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Nurse-Led Post Stroke Depression Screening (PSD) For Patients With Acute Stroke  
Using Patient Health Questionnaire-9 (PHQ9)

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**Author Note**

To my best friend, Elizabeth. Thank you for your unconditional love!

## **Acknowledgments**

To my dear “piccola” Elizabeth. I would not be where I am today without your help. Thank you for rescuing me and letting me be your parent. Thank you for your unconditional love and for always being by my side. You have given me the best 12 years of my life. I wish you were here today to celebrate my success. “Andiamo,” my little one!

## Abstract

**Introduction:** This Evidence-Based Practice Doctor of Nursing Practice project aimed to implement a nurse-led post-stroke depression (PSD) screening using Patient Health Questionnaire-9 (PHQ-9) in a 12-bed progressive care neuro-stroke unit at a tertiary care hospital. The first goal of this project was to detect stroke patients at risk for depression who met specific inclusion criteria. The second goal was to provide depression education, initiate social work and medical referrals, and start pharmacological treatment to reduce the medical and socioeconomic burden associated with untreated PSD before discharge from the hospital.

**Background:** Globally, stroke is a prominent cause of death and disability. Depression is the second most prominent cause of disability worldwide. A stroke coupled with depression is doubly disabling. Annually, 800,000 stroke survivors develop PSD in the United States and are clinically depressed. Unrecognized and untreated PSD is associated with poor recovery, lower quality of life and functional status, and a high risk of subsequent stroke and mortality.

**Methods:** PHQ-9 was used by nursing staff directly involved in post-acute stroke care. Expectation Management and Medical Information (EMMI) multimedia patient education videos on depression accessed via MyChart were used and provided to stroke patients who met the inclusion criteria for screening with a score > 5. The primary stroke team and social worker were successively notified to assess the patient further, initiate treatment, and provide post-discharge resources.

**Results:** Of the 21 stroke patients admitted to the unit between October 2022 and December 2022, 11 met the inclusion criteria for screening, and four screened positive for depression, with scores ranging from 5–19. There was a 1000% increase in the number of patients screened, and those who screened positive were 100% likely to receive an EMMI video, social work referral, and start treatment before discharge.

**Evaluation:** Increased screening for PSD using the PHQ-9 identified at-risk patients and improved referral and treatment. Future projects can focus on including stroke patients with aphasia by integrating and using other depression tools, such as the Aphasic Depression Rating Scale, to improve long-term health outcomes, functional recovery, and quality of life in these patients unable to complete PHQ-9.

*Keywords:* stroke, depression, depression screening, patient health questionnaire, PHQ-9

## **Nurse-Led Post-Stroke Depression Screening (PSD) For Patients With Acute Stroke Using Patient Health Questionnaire-9 (PHQ-9)**

### **Clinical Problem**

Stroke is a prominent cause of mortality and a significant cause of disability globally (Mitchell, 2016). Since depression is the second most prominent cause of disability worldwide, a stroke coupled with depression is doubly disabling. Depression after a stroke is considered the most frequent and essential neuropsychiatric consequence of a stroke that negatively affects stroke patients' outcomes (Shi et al., 2017). Annually, 800,000 stroke survivors develop post-stroke depression (PSD) in the United States and are clinically depressed (Trotter, 2019). Patients with PSD experience 1.2 times more inpatient stays, 1.3 times more outpatient visits, and 1.4 times longer hospital stays than patients without PSD (McIntosh, 2017).

However, without a systematic screening of stroke patients in clinical practice, PSD could remain unrecognized and untreated, resulting in worsened recovery outcomes, lower quality of life, functional status, and increased risk of subsequent stroke and mortality.

Numerous tools used to assist in diagnosing depression have been used to screen for PSD in the acute, recovery, or chronic phases of stroke (Shankar et al., 2017). The nine-item Patient Health Questionnaire (PHQ-9), for instance, has been used and validated for screening and aiding the diagnosis of depression in numerous neurologic disorders, including stroke (Shankar et al., 2017). Therefore, the addition of PHQ-9 in the acute care setting to screen stroke patients for depression can foster the detection of PSD. This early recognition of PSD has the potential to improve health outcomes by facilitating the early initiation of adequate medical treatment and reducing the medical and socioeconomic burden associated with untreated PSD before discharge from the hospital (Herrmann et al., 2011). Nurses are the health experts most in contact with

stroke survivors and their families during an acute stroke attack and are, consequently, crucial to assessing the presence of clinical depression (Mitchell, 2017).

