Research Article

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Depression among patients admitted to medical wards: comparison between a university hospital and regional hospital

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Abstract: Objective: We aimed to determine the prevalence of depression and to find factors associated with depression in admitted medical patients. The differences in the pattern of depression between a university hospital (UH) and a regional hospital (RH) were determined as well.

Methods: This is a cross-sectional study. The Patient Health Questionnaire-9 (PHQ-9) was administered among hospitalized patients in medical wards. PHQ-9 could not differentiate between the type of depressive disorder that could be from medical conditions, adjustment disorder with depressed mood, major depressive disorder, or dysthymia.

Results: A total of 343 patients (191 in UH, 152 in RH group) with age of 52.1 ± 16.9 years were included. Timing of interview was 4.3 ± 1.4 days after admission. The prevalence of depression (PHQ-9 score ≥ 9) was 12% (7.3% in UH vs 17.8% in RH, $p < 0.005$). According to PHQ-9 scoring, the prevalence of moderate-to-severe depression was 3.8%. Mean PHQ-9 score in RH was significantly higher than in UH ($p < 0.001$). Multiple baseline characteristics were analyzed by logistic regression and found no factors associated with depression. There was no difference in baseline characteristics of UH patients with depression compared to RH, except for universal health coverage plan.

Conclusions: The prevalence of depression was 1 in 10 patients and was found to be more frequent and severe in RH than UH. All patients were at equal risk to develop depression during admission.

Keywords: patient health questionnaires, rural health, urban health

1 Introduction

Depression refers to a common mental health problem characterized by a wide spectrum of symptoms, including the depressed mood, absence of interest or pleasure, loss of energy, feelings of guilt or low self-esteem, poor concentration, altered appetite, and disturbed sleep [1]. Depressive mood is an emotional state which is experienced by most people with poor physical health. More than 322 million people worldwide have a diagnosis of depression, an increase of more than 18% between 2006 and 2015 [2]. Depression is common in the general population, and even more frequent among patients with medical illnesses, such as cardiovascular disease, stroke, cancer [3-5]. Based on 20 studies, the median prevalence of depression in hospitalized medical patients was 33%, ranging from 15-60% [6]. Many mental disorders can occur after stressful events, including anxiety, depression, psychosis and post-traumatic stress disorder [5,7]. The prospective cohort of patients without psychiatric complaints at the emergency department demonstrated high rates of major depressive disorder, up to 27% [8]. The frequency of anxiety, depression and post-traumatic stress disorder among the survivors of critical illness was 46%, 40% and 22%, respectively [7]. The prevalence of depression among patients with myocardial infarction was high as 29% and may lead to poor long-term quality of life and increased cardiac mortality [9,10]. Many studies found depression is associated with poorer physical health, worse functional

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outcomes and rehospitalization [11–13]. Depression has been shown to be related with bad health habits, such as smoking, unhealthy diet, reduced physical activity and poor adherence to prescribed medication [14–16]. Although depression is highly prevalent among hospitalized patients, depression often remains unrecognized and thus undiagnosed and untreated.

In this study, depression includes all types of depressive disorders, such as medical conditions, adjustment disorder with depressed mood, major depressive disorder and dysthymia. Differences in terms of the prevalence of depression between university hospitals (UHs) and regional hospitals (RHs) have been controversial. UHs can be considered as referral centers for more complex and comprehensive care than RHs. Depression may occur more frequently in patients with more complicated conditions [17]. In contrast, a major teaching hospital in the United States was associated with lower overall mortality compared to nonteaching hospitals [18,19]. Some factors, such as higher physician-to-patient ratio, more specialists, technology and multidisciplinary teams may contribute to higher quality of care [20]. However, a systemic review showed no differences in patient outcomes between teaching and nonteaching hospitals [21]. Despite these concerns, the data is lacking for comparing UHs and RHs.

Little is known about the prevalence and risk factors of depression in hospitalized patients in Thailand. To the best of our knowledge, this is the first to study the difference in depression between UH and RH. The present study aimed to determine the prevalence of depression among admitted medical patients and to find factors associated with depression in admitted medical patients. The differences in the pattern of depression between UH and RH settings were explored. The accuracy of screening test for depression was also determined.

2 Materials and methods

2.1 Study design and participants

This was a cross-sectional study, involving two hospitals, one of which was a UH (Ramathibodi Hospital, Mahidol University, Bangkok; 1,378-bed hospital) and the other a RH (Sawanpracharak Hospital, Nakhonsawan; 659-bed hospital). During August 1 to November 30, 2018, adult patients who were hospitalized in a medical ward were recruited for the study. Inclusion criteria were admitted medical patients who are native Thai speakers aged ≥ 15

years old. Exclusion criteria were subjects with acute psychosis, severe cognitive deficits, aphasia, hearing impairment, decreased level of consciousness, unstable medical illnesses or refusal to participate the study.

