care Scale (BPCS) by Odedina et al., (1996). A 12 item questionnaire was designed with two domains namely, direct patient care/current pharmacy practice and exploring the awareness of pharmaceutical care. The questionnaire was checked for content, face and construct validity by experts in the field.

2. Inclusion Criteria

Inclusion criteria of experts: The experts included in this study were pharmacists with at least two years practice in hospital setting or lecturer from the department of clinical pharmacy and pharmacy management and Malaysian who can speak English.

Inclusion criteria of respondents: The respondents included in the study were both chain and independent community pharmacists who have registered with the Pharmacy Board of Malaysia and should be in close contact with the patients.

3. Content validity and Face validity

Content validity concerns how much an instrument has a proper sample of items for the develop being measured. An instrument's content validity is essentially in light of judgment of board of experts to assess and record content validity of instruments. The panel comprises of no less than three experts (Polit & Beck, 2004). The questionnaire was content validated by two pharmacists who are practicing at Government Hospital, three pharmacists from KPJ Specialist Hospital and three lecturer from department of School of Pharmacy each from KPJ Healthcare University College (KPJUC), AIMST University and International Medical University (IMU). They assessed the content of each of the domain relevant to the concept of pharmaceutical care.

Face validity is how the instrument looks, on the face of it and as it measures the construct of interest (Trochim, 2001). Face validation was carried out at ten community pharmacies located a Nilai and Seremban, Negeri Sembilan. It gives understanding about how potential the respondents may interpret and respond to the questionnaire. The pilot study generated data were not included in the final analysis.

4. Construct validity: Factor analysis

Construct validity refers to how much the instruments measures the construct developed. It depends on internal structure and external relationship (Rajender, 2011). It is a quantitative value as opposed to a qualitative distinctions amongst "valid" and "invalid" (Parsian & Dunning, 2009). As the indicator comprises of various items, factor analysis is utilized to decide the construct validity. Factor Analysis is a statistical technique used to bunch items into common factors, interpret each factor and outline the items into a little number of factors (Bryman & Cramer 1999). Random things which is not related to construct and should be deleted from the instrument (Munro, 2005). Copies of the questionnaire were distributed to 60 community pharmacists in the state, using an estimation of 63 community pharmacies avaliable in Negeri Sembilan for the year 2011 (Bahagian Perkhidmatan Farmasi, Kementerian Kesihatan Malaysia, 2013). This was decided based on sample size of known population by Krejcie & Morgan (1970). Out of the 60 questionnaire sent out, 30 was completed and included in study. Some of the community pharmacists also refused to participate in the study and that affected the sample size. Questionnaire distribution and data collection was conducted between May and June 2017.

5. Reliability procedure

Reliability is the how much an assessment tool produces steady and consistent outcomes. The advantage of carrying out a reliability analysis is that it empowers a researcher to treat a group of factors on the same subject as a single scale variable. This will diminish the many-sided quality of further analysis and hence the risk of Type I errors is decreased too (Samuels, 2016). The questionnaire was accessed on it's reliability by conducting two procedures which are Chronbach's alpha and Test-retest. Cronbach's alpha is utilized to assess the extent of variance that is systematic or reliable in an arrangement of test scores. Test-retest reliability is assessed by administering the similar test to the similar group of respondents at different point of time.The correlation between the two scores, and regularly between individual questions, demonstrates the soundness of the instrument. In any case, 2 weeks to 1 month is the for the most accepted time interval for retesting (Waltz et al., 2005). Cronbach's Apha was done on the same data collected for factor analysis and test-retest was done by 13 respondents.

III. RESULTS AND DISCUSSION

1.Response Rate

The response rate were 50%, 50% and 43.3% for face validation, construct validation and test-retest respectively. Based on this study's response rate, during further study the sample size can be determined and the probability of the response required by investigator can be estimated.