## **Materials and Methods**

### **Evidence-Based Practice Model**

The scholarly project was guided by the three-phase linear process, practice question, evidence, and translation (PET), of the Johns Hopkins Nursing Evidence-Based Practice Model. The PET Model is a problem-solving approach to clinical decision-making within the organizational setting of the medical facility where the project took place.

### **The PICOT Question**

(P) In hospitalized, non-aphasic adult patients with ischemic stroke, (I) does the implementation of nurse-led screening for PSD using PHQ-9, (C) compared to current practice without routine screening, (O) increases the percentage of patients screened, provided with depression education, referred to social work and started on treatment before discharge from the hospital, (T) over two months (October 2022 to December 2022).

### **Search Strategy**

A review of the literature was conducted using the following search engines for published peer-reviewed articles related to screening for PSD using PHQ-9: CHINAL, PubMed, NIH, and Cochrane Library. The Boolean operators used included “stroke AND depression,” “screening AND PHQ-9 AND poststroke depression,” and “PHQ-9 AND validity AND sensitivity.” In addition, the article search was narrowed to include systematic reviews and meta-analyses published between 2014 and 2022 that were written in English.

## Synthesis of Study Results

According to Medeiros et al. (2020), the rates of PSD in patients with stroke range from 18% to 33%. However, only 5% of stroke survivors are diagnosed and treated in clinical practice. Consequently, PSD is vastly underdiagnosed and necessitates active screening for symptoms in stroke patients (Medeiros et al., 2020).

Bartoli et al. (2018) supported the need for a regular assessment and screening of depressive symptoms in individuals with stroke. In their research, Bartoli et al. conducted a meta-analysis estimating the relative risk (RR) for mortality in individuals with PSD compared to those without. Seven studies accounted for 119,075 individuals; of that group, 17,609 participants suffered from early PSD. There were higher mortality rates in subjects with PSD than non-depressed ones (RR = 1.50; 95% CI: 1.28 to 1.75;  $p < 0.001$ ). When considering both short- and long-term mortality, patients with early PSD had a risk of death about 1.5 higher than non-depressed individuals. Due to those results, Bartoli et al. advocated for greater awareness of depression after stroke and its impact on survival among patients, families, and health professionals, which could facilitate recognition, earlier treatment, and improved outcomes.

Similarly, a systematic review and meta-analysis conducted by Cai et al. (2019) recommended regular assessment for depression and management in patients who have experienced a stroke. Cai et al. reviewed a sample of 15 prospective cohort studies with 250,294 participants, 139,276 cases, and follow-up periods ranging from 1 to 15 years. Cai et al. specifically examined PSD and the risk of stroke recurrence and mortality. Their meta-analysis concluded a hazard ratio for PSD and all-cause mortality of 1.59 (95% CI, 1.30– 1.96), which provides strong evidence that PSD is a risk factor for all-cause mortality following stroke. The

meta-analysis also suggested there is a need for regular assessment of depressive symptoms in patients with a history of stroke.

While prior studies have not suggested the ideal tool to measure depression in stroke survivors, several instruments have been validated with high sensitivity and specificity, such as the self-reported PHQ-9 (Medeiros, 2020). A meta-analysis of 24 diagnostic validity studies on screening for depression in stroke patients by Meader et al. (2014) provided data on 2907 participants and found the self-reported PHQ-9 appeared to be the optimal tool for screening measures (sensitivity: 0.86; 95% CI 0.70 to 0.94; specificity: 0.79; 95% CI 0.60 to 0.90). The scholars' data suggests PHQ-9 is the most promising option in screening for PSD. The scale is fast and most practical to administer (Meader, 2014; Medeiros, 2020).