2.2 Data collection

Participants were prospectively enrolled and interviewed at the 4th–6th day of hospitalization to allow time to treat medical conditions and to reduce potential mood swings associated with prolonged hospital stays. Each participant completed a questionnaire (see details in section 2.3) by a face-to-face interview. The interviewer was the same interviewer (W.H.) throughout the study to avoid the effects from interviewer differences.

Demographic data included gender, age, occupation, habitat, marital status, number of children, religion, education, underlying disease, chief complaint, diagnosis, medical history, previous history of hospital admission within 1 year, and family history of psychiatric problems.

2.3 Depression symptoms assessment

Depressive symptoms were assessed using the Thai version of the nine-item Patient Health Questionnaire (PHQ-9), one of the most commonly used depression screening tools [22]. The details are described at https://med.mahidol.ac.th/depression_risk. The PHQ-9 has been used as a reliable and valid depression screening tool in general practice, with a demonstrated good sensitivity and specificity for depressive disorder. Individual scores were summed to calculate a total score, which ranges from 0 to 27, with higher scores reflecting greater depressive symptoms [23]. The PHQ-9 was created in English and has been validated in Thai language, and the cut-off score of 9 or higher is considered consistent with clinical depression [22].

The PHQ-2 was used for depression symptoms assessment to compare the test performance with the PHQ-9. It includes the first two items of the PHQ-9: (1) during the last 2 weeks, have you often been bothered by feeling down, depressed, or hopeless? (2) during the last 2 weeks, have you often been bothered by having little interest or pleasure in doing things? Scores of 3 or higher (possible score from 0 to 6) have been recommended to identify cases positive for depression [24,25].

2.4 Statistical analysis

Categorical data were reported as frequencies and compared with chi-square statistics. Normally distributed continuous data were reported as mean $\pm$ standard deviation (SD) and compared by Student's *t*-test. Univariate regression analyses tested associations between PHQ-9 scores and demographic variables. Multivariate logistic regression to test for independent associations of depression was performed. Data were expressed as odds ratios (OR) with their confidence interval (CI). We assessed the sensitivity, specificity, positive predictive value, and negative predictive values of the PHQ-2 as a screening instrument, using the PHQ-9 as a gold standard. Statistical significance was set at two-tailed, with *p* values of less than 0.05. Analysis used STATA commercial statistical software version 13 (StataCorp LLC, College Station, Texas, USA).

3 Results

3.1 Study population

A total of 348 patients were recruited in the study. Five patients were excluded because they refused to participate. Finally, a total of 343 patients collected from medical wards in two hospitals were included in the study. The first group from UH (Ramathibodi Hospital) had 191 patients and the second group from RH (Sawanpracharak Hospital) had 152 patients. The mean age was 52.1 ± 16.9 years. 61.2% of the participants were male. Baseline characteristics are shown in Table 1. Main diagnoses for admission and underlying diseases are shown in Table 2. The timing of interview was 4.3 ± 1.4 days after admission.

3.2 Prevalence of depression

The overall prevalence of depression, defined by PHQ-9 scores ≥ 9 , was 12%. The rate of depression was higher in RH than UH (17.8% vs 7.3%, $p < 0.005$). The severity of depression was moderate/severe in 2.6% of UH patients and 5.3% of RH patients.

3.3 Factors associated with depression

From the univariate analysis, no association between demographic variables (gender, age, occupation, habitat, marital status, number of children, religion, education,

underlying disease, chief complaint, diagnosis, medical history, previous history of hospital admission within 1 year, family history of psychiatric problems) and depression was demonstrated. Due to nonsignificant results on univariate analysis, we did not proceed to perform multivariate analysis.

3.4 Sensitivity and specificity of the PHQ-2

Using a cut-off of 3 or greater, the PHQ-2 had a sensitivity of 87.8%, specificity of 71.6%, positive predictive value of 30.3%, and negative predictive value of 97.8%. Using the PHQ-2 at a cut-off score of 3, the prevalence of depression was 35%.

3.5 The differences of depressed patient between UH and RH

Among patients diagnosed with depression by the PHQ-9, there was no difference in demographic variables between UH and RH, with the exception of health coverage. Patients in RH used universal health coverage more than UH (77.7% vs 50%, $p = 0.02$).