2. Content Validation

Based on content validation result 11 questions' Content Validity Ratio (CVR) was equal or more than 0.75 and excellent Modified Kappa value which is more than 0.74. Therefore, these questions can be remained in the questionnaire whereas Question 9's CVR was 0.25 annd fair Modified Kappa value which is 0.52 which needed to be eliminated. But Question 9 which was about psychological commitment and effort, was remained in the questionnaire for further validity procedures because, based on the comments from the experts and literature review, it is important to make psychological commitment to influence the patient to be compliance to the medication therapy. This is because good medication adherence improves patient's condition which is supported by the study by Ying & Wei (2015) reported that explaining positive outcomes of good medication adherence and encourages patients to do so, improves patient's medication adherence. Details of computation of CVR are shown in Table 1. All question have appropriate Content Validity Index (CVI) except question 9 requires revision because of I-CVI of 0.625. Suitability and understandability of question 9 was tested in face validation. Details of the content validation result are shown in Table 2.

3.Face Validation

Based on face validation results and comments from community pharmacists who have participated, all questions appear simple, understandable and acceptable by the intended targeted respondents.

4.Construct Validation: Factor Analysis

Factor analysis was done based on the data collected from 30 community pharmacists around Negeri Sembilan who practices at independent community pharmacy and chain community pharmacy. Question 7 which was about whether pharmacists heard about concept of pharmaceutical care was not included in this analysis as the answer by respondent was 100% yes. The communality value should be more than 0.5 to be considered for further analysis. All the questions of the questionnaire have scored 1.000 which was more than 0.5, therefore the next step of factor analysis was continued. Details of communality result are shown in Table 3. Factor analysis with principal component and varimax was performed on the 12 question and three factors/ domains emerged. Based on the results obtained it was concluded that question 1 to 6 loaded well with factor (component) 1 whereas question 8, 9, 11 and 12 loaded well with factor (component) 2 and only question 10 loaded to factor (component) 3. Question 10 which about how often pharmacists inquire of patient's satisfaction with their services requires further analysis with bigger sample size to determine whether to be included in factor 2 or to be removed from the questionnaire. This question can not directly excluded as there are studies done in Malaysia on regards of

assessment of pharmaceutical care services provided by a community pharmacy by Sam, Jothy & Parasuraman (2015) and it is one of the criteria mentioned in FIP/WHO Guidelines 2011. The questionnaire was finalized with two domains as question 10 remained in second factor. Details of factor analysis are shown in Table 4.

5. Reliability Study

The reliability of domain 1 (Part A) of questionnaire was 0.921, which indicates that the questions have good internal consistency and reliability. The alpha coefficient of domain 2 (Part B) of questionnaire was 0.686, indicating that the questions have relatively internal consistency as the value is closer to 0.7. Cronbach's value of 0.70 or higher indicates that questions are sufficiently correlated to form a scale (Nunnally & Bernstein, 1994). The corrected item correlation of each component is more than 0.3, this proves that all the questions were to be considered reliable. Details of Cronbach Alpha and Item total statistics are shown in Table 5 and 6 respectively. Wilcoxon non-parametric test output showed no significant difference between test and retest score for all the item, where the P values of all item between the two test is more than 0.05. Details of Wilcoxon non-parametric test are shown in Table 7.

This preliminary study aimed to validate a questionnaire which is reliable for assessing pharmaceutical care rendered by community pharmacists in Malaysia. This questionnaire is the first of its kind to be used in Malaysian community practice setting. Some of the questions requires modification in a way that could fit the Malaysian practice setting. The validated questionnaire will form a reliable work tool for researchers to improve on pharmaceutical care practiced within community pharmacies.There are some limitations related in conducting this study which was small sample size as some pharmacists decline to participate due to tight work schedule. Next, the self administered nature of the instrument may lead to response bias. It is highly recommended for further study to be conducted with larger sample size in different states of Malaysia.The usage of the questionnaire can be widen to be used in hospital pharmacy setting as there were no questions intended specifically to measure activity of community pharmacists.

IV. CONCLUSION

This study validated a questionnaire, a first of its kind to be used by Malaysian community pharmacy setting. The results from the validation process indicate that the questionnaire is valid, reliable and stable over time, and so might be a valuable instrument for assessing pharmaceutical care rendered by community pharmacists in Malaysia. Further study is needed to expand the robustness of the instrument.