Subsequently, Dajpratam et al. (2020) examined the validity and reliability of PH-9 among 115 stroke patients in Thailand. Dajpratam et al. concluded PHQ-9 has acceptable psychometric properties for detecting PSD with an optimal cut-off score of 6 (sensitivity of 0.87, specificity of 0.75). Burton and Tyson (2015) also examined and systematically reviewed the psychometric properties and clinical utility of mood screening tools for stroke survivors. Their analysis concluded PHQ-9 could accurately screen for depression in stroke survivors, and the scale is feasible to use in clinical practice. However, its sensitivity dropped to 78% in identifying mild symptoms.

Lastly, Trotter et al. (2019) conducted a literature review using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis to evaluate the specificity, sensitivity, and appropriateness of PHQ-9 to screen stroke patients for PSD. Findings from Trotter et al.'s review noted that PHQ-9 had a sensitivity of 86% and a specificity of 79% when screening stroke patients for PSD. Trotter et al. also recommended screening for PSD as part of overall stroke



care. Nevertheless, they concluded PHQ-9 is better suited as a screening tool to identify stroke survivors without depression rather than stroke survivors with depression.

### **Evaluation of Current Practice and Project Purpose**

Based on the literature review, the doctor of nursing practice (DNP) student conducted informal interviews with the attending neurology physicians, neurology residents, staff nurses, and social workers in a 12-bed-progressive care neuro-stroke unit at a tertiary care hospital in San Diego to evaluate the current practice. Data from these interviews showed the nursing unit did not currently have formal screening and referral processes for PSD; the resident physicians, and social workers inconsistently screened patients; and the nursing staff needed to familiarize themselves with available screening tools. As a result of those findings, this Evidence-Based Practice Doctor of Nursing Practice (EBP-DNP) project aimed to implement a nurse-led PSD screening using PHQ-9 in the 12-bed progressive care unit with several objectives.

The first objective of this project was to detect stroke patients at risk for depression who met the inclusion criteria. The second objective was to provide depression education, initiate social work and physician referral, and start pharmacological treatment (based on physician discretion) to reduce the medical and socioeconomic burden associated with untreated PSD before discharge from the hospital.

### **Project Development, Implementation, and Measurement Period**

The development and implementation of the EBP-DNP project encompassed screening, education, and pharmacological management (when deemed necessary by the resident or attending physician) of depression in adult patients hospitalized for acute stroke in the progressive care setting during October 14, 2022 and December 15, 2022.

The unit nurse educator facilitated and coordinated the initial stakeholder project presentation with attending physicians and neurology residents for consent. An endorsement letter was obtained and written by the unit assistant manager. The project was then submitted to the Human Subject Review Board (HSRB) of the University of San Diego and the Aligning and Coordinating Quality Improvement, Research, and Evaluation (ACQUIRE) Committee of the tertiary care hospital for review. The ACQUIRE Committee's approval of the EBP-DNP included a determination that the project was not regulated as research involving human subjects and did not require institutional review board (IRB) review or approval. Respectively, the USD-HSRB determined the project relied on an external (tertiary care hospital) review of study protocols as a not-human subjects research study.

Once IRB exemption was obtained, core nursing staff responsible for caring for patients with acute stroke were provided with four in-service educational sessions, each lasting 15 minutes and conducted by the DNP student. Each session described the screening purpose, screening instrument used, whom to screen, documentation of results, patient education, and whom to notify of the results.

A convenience sample of patients admitted to the 12-bed-progressive care stroke unit served as a sample for the EBP-DNP project. Inclusion criteria included age >18 years, having sufficient proficiency/fluency to understand spoken and written English, no severe language deficit (aphasia) or cognitive impairment (must be alert and oriented to person, place, time, and situation), and no history of depression at the time of admission and currently treated for depression.

All eligible patients were screened by their assigned nurse within 24-48 of admission using the nine-item self-reported scale, PHQ-9. The severity of depression was determined based

on the following five score range categories: 0–4 = no depression, 5–9 = mild depression, 10–14 = moderate depression, 15–19 = moderate to severe depression, and 20–27 = severe depression. A cutoff score of  $> 5$  was considered a positive screen and necessitated provider notification. The primary stroke team and social worker were successively notified of every positive screen to assess the patient further, initiate treatment, and provide post-discharge resources.

