USE OF PATIENT HEALTH QUESTIONNAIRES (PHQ-9, PHQ-2 & PHQ-1) FOR DEPRESSION SCREENING IN SINGAPORE PRIMARY CARE

Dr Charity Low Cheng Hong, Dr Sharon Cohan Sung, Dr Adrian Tan Kok Heng, Dr Chan Yiong Huak, Dr Daniel Fung Shuen Sheng

ABSTRACT

Introduction: Depression is common and debilitating, yet treatable; however, it is often overlooked in primary care settings. The second leading cause of disease burden globally, it has significant socioeconomic consequences in Singapore. Hence there is a need for well-validated screening tools to identify depressed patients in primary care. We had previously validated the 9-item Patient Health Questionnaire (PHQ-9) against a structured interview diagnosis of major depressive disorder (Mini International Neuropsychiatric Interview) in 400 patients in a local primary care clinic . The present study was a secondary analysis undertaken to evaluate the performance of 1- and 2-item versions of the PHQ (PHQ-1 and PHQ-2) as compared to the full instrument.

Results: For screening of major depression in local primary care clinic, PHQ-9 shows good validity and reliability. It had sensitivity of 91.7%, specificity of 72.2% (optimal cutoff score 6), with good internal consistency (Cronbach's alpha 0.87). Sensitivity and specificity for PHQ-2 (optimal cutoff score 2) were 91.7% and 66.8% respectively; whereas that for PHQ-1 (optimal cutoff score 1) was 83.3% and 62.9% respectively. For settings where an ultra-brief screen is preferred, PHQ-2 and PHQ-1 may be employed with limitations. Overall prevalence of major depressive disorder in this study was 3.0%.

Keywords: PHQ-9; PHQ-2; PHQ-1; depression; Singapore.

SFP2018; 44(2): 68-73

INTRODUCTION

Depression is a common, debilitating condition that affects 350 million people globally.[1] Depression crosses the boundaries of age, gender, race, and societal strata. It is a comorbidity that complicates many chronic diseases, leading to considerable morbidity and mortality. In the Global Disease Burden Study (2010), depression has been shown to be the second leading cause of disease burden globally.[2] It is the most common factor leading to suicide[3] and has important socio-economic consequences for the community. The World Health Assembly resolution (2012) called for a comprehensive, coordinated response to mental disorders at the country level. Depression is one of the priority conditions covered by the World Health Organization (WHO)'s Mental Health Gap Action Program (mhGAP).

CHARITY LOW CHENG HONG*

SHARON COHAN SUNG

ADRIAN TAN KOK HENG

CHAN YIONG HUAK

DANIEL FUNG SHUEN SHENG

* PEACE FAMILY CLINIC

Mental Health Policies in Singapore

Singapore has advanced to become a First World country with all its associated mental health risks. Our national policy is in line with WHO's most fundamental healthcare recommendation in its MIND Project (Mental Improvement for Nations Development):[4] integrating mental health services into primary care. Our vision in raising the standard of primary care in Singapore is prominently expressed in the promotion of primary care psychiatry.[5] Locally, the Early Psychosis Intervention Programme (EPIP) was launched in 2001, the General Practitioner Partnership (GPP) programme for general practitioners (GPs) to work with mental health services was launched in 2007, the Chronic Disease Management Programme (CDMP) included Depression in 2009, and the Graduate Diploma in Mental Health (GDMH) started in 2010. At the institutional level, various policies were started in different hospitals to improve early detection and management of depression. However, the role of primary care in its gate-keeping function remains irreplaceable in its first contact with patients. Depression in primary care often presents in its early stage and is most amenable to treatment. Moreover, the personal, therapeutic relationship built between primary care physicians and patients enables patients to open up and ventilate, and it can make them more receptive towards the diagnosis and psychological counseling management. Accessibility in follow-up and monitoring in primary care, with less stigma attached, enhances compliance. Depressed patients are managed in the familiar context of their community, occupation, and family, with skilful collaboration with tertiary services and help when necessary.