4 Discussion

Despite the fact that poor mental health can negatively impact on physical illness, there is no available data on the prevalence of depression and associated risk factors among admitted medical Thai patients. Even though the type of healthcare facilities may impact the prevalence of depression, the comparison between different settings is lacking. This cross-sectional study demonstrated that depression was quite common, about 12%, among hospitalized medical patients. The prevalence of depression was higher in RH than UH. No demographic risk factor was associated with depression. When compared with the PHQ-9 as a gold standard for depression screening tools, the PHQ-2 (i.e. the first 2 items of the PHQ-9), had a high negative predictive value. Between UH and RH, no difference in the demographic characteristics was demonstrated in the depressed patients, except for health coverage.

In the current Thai healthcare system, inpatient hospital care often focuses on assessing only the patient's present illness. Indeed, poor physical and mental health often occurs together. Psychosocial and physical factors

Table 1: Baseline characteristics

	University Hospital (N = 191)	Regional Hospital (N = 152)	p value
Male, no. (%)	96 (50.2%)	117 (77%)	< 0.001
Age, years	53.6 ± 17.2	50.1 ± 16.2	NS
Occupation			< 0.001
Farmer, no. (%)	74 (38.7%)	106 (69.7%)	
Unemployed, no. (%)	70 (36.6%)	29 (19.1%)	
Private job, no. (%)	25 (13.1%)	10 (6.6%)	
Civil servant, no. (%)	22 (11.5%)	7 (4.6%)	
Buddhism, no. (%)	188 (98.4%)	152 (100%)	NS
Married, no. (%)	132 (69.1%)	115 (75.6%)	NS
Education attainment			< 0.005
None, no. (%)	9 (4.7%)	10 (6.6%)	
Primary school, no. (%)	51 (26.7%)	85 (55.9%)	
Secondary school, no. (%)	33 (17.2%)	37 (24.3%)	
University/college, no. (%)	98 (51.3%)	20 (13.2%)	
Health coverage			< 0.001
Universal health coverage, no. (%)	83 (43.5%)	129 (84.9%)	
Civil servant medical benefit scheme, no. (%)	78 (40.8%)	12 (7.9%)	
Social health insurance, no. (%)	20 (10.5%)	11 (7.2%)	
Self-payment, no. (%)	10 (5.2%)	0	
Previous admission			0.007
None, no. (%)	99 (51.8%)	104 (68.4%)	
1-3 admissions, no. (%)	69 (36.1%)	39 (25.7%)	
4-6 admissions, no. (%)	11 (5.8%)	7 (4.6%)	
≥ 7 admissions, no. (%)	12 (6.2%)	2 (1.3%)	
Duration of illness			0.035
Less than 2 weeks	163 (85.3%)	122 (80.3%)	
Two weeks to 1 month	17 (8.9%)	26 (17.1%)	
More than 1 month	11 (5.8%)	4 (2.6%)	
Psychiatric problems in family			NS
None	177 (92.6%)	146 (96.1%)	
Spouse/parents	9 (4.7%)	2 (1.3%)	
Brother/sister	4 (2.1%)	4 (2.6%)	
Children	1 (0.5%)	0	

Abbreviations: no., number; NS, not significant

Table 2: Main diagnosis of diseases in this admission and previous underlying diseases

Current Diagnosis, no. (%)	University Hospital (N = 191)	Regional Hospital (N = 152)	p value
Infectious diseases	36 (18.8%)	16 (10.5%)	0.033
Oncologic/hematologic diseases	35 (18.3%)	31 (20.4%)	NS
Cardiovascular diseases	32 (16.8%)	33 (21.7%)	NS
Gastrointestinal diseases	31 (16.2%)	21 (13.8%)	NS
Pulmonologic diseases	24 (12.6%)	31 (20.4%)	0.05
Renal diseases	19 (9.9%)	8 (5.3%)	NS
Endocrinologic diseases	4 (2.1%)	2 (1.3%)	NS
Others	10 (5.2%)	10 (6.6%)	NS
Previous underlying diseases*, no. (%)			
Cardiovascular diseases	89 (46.6%)	49 (32.2%)	0.007
Oncologic/hematologic diseases	68 (35.6%)	12 (7.9%)	< 0.001
Endocrinologic diseases	42 (22.0%)	28 (18.4%)	NS
Renal diseases	28 (14.7%)	15 (9.9%)	NS
Gastrointestinal diseases	17 (8.9%)	9 (5.9%)	NS
Infectious diseases	9 (4.7%)	4 (2.6%)	NS
Others	30 (15.7%)	7 (4.6%)	NS
None	20 (10.5%)	59 (38.8%)	< 0.001