A series of five free EMMI multimedia patient education videos on depression assigned by the nursing staff to the patient via EPIC and accessed via MyChart were used and provided to those who met the inclusion criteria for screening and scored  $> 5$ . The duration of each video varied from one minute to two and a half minutes, and communicated important information about depression. The patient could review and rewatch the assigned videos as often as desired within 1 month.

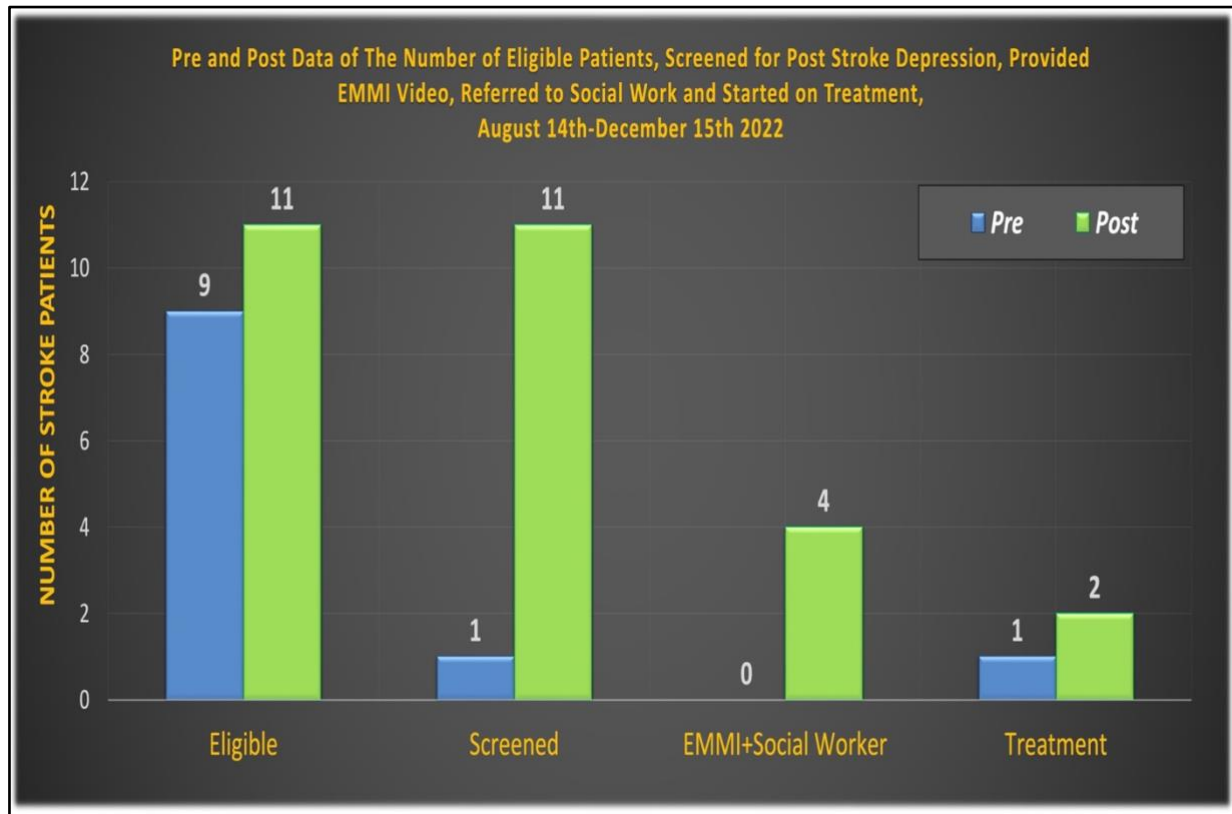
The project benchmark involved a retrospective pre-and post-intervention charts review to measure the number of patients with stroke screened for depression, provided with education, referred to social work and the primary team for further evaluation and treatment, and to evaluate the usefulness of the nurse-led PSD intervention.

### **Evaluation of Results and Discussion**

Pre-project data obtained from retrospective charts review, August 14–October 14, 2022 showed 29 patients admitted to the unit with acute stroke. Nine patients (31%) met the inclusion criteria and were eligible for PHQ-9 screening. Nevertheless, only one (11%) was screened, found positive for depression (a score  $>5$ ), and started treatment. Furthermore, none of the patients received an EMMI video and social work support intervention (see Figure 1).