In 2007, the Ministry of Health (MOH) implemented the National Mental Health Policy for the country.[6] The Singapore Mental Health Study (SMHS), a household survey of the adult resident population, was conducted between December 2009 and December 2010.[7] There was compelling evidence of poorer prognosis with longer duration of untreated illness in common mental disorders such as depression.[8] Of those who sought help, there was a considerable delay before doing so: the shortest was among those with major depression (median 4 years). The rate of patients with mental health disorder locally who consulted a GP was lower than in the United States (8.4%[9] vs 22.8%[10]). There seems to be an over-reliance and undue strain on the specialised mental health providers. The GPP Programme was then initiated as an effort to engage GPs to share the load of care

for stable patients who require maintenance medication and are best managed in the community. The programme allows for the right siting of care for patients and allows the hospital to channel precious resources to more appropriate uses. The eventual plan is for all GP partners to be trained via the GDMH.[11]

Prevalence and Statistics of Major Depression in Singapore

Locally, a study in 1998 reported a 12-month prevalence rate of major depression as 5.5 percent among Singaporeans aged 13 to 65 years old.[12] Another study in 2004 reported a lifetime prevalence of depression among the adults to be 5.6 percent.[13] In the SMHS 2010 population survey of Singapore adult residents, the lifetime prevalence of depression was found to be 5.8 percent. There were studies conducted on the prevalence of depression in sub-groups of patients in certain centres: 17.2 percent in vitiligo patients;[14] 12.2 percent in antenatal patients; 6.8 percent in postnatal patients;[15] 40 percent in older adults on dialysis;[16] 16.8 percent in cancer patients;[27] 27.4 percent in Chinese diabetics; 43.2 percent in Indian diabetics;[28] and 30 percent in glaucoma patients.[17]

Other alarming national statistics reinforce the need for depression screening locally. Depression is the most frequent pre-existing condition of suicide attempts. The SMHS 2010 found that the prevalence of suicidal ideation, plan, and attempt among those with lifetime major depression was 43.6 percent, 13.7 percent, and 12.3 percent, respectively.[18] According to police records, the number of local attempted suicides had increased to 1090 in 2012. In a five-year review of homicides in Singapore (1997–2001), depression was documented in 9.1 percent of the accused persons.[19] Depression is also costly. A recent study examining the severity of depressive disorder on economic burden in a university hospital in Singapore found that the mean annual total cost per patient was US$7,638.[20] The stigma of mental disease also had a negative effect on patients' self-esteem, relationships, and job opportunities.[21]

Depression Screening Instruments Used in Singapore

In busy primary care clinics, ubiquitous somatisation masks detection of depression.[22] Effective screening instruments are recommended to assist primary care providers in identifying patients with depression.[23] Several depression-screening instruments have been validated for use with sub-groups of the local population, including children (ACDS: Asian Children Depression Scale),[24] adolescents (AADS: Asian Adolescent Depression Scale),[25] the elderly (GDS-15: Geriatric Depression Screening Scale),[26] cancer patients (HADS: Hospital Anxiety and Depression Scale),[27] and diabetes patients (CES-D: Center for Epidemiologic Studies Depression Scale).[28] Of late, the 9-item Patient Health Questionnaire (PHQ-9) has been employed in local healthcare to assist in depression screening. However, there has as yet been no instrument uniformly recommended for local primary care clinics. Our research team recently examined the psychometric properties of the PHQ-9 compared to another popular depression inventory in a sample of 400 patients recruited from a local, private-practice, primary care clinic in Singapore. The present study was a secondary analysis undertaken to evaluate the performance of 1- and 2-item versions of the PHQ (PHQ-1 and PHQ-2) compared to the full PHQ9.

METHODS

Participants and Procedures

The study clinic was a private primary care clinic in Singapore. Patients seeking medical consultations from April 2011 onwards, for a duration of 5 months, were invited to participate in the study. Full details regarding patient recruitment and assessment procedures can be found in Sung et al (2013)[29]. Briefly, patients were eligible to participate if they were 21¬–65 years of age, intellectually capable, and proficient in English. They completed the PHQ-9 and a demographics questionnaire while waiting for consultation. (The 16-item Quick Inventory of Depressive Symptoms [QIDS-SR16] was also included in the design of the original study. It will not be mentioned in this paper as it is beyond its scope.) The study physician interviewed each patient using the depression module of the Mini International Neuropsychiatric Interview (MINI)[30] to assess if the patient met criteria for major depressive disorder. The interviewer was blind to patients' self-report ratings. The local Clinical Research Committee (CRC) and National Healthcare Group Domain-Specific Review Board (DSRB) had approved the study methods.