Abbreviations: no., number; NS, not significant

* The total of the percentages does not equal 100% as some patients may have several underlying diseases.

associated with depression put patients at risk for poorer outcomes, increased length of stay and higher risk for rehospitalization [11,12]. In addition, hospitalization represents an unrecognized opportunity to optimize both physical and mental health outcomes [26]. In comparison with data from the systematic reviews and meta-analysis, the depression rate found in hospitalized patients was lower in this study [6]. However, the prevalence is still higher than that of the general Thai population (~4%) [27]. The wide range of depression rate may depend on the differences of the ethnic populations, age, sex, depression screening tools, and hospital settings.

The prevalence of depression in RH was higher than in UH. Our hypothesis is that this is related to urban-rural differences. UH (Ramathibodi Hospital) is located in a more urbanized area than RH (Sawanpracharak Hospital). Rural residents may be more likely than urban residents to experience more adverse living circumstances and behaviors that may increase the frequency of depression. These include a greater likelihood of reporting fair or poor health, excessive alcohol intake, and unhealthy lifestyle [28-31]. Rural populations are also more likely to suffer from greater poverty than urban residents and poverty is

associated with higher morbidity [32,33]. However, there was no difference demonstrated between demographic characteristics of depressed patients from the two hospitals in the present study, except for health coverage. Universal health coverage plan was used more frequently by patients treated in RH than UH. This factor may suggest that socioeconomic status is the predominant factor accounting for the urban-rural depression gap [34]. Unfortunately, the detailed data on socioeconomic status was not collected in this study.

Many factors contribute to developing depression. Among general populations, the prevalence of depression varies by age, sex, race/ethnicity, family history of psychiatric disorders, marital status, geographic area, educational attainment, employment status, and substance misuse [26]. Some risk factors such as poor health status, disability, number of chronic medical illnesses, loneliness, unresolved grief, chronic sleep disorder, and prior depression history are more common in older age [35]. However, the presence of risk factors alone cannot differentiate depressed from nondepressed patients. Thus the results are similar to the United States Preventive Service Task Force (USPSTF) recommendations that

suggest screening of depression in all adults regardless of risk factors [26].

Screening for depression is not routinely carried out in current clinical practice. Moreover, depressed people manifesting with somatic symptoms are less likely to be detected [36]. In Asian populations, one barrier to the detection of depression is due to a culture that discourages people from discussing emotional and mental problems with physicians [37]. The PHQ-2 is widely known and generally accepted as an initial screening tool for depression in all age groups [38]. If depression is identified by the PHQ-2, completion of the PHQ-9 or a clinical review is recommended. The rate of positive depression screens measured by the PHQ-2 in this study was 35%, higher than that measured by the PHQ-9. This suggests that the first two questions of the PHQ-9 could be an excellent screening test for depressive symptoms, as well as the remainder of the questionnaire.

5 Limitations

First, we have taken a static view on depressive symptoms, which by nature are dynamic. The best timing for screening is also not known. Further studies need to investigate how the patients experience depressive symptoms in a continuous way. Secondly, the findings should be interpreted as correlations. We have not established the direction of effects with cross-sectional data. Thirdly, although we have used multiple factors to measure the difference between UH and RH, the variables may not have been captured precisely, which may have contributed to the non-significant results. Future research may incorporate other objective measures to supplement the current evaluation and improve the interpretation of findings. Fourthly, this study population may not be a good representative of the country population. These data only came from two major hospitals. The research study should be performed in the larger population and include smaller hospitals. Even with these limitations, this study has strengths to contribute to the growing effort to understand mental health among hospitalized patients.

6 Conclusions

Evaluation of depression should not be overlooked in admitted patients. The prevalence of depression was approximately 1 in 10 patients and found to be more frequent and severe in RH than UH. No difference in demo-

graphic characteristics was demonstrated in the patients with depression. All patients were at equal risk to develop depression during admission. For ease of use, a simple depression screening tool, such as the PHQ-2, has great sensitivity and could be used to detect depression among hospitalized patients. However, clinicians should not rely on the two-questions survey alone, but should proceed to a more detailed psychiatric assessment for those who score positively.

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Informed consent: Informed consent has been obtained from all individuals included in this study.

Ethical approval: The research related to human use has been complied with all the relevant national regulations, institutional policies and in accordance with the tenets of the Helsinki Declaration, and has been approved by the Ethics Committee of the participating hospitals.

Data availability: The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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