**Figure 1**

*Pre and Post Data of The Number of Eligible Patients, Screened for PSD, provided EMMI, Referred to Social Work, and Started on Treatment*



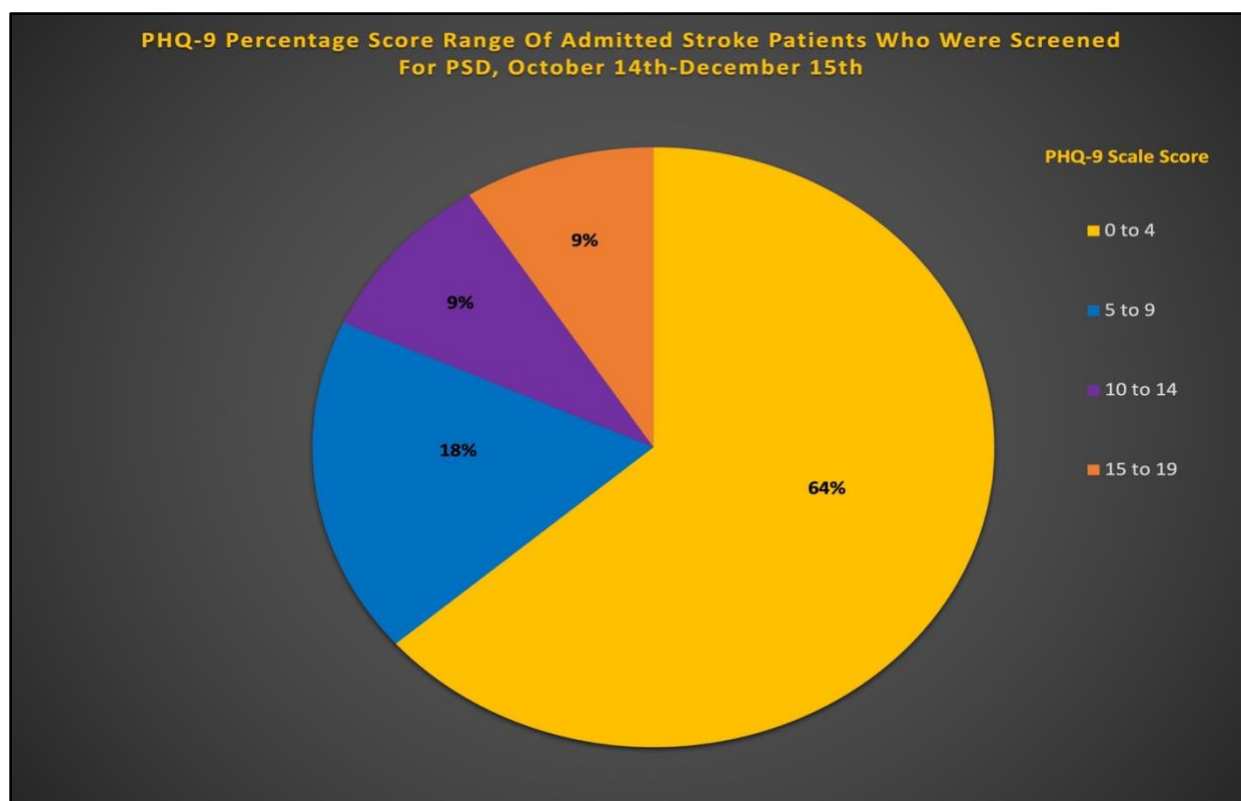
During the project implementation period, October 14–December 15, 2022, 21 patients with acute stroke were admitted to the unit. Eleven patients (52%) met the inclusion criteria and were screened for depression (see Figure 1). Of the patients screened, seven (64%) had a screening score indicating no depression (PHQ-9 score 0–4), two (18%) had mild depression symptoms (PHQ-9 score 5–9), one (9%) had moderate depression (PHQ-9 score 10–14), and another one (9%) had moderate to severe depression (PHQ-9 score 15–19) (see Figure 2).