APPENDIX

Table 1: CVR of questions and interpretation

Question	Ne	CVR	Interpretation
1	8	1 (≈0.99)	Remained
2	7	0.75	Remained
3	7	0.75	Remained
4	8	1 (≈0.99)	Remained
5	8	1 (≈0.99)	Remained
6	8	1 (≈0.99)	Remained

7	7	0.75	Remained
8	7	0.75	Remained
9	5	0.25	Need to be eliminated
10	8	1 (≈0.99)	Remained
11	8	1 (≈0.99)	Remained
12	8	1 (≈0.99)	Remained

Ne is number of experts evaluated the item essential or agrees with the item and Content Validity Ratio (CVR) = (Ne-N/2)/(N/2). The items with the CVR equals or bigger than 0.75 remained at the instrument and the rest needed to be eliminated.

Table 2: Content Validation Results

Dimensions of construct of study: Pharmaceutical Care Assessment	Number giving rating of 3 or 4 to relevancy of item	I-CVI	Pc	K	Interpretation	Comprehensiveness of instrument dimension	
						Agree	Proportion of consensus
Part A: Direct patient care/Current pharmacy practice							
1	8	1.00	0.004	1.00	Excellent	8	1
2	7	0.875	0.031	0.87	Excellent		
3	7	0.875	0.031	0.87	Excellent		
4	8	1.00	0.004	1.00	Excellent		
5	8	1.00	0.004	1.00	Excellent		
6	8	1.00	0.004	1	Excellent		
Part B:Exploring the awareness of pharmaceutical care							
7	7	0.875	0.031	0.87	Excellent	8	1
8	7	0.875	0.031	0.87	Excellent		
9	5	0.625	0.218	0.52	Fair		
10	8	1.00	0.004	1.00	Excellent		
11	8	1.00	0.004	1.00	Excellent		
12	8	1.00	0.004	1.00	Excellent		
12 items	S-CVI/Ave = 0.927 S-CVI/UN= 0.583					Agreement on total comprehensiveness=8	

I-CVI is item-level content validity index, Pc is probability of a chance occurrence was computed using the formula Pc= [N! /A! (N - A)!] *.5N where N= number of experts and A= number of experts who agree that the item is relevant. Number of experts=8, K(Modified Kappa) was computed using the formula: K= (I-CVI-PC)/(1-PC). Interpretation criteria for Kappa as per guidelines described in Cicchetti and Sparrow (1981) is fair when K of 0.40 to 0.59; good when K of 0.60 to 0.74 and excellent when K>0.74.

Table 3: Communalities

Questions	Initial	Extraction
1. Asked patient questions to access actual patterns of use of medication.	1.000	0.858
2. Asked patient questions to find out about perceived effectiveness of drugs he or she was taking.	1.000	0.696
3. Asked patient questions to ascertain whether therapeutic objectives were realized.	1.000	0.783
4. Asked patient questions to find out if he or she might be experiencing drug-related problems.	1.000	0.773
5. Implemented a strategy to resolve (or prevent) drug related problem	1.000	0.553
6. Follow up patients to evaluate their progress towards the drug therapy objectives	1.000	0.662
8. How often do you try to provide pharmaceutical care to your patients?	1.000	0.745
9. How often do you make psychological commitment and effort required to improve their outcome	1.000	0.627
10. How often do you inquire of patient's satisfaction with your services in order to evaluate your work	1.000	0.863
11. How often do you participate in higher educational programs to maintain and improve your competence?	1.000	0.635
12. How often do you provide general medical information to patients?	1.000	0.745
Extraction Method: Principal Component Analysis.		

