Post stroke Depression: Screening and Assessment

Canadian Best Practice Recommendations for Stroke Care 2012-2013 Update

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Background

Depression is a well-documented sequela of stroke. Based on pooled data from published prevalence studies, Robinson\(^1\) reported a mean prevalence of depression among inpatients in acute or rehabilitation hospital settings of 19.3\% and 18.5\% for major and minor depression, respectively. Among participants in outpatient studies, mean reported prevalence was 23.3\% for major depression and 15\% for minor depression. Overall, mean prevalence was 35.5\% in acute care or rehabilitation hospital settings and 31.8\% in community-based studies.\(^1\) Similarly, in a systematic review of 51 prospective, observational studies of post-stroke depression conducted in hospital-, rehabilitation-, and population-based settings, Hackett et al\(^2\) estimated that 33\% of individuals who experience stroke exhibit depressive symptoms at some time following the event (i.e., at acute, sub-acute or long-term follow-up). The authors stated that this is likely to be an underestimation of the frequency with which post-stroke depression (PSD) occurs given possible under-reporting of unusual mood, difficulties in the assessment of depression in neurologically-impaired individuals, and variability in the methods used to assess and define cases of depression within the literature.\(^2\)

Of course, the time from stroke onset to assessment of depression may also have an effect on estimates of prevalence. Individuals assessed during the sub-acute phase post stroke may be experiencing a period of transition during which they are attempting to adjust to the consequences associated with a traumatic event.\(^3\) At this point, symptoms of depression may simply be a reflection of the difficulties associated with this transition and, in fact, the highest rates of incident depression have been reported within the first month of the stroke event.\(^4\) Paolucci et al\(^10\) reported that, of 1064 patients included in the Italian DESTRO study, 36\% developed depression. Eighty percent of these became depressed within the first 3 months of the stroke event. In that study, minor depression was the most common form of depression documented, occurring in 80.7\% of cases, whereas major depression was diagnosed in only 2.9\%.

Incident rates of post-stroke depression do not remain stable over time. In a recent study of 190 individuals with first-ever stroke, Bour et al\(^9\) reported a decrease in incident cases of depression over the course of the first year following the stroke event. Cumulative incidence of PSD was 18.8\% at 1 month and 23.1\%, 26.7\%, 31\%, and 36.2\% at 3, 6, 9 and 12 months, respectively. Although incident rates decline over time and a general trend toward improvement in depressive symptomatology is evident in the first year post stroke,\(^11\) PSD may prove to be persistent for a significant proportion of individuals identified as depressed.\(^11-14\) Ostir et al\(^11\) examined patterns of change in depressive symptomatology over the course of the first year following first-ever stroke in 544 individuals. At the time of discharge from inpatient rehabilitation, 27.6\% of patients were identified as depressed. Over the following 12 months, the authors identified a general trend toward recovery in terms of depressive symptomatology. However, approximately one-fifth of individuals identified as depressed at baseline remained depressed at 1 year; for approximately one-third of this group, depression remained largely unresolved and they continued to experience episodes of depression during the follow-up period.\(^11\)
Ayerbe et al\textsuperscript{12} followed individuals (n=3689) for 5 years as part of a population-based study (South London Stroke Register). Over this period, the prevalence of PSD was reported to be 33\%, 28\%, 32\% and 31\% at 3 months, 1 year, 3 years and 5 years, respectively. While some identified cases of depression appeared to resolve over time, 15 to 20\% of individuals identified as depressed at each follow-up were new cases. In addition, more than one-half of individuals identified as depressed at any one assessment point remained depressed on subsequent follow-up.\textsuperscript{12} Similarly, Farner et al\textsuperscript{13} reported persistent depression in 55\% of individual study participants identified as depressed during inpatient rehabilitation post stroke. Significant predictors of persistent depression included lower levels of pre-stroke social activity, greater severity of stroke and lower levels of function at baseline.

Depression in individuals with stroke is associated with enormous personal, social and financial costs that include poorer functional recovery\textsuperscript{15-18} and increased risk for dependence\textsuperscript{19-26}, poorer cognitive function\textsuperscript{4,9,27-29 30 58, 59}, and reductions in social participation\textsuperscript{4,31-33}. Within each area (i.e., physical function, cognition and social participation), reciprocal relationships have been identified; poorer function, poorer cognition and greater social isolation also are significant risk factors for depression creating the potential, particularly in untreated cases of depression, for a downward spiral in outcomes. The presence of PSD also is associated with increased risk for mortality\textsuperscript{34 35,36}.