All four patients (36%) who screened positive for depression were provided with an EMMI video and received social work support. However, only two patients (18%) were started

on antidepressant treatment before discharge from the hospital. The remaining two patients (18%) who screened positive had mild depressive symptoms and, per the physician's discretion, required watchful waiting and repeat PHQ-9 at follow-up (see Figure 1).

## Figure 2

*PHQ-9 Percentage Score Range Of Admitted Stroke Patients Who Were Screened For PSD, October 14th-December 15th*



The main objectives of this EBP-DNP project were to screen and detect all eligible stroke patients at risk for depression, provide education, initiate social work and physician referral, and start pharmacological treatment before discharge from the hospital. The results of this EBP-DNP project validated that PHQ-9 could be successfully administered by nurses at the bedside in the acute care setting to screen stroke patients for depression. Increased screening for PSD using the PHQ-9 identified at-risk patients and improved referral and treatment. The prevalence of PSD in the nursing unit among those eligible for screening for depression was 36%, slightly higher than

the expected prevalence of 33% reported in the literature (Medeiros et al., 2020). This minor discrepancy might be attributed to the smaller sample size, contributing to the percentage increase.

Before the project was implemented, the nursing unit did not have a formal screening and referral process to screen eligible patients. Stroke patients were either screened by the unit social worker or the neurology resident physician if they thought the patient might be suffering from depression, or the nursing staff observed and reported depressive symptoms in the patient. Nursing personnel, on the other hand, while skillful in recognizing depressive symptoms, were unfamiliar with screening tools they could efficiently use at the patient's bedside. This created a missed opportunity to identify those who were depressed and required further evaluation.

One patient was screened (11%) for depression of the eligible nine in the preceding two months compared to all 11 eligible patients (100%) after the project started. This demonstrated a 1000% increase in the number of patients screened, and those who screened positive were 100% likely to receive EMMI videos and social work referrals and start treatment before discharge.

### **Financial Implication and Project Constraints**

#### **Cost-Benefit Analysis**

There was no direct cost associated with the EBP-DNP project intervention. Nevertheless, if the project were to go live and be adopted by the hospital, there would be a financial cost associated with mandatory training of nursing staff on depression screening, taking into consideration the nursing salary, as well as the amount of time it requires for each nurse to complete the training. For instance, if the average hourly pay of a nurse on the unit at the tertiary health center was \$60.15, and the training took approximately an hour to complete, it would cost the hospital \$842.1 to train the 14 nurses working on the unit.

Of equal importance is the prospective benefit of implementing a hospital-wide screening for depression in patients with acute stroke, which would result in financial compensation for the hospital, factoring insurance reimbursement for screening and reducing the risk of hospital readmission due to previously unrecognized and untreated depression. For example, the average insurance reimbursement for depression screening is \$15 (Savoy & O’Gurek, 2016). Therefore, for the 11 patients screened, the hospital would profit \$165. Furthermore, by implementing a systemic screening, initiating early treatment for depression, and reducing the risk of hospital readmission due to previously untreated and unrecognized depression, the hospital could save on average \$6,713, which is the total hospital charge per stay (six days) for major depressive disorder (Citrome et al., 2019). By applying the cost-benefit and return-on-investment formula, respectively, for every dollar spent, there would be an \$ 8.16 cost savings per patient. Thus, in a program size of 11 patients, there would be a 78 % return on investment.

Aside from the financial benefits, there are also nonfinancial and intangible profits, which indirectly enhance, influence, and benefit the hospital, such as improved early detection and treatment of PSD, improved long-term health outcomes and functional recovery, decreased mortality, improved patient satisfaction, and improved overall stroke patients’ health.

### **Limitations of the Study**

This project was confronted with several limitations. A major constraint was the small sample size of the screened patients, resulting in project data possibly being extrapolated. Another limitation encountered was the exclusion of stroke patients with aphasia and those without sufficient English language comprehension. The PHQ-9 is a self-reported depression scale and requires intact language and communication skills, which limits its applicability with aphasic patients. Moreover, while PHQ-9 has been translated and made available in over 30

languages, EMMI multimedia patient education videos are accessible in English only. This restricts the pragmatism of the videos and their usefulness to only people who understand English. Finally, EMMI videos are available to patients for a limited time and expire after a month, narrowing their practicality.