Assessment Instruments

The PHQ-9[31] is a widely-used self-report questionnaire designed to help identify patients with depression in primary care and other medical settings (See Figure 1). Scores of 5, 10, 15, and 20 correspond to mild, moderate, moderately severe, and severe depression, respectively.[32] The sensitivity and specificity have been reported as 88 percent (cutoff score ≥10) for Diagnostic and Statistical Manual, 4th Edition (DSM-IV-TR) major depressive disorder. The PHQ-9 has shown good internal consistency (Cronbach's alpha=0.89) for US and Singapore (Cronbach's alpha=0.87) sample.[29]

The PHQ-2 consists of the first two questions of PHQ-9 (Question 1: "Little interest or pleasure in doing things over the last 2 weeks". Question 2: "Feeling down, depressed, or hopeless over the last 2 weeks"), with the same scoring system. The PHQ-1 consists of one screening question ("Feeling down, depressed, or hopeless over the last 2 weeks"). The PHQ-2 has been validated in three studies where it showed variability in sensitivity (61 – 87%), specificity (78 – 92%) and optimal cutoff score (2 or 3).[33,34,35] The PHQ-1 has, to date, not been validated.

Figure 1: Patient Health Questionnaire (PHQ-9)

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? (Use "✔" to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING __0__ + _____ + _____ + _____
=Total Score: _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

The MINI[30] is a brief, structured clinical interview based on DSM-IV criteria. The depression module was employed in this study. The coding of occupational status was made systematic by the updated version of the Hollingshead Index.[36]

RESULTS

Out of 492 patients who satisfied the inclusion criteria, 405 gave informed consent while 87 declined. With 2 patients who withdrew their consents midway and 3 with incomplete data, 400 patients completed the survey forms and were finally included in the analysis; of these, 12 were diagnosed with major depression (3% prevalence).

Table 1: Demographic and clinical characteristics of study sample (n = 400)

Characteristic	Mean (SD), Range
Age	36.1 (10.5), 21-65
	n (%)
Gender	
Male	139 (34.8)
Female	261 (65.3)
Race/ethnicity	
Chinese	208 (52.0)
Malay	91 (22.8)
Indian	62 (15.5)
Others	39 (9.7)
Marital status	
Married	247 (61.8)
Single	142 (35.5)
Divorced/Separated	8 (2.0)
Widowed	3 (0.7)
Education	
Primary or below	16 (4.0)
Secondary/Vocational	145 (36.3)
Pre-university/Polytechnic	118 (29.6)
University/Postgraduate	120 (30.1)
Nationality	
Singaporean	302 (75.5)
Singaporean Permanent Resident	45 (11.2)
Others	53 (13.3)
Occupational Status	
Not working	75 (18.8)
Unskilled/Labourer	45 (11.3)
Semi-skilled/Clerical	137 (34.3)
Executive/Professional	143 (35.8)
Past history of mental illness	
No	382 (95.5)
Yes	18 (4.5)
Family history of mental illness	
No	367 (91.8)
Yes, 1st degree relatives	20 (5.0)
Yes, other relatives	13 (3.2)
PHQ-9[a] score	
≥10	43 (10.8)
≥15	14 (3.5)
≥20	3 (0.8)

[a] PHQ-9: 9-item Patient Health Questionnaire
Note: Occupational status was coded based on an updated version of the Hollingshead Index (Hollingshead, 1975).

Table 2: ROC analysis of PHQ-9, PHQ-1 and PHQ-2 optimal cutoffs for Major Depressive Disorder (MDD

Optimal cutoff score	Area under ROC[b] (95% CI[c])	Sensitivity (%)	Specificity (%)	Positive likelihood ratio	Negative likelihood ratio	Positive predictive value (%)	Negative predictive value (%)
PHQ-9 score of 6	0.819 (0.720-0.919)	91.7	72.2	3.3	0.11	9.2	99.6
PHQ-1 score of 1	NA	83.3	62.9	2.2	0.27	6.5	99.2
PHQ-2 score of 2	0.874 (0.797-0.951)	91.7	66.8	2.8	0.12	7.9	99.6