Risk for Depression

Whyte et al.\textsuperscript{37} reported that the risk for depression among individuals aged 65 or over, living in the community and who have experienced a stroke 2 years previously, is 6 times greater than for their stroke-free counterparts. Although post-stroke depression (PSD) is a common consequence of stroke, risk factors for the development of PSD have not been clearly delineated. In a systematic review, Hackett and Anderson\textsuperscript{38} included data from a total of 21 studies. Of the many different variables assessed, physical disability, stroke severity and cognitive impairment were most consistently associated with depression. The authors noted that major methodological limitations within the available literature make it difficult to form a definitive conclusion. Methodological limitations cited include selection biases, poor methodology and reporting, problems in choosing variables to include as potential predictors and inadequate sample size from which to derive appropriate predictive models for depression.\textsuperscript{38} As part of the DESTRO study, a multicentre observational study of depression in stroke, Paolucci et al.\textsuperscript{39} identified female sex (OR=1.49), previous stroke (OR = 1.55), previous depression (OR=3.97) and severe disability (Modified Rankin Scale score >3, OR = 2.70) as factors likely to facilitate the development of depression following stroke. The risk for post-stroke depression was found to increase exponentially in individuals with more than one risk factor. This ranged from 25\% in males with one previous stroke episode, mild disability but no previous psychiatric episodes to 89.1\% in women with previous stroke, previous depression and moderate to moderate/severe disability.\textsuperscript{39}

In a report from the Auckland Regional Community Stroke Study\textsuperscript{40}, the authors described an attempt to create a simple, predictive tool for the identification of individuals most at risk for abnormal mood. Unfortunately, the resulting model, which included female gender, age, more than two co-morbid conditions, prior treatment for depression and requiring “much help” (based on baseline Barthel Index score) could correctly identify mood status, assessed on the General Health Questionnaire at 6 months, in only 54\% of patients. Of the factors included in the model,
only two were significant predictors of mood; prior treatment for depression (OR = 2.4, 95% CI 1.34 – 3.43) and requiring “much help” with activities of daily living (OR = 2.35, 95% CI 1.33 – 4.14). The ability of the model to predict risk for depression might be increased by the inclusion of other factors such as fatigue and performance of instrumental activities of daily living. However, Van de Port et al. demonstrated that use of these two predictors (prior treatment for depression and requiring much help with ADLs) in a multivariate model could correctly classify depression in 76% of patients 3 years post stroke.
## Evidence Summary