### **Conclusion and Recommendations**

This EBP-DNP project demonstrated that increased screening for PSD using the PHQ-9 identified at-risk patients and improved referral and treatment. Incorporation of routine assessment for PSD using a reliable screening tool into the care plan should be recommended for every stroke patient. Screening for early symptoms of PSD could assist clinicians in the prompt identification of PSD, which has the potential to improve the overall health of the stroke survivor. Future projects should focus on including stroke patients with aphasia by integrating and using other depression tools, such as the Aphasic Depression Rating Scale, to improve long-term health outcomes, functional recovery, and quality of life in these patients unable to complete PHQ-9. Nurses and physicians should receive continuous training and education to sustain the screening process and maintain their knowledge of PSD up to date.



## References

- Bartoli, F., di Brita, C., Crocamo, C., Clerici, M., & Carrà, G. (2018). Early post-stroke depression and mortality: Meta-analysis and meta-regression. *Frontiers in Psychiatry, 9*. <https://doi.org/10.3389/fpsy.2018.00530>
- Burton, L.-J., & Tyson, S. (2015). Screening for mood disorders after stroke: A systematic review of psychometric properties and clinical utility. *Psychological Medicine, 45*(1), 29–49. <https://pubmed.ncbi.nlm.nih.gov/25066635/>
- Cai, W., Mueller, C., Li, Y. J., Shen, W. D., & Stewart, R. (2019). Post stroke depression and risk of stroke recurrence and mortality: A systematic review and meta-analysis. *Ageing Research Reviews, 50*, 102–109. <https://doi.org/10.1016/j.arr.2019.01.013>
- Dajpratham, P., Pukrittayakamee, P., Atsariyasing, W., Wannarit, K., Boonhong, J., & Pongpirul, K. (2020). The validity and reliability of the PHQ-9 in screening for post-stroke depression. *BMC Psychiatry, 20*(1). <https://doi.org/10.1186/s12888-020-02699-6>
- Herrmann, N., Seitz, D., Fischer, H., Saposnik, G., Calzavara, A., Anderson, G., & Rochon, P. (2011). Detection and treatment of post stroke depression: Results from the registry of the Canadian stroke network. *International Journal of Geriatric Psychiatry, 26*(11), 1195–1200. <https://doi.org/10.1002/gps.2663>
- Mcintosh, C. (2017). A depression screening protocol for patients with acute stroke: A quality improvement project. *Journal of Neuroscience Nursing. https://doi.org/10.1097/jnn.0000000000000231*
- Meador, N., Moe-Byrne, T., Llewellyn, A., & Mitchell, A. J. (2014). Screening for poststroke major depression: A meta-analysis of diagnostic validity studies. *Journal of Neurology,*

- Neurosurgery, and Psychiatry*, 85(2), 198–206. <https://doi.org/10.1136/jnnp-2012-304194>
- Medeiros, G. C., Roy, D., Kontos, N., & Beach, S. R. (2020). Post-stroke depression: A 2020 updated review. *General Hospital Psychiatry*, 66, 70–80. <https://doi.org/10.1016/j.genhosppsy.2020.06.011>
- Mitchell P. H. (2016). Nursing assessment of depression in stroke survivors. *Stroke*, 47(1), e1–e3. <https://doi.org/10.1161/STROKEAHA.115.008362>
- Shankar, L., Smith, N. M., Uchino, K., Thompson, N. R., Pozuelo, L., & Katzan, I. L. (2017). Evaluation of the patient health Questionnaire-2 as a screening tool for depression during the acute stroke admission. *Journal of Stroke and Cerebrovascular Diseases*, 26(11), 2519–2526. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2017.05.044>
- Shi, Y., Yang, D., Zeng, Y., & Wu, W. (2017). Risk factors for post-stroke depression: A meta-analysis. *Frontiers in Aging Neuroscience*, 9. <https://doi.org/10.3389/fnagi.2017.00218>
- Trotter, T. L., Denny, D. L., & Evanson, T. A. (2019). Reliability and validity of the patient health Questionnaire-9 as a screening tool for poststroke depression. *Journal of Neuroscience Nursing*, 51(3), 147–152. <https://doi.org/10.1097/jnn.0000000000000442>