Table 4: Result of Factor Analysis, Component Matrix of Domain 1 and Domain 2

Questions	Component
	1
1. Asked patient questions to access actual patterns of use of medication.	0.926

2. Asked patient questions to find out about perceived effectiveness of drugs he or she was taking.	0.834
3. Asked patient questions to ascertain whether therapeutic objectives were realized.	0.885
4. Asked patient questions to find out if he or she might be experiencing drug-related problems.	0.879
5. Implemented a strategy to resolve (or prevent) drug related problem	0.744
6. Follow up patients to evaluate their progress towards the drug therapy objectives	0.814
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

Questions	**Component**	
	2	**3**
8. How often do you try to provide pharmaceutical care to your patients?	0.860	
9. How often do you make psychological commitment and effort required to improve their outcome	0.648	0.455
10. How often do you inquire of patient's satisfaction with your services in order to evaluate your work		0.881
11. How often do you participate in higher educational programs to maintain and improve your competence?	0.703	
12. How often do you provide general medical information to patients?	0.818	
Extraction Method: Principal Component Analysis.		
a. 2 components extracted.		

Table 5: Cronbach's Alpha

	Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
Part A	0.921	0.921	6
Part B	0.686	0.704	5

Table 6: Item total statistics

	Questions	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Part A	1	12.10	22.438	0.884	0.812	0.891
	2	12.20	25.131	0.758	0.685	0.909
	3	12.60	25.283	0.825	0.692	0.901
	4	12.63	24.033	0.817	0.688	0.901
	5	12.90	26.231	0.648	0.478	0.923
	6	12.57	24.875	0.727	0.662	0.913
Part B	8	5.87	2.395	0.644	0.592	0.558
	9	6.20	2.234	0.519	0.321	0.598
	10	6.13	2.878	0.190	0.279	0.743
	11	5.87	2.464	0.403	0.361	0.654
	12	5.80	2.579	0.537	0.555	0.604

Table 7: Wilcoxon non-parametric test result (P values after Re-test)

Questions	Asymp. Sig. (P value)
1. Asked patient questions to access actual patterns of use of medication.	0.317
2. Asked patient questions to find out about perceived effectiveness of drugs he or she was taking.	1.000
3. Asked patient questions to ascertain whether therapeutic objectives were realized.	1.000
4. Asked patient questions to find out if he or she might be experiencing drug-related problems.	0.317
5. Implemented a strategy to resolve (or prevent) drug related problem.	0.317
6. Follow up patients to evaluate their progress towards the drug therapy objectives.	1.000
7. Have you heard about the concept of pharmaceutical care?	1.000
8. How often do you try to provide pharmaceutical care to your patients?	1.000
9. How often do you make psychological commitment and effort required to improve their outcome?	1.000
10. How often do you inquire of patient's satisfaction with your services in order to evaluate your work?	1.000
11. How often do you participate in higher educational programs to maintain and improve your competence?	1.000

12. How often do you provide general medical information to patients?	1.000

Table 8: The finalized questionnaire for assessing pharmaceutical care by community pharmacists

Part A: Direct patient care/Current pharmacy practice

Please indicate how many of your last five (5) patients with chronic conditions, who presented a refill prescription you provided the following activities by ticking the appropriate response.

Question	The respondent	Very often (4)	Often (3)	Sometimes (2)	Rarely (1)	Never (0)
1.	Asked patient questions to assess actual patterns of use of medication.					
2.	Asked patient questions to find out about perceived effectiveness of drugs he or she were taking.					
3.	Asked patient questions to ascertain whether therapeutic objectives were realized.					
4.	Asked patient questions to find out if he or she might be experiencing drug-related problems.					

Please indicate the activities provided to last five patients of yours you discovered were experiencing drug related problems by ticking the appropriate response.

5.	Implemented a strategy to resolve (or prevent) drug related problem.					
6.	Follow up on patients to evaluate their progress towards the drug therapy objectives.					

Part B. Exploring the awareness of pharmaceutical care

Question	The Respondent	Yes (1)	No (0)
7.	Have you heard about the concept of pharmaceutical care?		

Question	The Respondent	Always (2)	Sometimes (1)	Never (0)
8.	How often do you try to provide pharmaceutical care to your patients?			
9.	How often do you make psychological commitment and effort required to improve their outcome?			
10.	How often do you inquire of patient's satisfaction with your services in order to evaluate your work?			
11.	How often do you participate in higher educational programs to maintain and improve your competence?			
12.	How often do you provide general medical information to patients?			

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