[b] Receiver operating characteristic
[c] Confidence interval

In this study, the PHQ-2 and PHQ-1 analysis were derived from the PHQ-9. Derived sensitivity and specificity for PHQ-2 (optimal cutoff score of 2) were 91.7 percent and 66.8 percent respectively; whereas for the PHQ-1 (optimal cutoff score of 1) sensitivity was 83.3 percent and specificity was 62.9 percent. Both showed good negative predictive value of 99 percent and strong LR- of at most 0.3. They had positive predictive value of 7 to 8 percent and LR+ of 2 to 3. More detailed analysis of PHQ-9 and demographics of study sample could be referred to Sung et al (2013).[29]

DISCUSSION

We previously found the PHQ-9 to be a reliable depression screening tool, with good criterion validity and internal consistency.[29] It demonstrated high sensitivity in detecting patients with major depression and high negative predictive value in detecting participants without depression at the optimal cutoff score of 6 points. It had modest specificity and likelihood ratios, with low positive predictive value. It had high false-positive rate. Perhaps some patients might have neglected the diagnostic rule-outs due to bereavement within two months, physical sickness, medications, substance abuse or bipolar disorder. Thus, positive screens with the questionnaire may not confirm the diagnosis of depression; they have to be followed up with complete clinical assessments.

The optimal PHQ-9 cutoff score of 6 detected here for the diagnosis of major depressive disorder was lower than that of other studies, which have an average cutoff score of 10.[37] Local patients, sensing the stigma of being labelled depressed, might have subjectively rated their symptoms lower. This underlines the need to validate the screening questionnaire independently in different countries with different social and cultural contexts. Perhaps an area of exploration could be to ascertain if the depressive patients with low scoring of depressive symptoms present with somatising symptoms instead. Interestingly, a sub-analysis of our data by age groups indicated that there is a higher level of symptom endorsement (anhedonia, depressed mood, sleep/appetite disturbance, negative view of self, low energy, and concentration difficulties) by younger people, which may reflect their openness and a greater willingness to discharge such symptoms relative to older adults.[38]

All three questionnaires had good negative predictive value. For PHQ-1, that meant an answer of "No" to this single question of "Are you depressed?" strongly ruled out depression. However, PHQ-1 was lower in sensitivity and specificity than PHQ-9 and PHQ-2. The PHQ-2 had similar sensitivity to PHQ-9 (91.7%) but lower specificity (66.8%). In comparison, other studies showed lower sensitivity but higher specificity.[33,34,35] Being too brief, PHQ-2 could not be used to monitor depression severity

nor the impact on daily activities, which were the additional benefits of PHQ-9. However, it may be a useful tool to detect patients with depressive symptoms in settings where an ultra-brief screener is desirable.

Comparison of the three questionnaires yielded interesting results. The PHQ-9 corresponded well to the 9 domains of depression and gave a clear diagnosis. Its total score could assess severity and be employed in the monitoring of severity of depression. It recorded the different symptom domains specific for particular patients which could be addressed and reassessed in subsequent follow-ups. It can be self-administered and takes only 3 to 5 minutes. While patients are waiting for long periods for their doctors outside the consultation room, it makes sense to gather more information than less. However, for patients already in the consultation room with the busy physician pre-occupied most of the time with multiple diseases concurrently presenting in a patient, PHQ-2 would be useful as a "first step" approach to ring an alarm for the primary care physician to subsequently administer the PHQ-9. The PHQ-1 may be asked in one minute for absolutely tight consultations of patients with low suspicion of depression.

The point-prevalence of major depression in this study was 3 percent, lower than the local population prevalence of 5.8 percent (2010). Only one patient reported suicidal ideation. Major depression detected in this primary care setting appeared to be less severe and this affirms that primary care physicians are in a privileged position to pick up depressive patients at a stage most amenable to treatment.

It is important to recognise the role that primary care physicians could play in primary psychiatry care.[5] Primary care physicians would require the full support of the psychiatrist in three main aspects: helpful patient information from the psychiatrist to the receiving primary care doctor for the transfer of care of patient; availability of hotline contact for timely expert advice if primary care physicians needed help; and clinical support resources of online materials or seminars for training of primary care physicians. Proper, coordinated care is needed in optimal management of depression and must be done in a timely manner.[39]

Strengths of this study are an acceptable sample size, a good response rate of 82 percent (400/490) and the "blinding" of the trained interviewer who examined independently participants after they had completed the questionnaires.