### Use of Formal Screening Tools to Identify Possible Cases of PSD

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<td>Yamada et al. 2012&lt;sup&gt;42&lt;/sup&gt; (Japan)</td>
<td>Prospective Observational Study</td>
<td>172 consecutive non-psychiatric inpatients aged ≥65 years referred to the consultation-liaison psychiatry service of a single general hospital from January 2009 through February 2010.</td>
<td>Referring non-psychiatric doctor diagnosis and/or reason for referral was recorded along with primary reason for hospital admission, medications and demographies. The psychiatric diagnosis was recorded by a C-L psychiatrist following consultation with the service. An investigator categorized the referring physician and psychiatric diagnoses according to ICD-10 categories of diagnoses as follows: F0 (delirium, dementia or other organic brain syndrome0, F1 (psychoactive substance-use disorder), F2/F3 (psychotic or mood disorder) and F4/F5 (Neurotic or sleep disorder).</td>
<td>Agreement between referring physician diagnoses and psychiatric diagnoses evaluated by kappa statistics.</td>
<td>23 patients (13.4%) were referred to the psychiatry liaison service with a diagnosis or reason for referral of depression. There were 6 diagnosable cases of depression identified by the psychiatric service. The kappa statistic for the F2/F3 diagnostic category (which was mostly depression) was 0.28, overall. In this category, there were 4 cases of possible psychotic disorder identified by referring physicians – these were diagnosed as cases of psychotic disorder in 3 of the 4 cases.</td>
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| Mitchell and Kakkadasam, 2011<sup>43</sup> (UK) | Meta-analysis | 22 studies reporting the unassisted clinical detection of depression by nurses or nursing assistants | Literature review, critical appraisal of identified studies and meta-analysis of diagnostic accuracy studies. Heterogeneity was assessed using the I² statistic. In cases of heterogeneity, random effects and bivariate analysis was used. Bayesian curve analyses were also conducted. | Pooled sensitivity, specificity, PPV and NPV. Also area under the Bayesian positive curve and 1-AUC to determine rule in and rule-out effectiveness, respectively. | Studies were examined by setting; primary care or community (n=4), hospital (n=7), and nursing homes (n=11). 9 studies used an interview-based assessment to establish depression. In community settings, sensitivity of nurses’ observations = 26.3%, specificity = 94.8%. Nurses in hospitals identified 43.1% of cases correctly and 79.6% of noncases while the sensitivity & specificity of observations made by nurses and nursing assistants in nursing homes was 47.8% and 79.4%, respectively. However, curve analysis correcting for variations in prevalence demonstrated AUC for community }
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<td>Mitchell et al., 2011 (UK)</td>
<td>Meta-analysis</td>
<td>23 studies that examined the ability of GPs to diagnose defined distress and 9 studies that examined GPs ability to correctly identify mild depression</td>
<td>Literature review, critical appraisal of identified studies and meta-analysis of diagnostic accuracy studies. Heterogeneity was assessed using the I² statistic. In cases of heterogeneity, random effects and bivariate analysis was used. Bayesian curve analyses were also conducted.</td>
<td>Pooled sensitivity, specificity, PPV and NPV. Also area under the Bayesian positive curve and 1-AUC to determine rule in and rule-out effectiveness, respectively.</td>
<td>Only 5 of 9 studies examining mild depression provided information on both sensitivity and specificity of clinician observation vs. a robust outcome standard. Pooled analysis revealed that GPs correctly identified mild depression 33.8% of the time and correctly classified non-depressed individuals as non-depressed 80.6% of the time. The authors also provided a pooled estimate of clinician observation sensitivity for the identification of moderate to severe depression of 56.5%. Bayesian curve comparison demonstrated that their ability to rule-in mild depression was worse (AUC=0.59) than their ability to rule-in non-mild forms of depression (AUC=0.67).</td>
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<td>Su et al. 2011 (Taiwan)</td>
<td>Retrospective chart review</td>
<td>Collected data from 5 years of consecutive psychiatric consultations performed in a regional 650-bed general hospital. Review included reason and source of referral, and the final diagnosis. All psychiatric diagnoses were based on DSM-IV.</td>
<td>Five common psychiatric diagnoses were chosen for analysis: depressive disorder (MDD and dysthymia), substance use disorders, anxiety disorders, delirium and psychotic disorders (schizophrenia, brief psychotic disorder and schizophreniform disorders). Primary care physician initial impression was recorded from the “reason for referral”. Accurate recognition was based on matching this initial impression with the psychiatric diagnosis. In addition, mentioning core criteria for diagnosis in the referral was considered correct recognition.</td>
<td>Annual rate of accuracy and overall 5-year rate of accuracy for each diagnosis. Trends in accuracy rate over 5 years was examined as were patient factors associated with accurate recognition.</td>