There is a limitation in generalising the findings in this study to the whole population of primary care patients locally as it was conducted in a single primary care clinic. The prevalence of depression in primary care clinics locally is expected to be similar to or higher than the local population prevalence of 5.8 percent (2010). The current prevalence of 3 percent in this study is unexpectedly low. Studies with larger sample sizes are needed to evaluate the prevalence rate more accurately. There may be limitations in the analysis and interpretation of results drawn from this small number of 12 depressed patients. In our context of multi-ethnicity, 80 percent of Singaporeans speak English.[40] The PHQ-9 employed in English is an appropriate language medium for the majority. However, to reach out to the rest, translated versions may be useful.

CONCLUSION

The PHQ-9 appears to be valid and reliable for depression screening in primary care clinics in Singapore. The single-paged questionnaire approximates closely the 9 domains for the diagnosis of depression and can be easily self-rated by patients in a short time in the waiting room. The PHQ-2 also performed well and can be used by busy primary care physicians as a first-step approach to assess if PHQ-9 should be administered. Employment of such screening questionnaires works towards our national initiative of primary care psychiatry. It may have the potential to increase the vigilance of primary care physicians and the awareness of this under-diagnosed condition in our society. Depression screening questionnaires should not be used alone. It has to be followed up by clinical assessment to confirm diagnosis and structured management programmes to improve depression outcomes in primary care.[41] With a high index of suspicion, primary care physicians are in the best position to improve the diagnosis and management of depression as long as they have been adequately trained in this area. A key challenge locally is the systematic screening of depression in primary care.

STATISTICAL ANALYSIS

SPSS (version 17.0) was used to analyse the data collected. Receiver operating characteristic (ROC) analysis was performed for PHQ-9, PHQ-2, and PHQ-1 in the detection of MINI major depression.

AUTHOR CONTRIBUTORSHIP

The contribution of each author is outlined briefly here:

1. Dr Charity Low Cheng Hong conducted the study in her primary care clinic (Peace Family Clinic (WL 832)), collected the data, drafted, edited, prepared and submitted the paper.

2.Dr Sharon Cohan Sung assisted in revising the paper critically to reach its final version to be submitted.

3. Dr Adrian Tan Kok Heng assisted in editing the paper.

4. Dr Chan Yiong Huak analysed and interpreted the data.

5. Dr Daniel Fung Shuen Sheng conceptualized, designed the study, applied for DSRB and took oversight of the entire study.

AUTHOR DECLARATION

1. The authors warrant that the article "USE OF PATIENT HEALTH QUESTIONNAIRES (PHQ-9, PHQ-2 & PHQ-1) FOR DEPRESSION SCREENING IN SINGAPORE PRIMARY CARE" is original, does not infringe upon any copyright or other proprietary right of any third party, is not currently under consideration by another journal and has not been previously published.

2. The authors declare that there were a poster and an oral presentation derived from this same study, and an original paper

published. These centred on validation of PHQ-9 and QIDS-16; the comparisons between both instruments; the demographics and depressive symptoms of patients. This article is a secondary analysis, with a different focus on PHQ-2 and PHQ-1 for employment in busy primary care clinic. It also has its value in offering an updated survey of the mental health setting locally. The 3 presentations were all quoted as references in this article submitted to SFP:

(i) Low, Sung, Fung, Chan. Validation of the PHQ-9 and QIDS-16 as screening tools for depression in a primary care clinic in Singapore. SingHealth. Dukes-NUS Scientific Congress August 2012.

(ii) Sung, Low, Fung. Depressive symptoms in Singaporean primary care patients: Do they differ based on age, gender, or ethnicity? 3rd Singapore Health and Biomedical Congress, September 2012.

(iii) Sung, Low, Fung, Chan. Screening for major and minor depression in a multi ethnic sample of Asian primary care patients: A comparison of the nine-item PHQ-9 and QIDS-SR16. Asian-Pacific Psychiatry. 2013;5:249–58.

INSTITUTION FROM WHICH WORK ORIGINATES:

Peace Family Clinic (WL 832)
Address: Block 832, #01-71, Woodlands Street 83, Singapore 730832

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