<td>Overall, 5-year accuracy rate was 41.5%; for depressive disorders, the rate was 31.4%. Over the 5-year period, there was no significant change in rate of accurate diagnosis (p=0.62 for the chi-squared test of trend). For depressive disorders, the rate of accurate diagnosis was associated with younger age (OR=0.61, 95% CI 0.40, 0.92) and the presence of multiple physical illnesses (OR=1.77, 95% CI 0.93, 0.99).</td>
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<td>Mitchell et al. 2010 (UK)</td>
<td>Meta-analysis</td>
<td>31 studies examining the sensitivity and specificity of primary care physician recognition of depression in older (≥60 years) and younger (&lt; 60) individuals</td>
<td>Literature review, critical appraisal of identified studies and meta-analysis of diagnostic accuracy studies. Heterogeneity was assessed using the I² statistic. In cases of heterogeneity, random effects and bivariate analysis was used. Bayesian curve analyses were also conducted.</td>
<td>Pooled sensitivity, specificity, PPV and NPV. Also area under the Bayesian positive curve and 1-AUC to determine rule in and rule-out effectiveness, respectively.</td>
<td>12 studies enrolled older patients, 12 younger and the remainder were mixed. 13 studies used structured or semi-structured interview–based assessments as the criterion method to establish depression. The remainder used administration of “severity scales”. In the 12 studies of late-life depression, pooled random effects sensitivity of GP clinical diagnosis was 47.3%. However, pooled (random effects) specificity was 78.6%. Based on the Bayesian plot created from meta-analytic data from the older, younger and mixed groups, it was determined that the AUC (ruling in or case-finding) was 0.63</td>
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<td>Zimmerman and Galione, 2010&lt;sup&gt;47&lt;/sup&gt;</td>
<td>Survey</td>
<td>291 psychiatrists and 40 non-psychiatrist physicians who were attending a half or full-day medical education conference in 2006 or 2007 in Wisconsin, New York, California or Massachusetts at which the first author also lectured.</td>
<td>Questionnaires were distributed and completed prior to a lecture on the treatment of depression. The first portion of the questionnaire collected demographic information including sex, age, and professional background while the second part contained questions regarding the assessment and treatment of depression. Only one question asked specifically about the use of the DSM-IV criteria in the diagnosis of major depressive disorder (MDD).</td>
<td>The frequency with which psychiatrist and non-psychiatrist physicians use the DSM diagnostic criteria in their assessment and diagnosis of depression.</td>
<td>45% (n=18) of the non-psychiatrist doctors reported using the criteria in the DSM to diagnose depression less than 25% of the time and 27/40 reporting the criteria less than 50% of the time. Fewer than 20% (n=7) of the non-psychiatrist physicians reported using the DSM-IV criteria more than 75% of the time in making a diagnosis of major depression vs. 60.5% (n=176) psychiatrists who used the criteria more than 75% of the time. Psychiatrists who reported less frequent use of the DSM criteria tended to be older and in practice for the longest amount of time.</td>
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<td>Mitchell et al. 2009&lt;sup&gt;48&lt;/sup&gt; (UK)</td>
<td>Meta-analysis</td>
<td>41 studies assessing the accuracy of unassisted clinical diagnosis of depression by general practitioners. All studies assessed depression using a “robust outcome standard” based on a structured or semi-structured clinical interview.</td>
<td>Literature review, critical appraisal of identified studies and meta-analysis of diagnostic accuracy studies. Heterogeneity was assessed using the I² statistic. In cases of heterogeneity, random effects and bivariate analysis was used. Bayesian curve analyses were also conducted.</td>
<td>Pooled sensitivity, specificity, PPV and NPV. Also area under the Bayesian positive curve and 1-AUC to determine rule in and rule-out effectiveness, respectively.</td>
<td>Rate of correct identification across 41 studies was 45.4% (uncorrected). Using random effects analysis, the pooled sensitivity was 47.3% (41.7% - 53%). Sensitivity of GP diagnosis appeared somewhat higher in older people (&gt;65 years of age) than in younger people, although this difference was not statistically significant (49.6% vs. 45.1%, p=0.08). There were no significant differences in sensitivity found on the basis of ICD-defined vs. DSM-defined depression, country of study origin, sample size, year of publication, prevalence, practice size, or mean patient age. There were 19 studies reporting data for both sensitivity and specificity – based on these studies, it was determined that GPs correctly classified 82.4% of nondepressed individuals as nondepressed. The adjusted (random effects) pooled specificity = 81.3%. Corrected PPV=42% and NPV=85.8%, positive LR=2.37 and negative LR=0.64.</td>
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<td>Cepoiu et al. 2007&lt;sup&gt;49&lt;/sup&gt; (Canada)</td>
<td>Meta-analysis</td>
<td>36 studies that included both a clinical diagnosis made by a non-psychiatric physician and a gold standard diagnosis made by a psychiatrist or other individual based on a structured interview of patients.</td>
<td>Literature review, critical appraisal of identified studies and pooled analysis. Where possible, authors calculated missing sensitivities, specificities and odds ratio values based on data reported in identified papers as published. Summary statistics were calculated using random effects models.</td>
<td>Summary receiving operating characteristic (ROC) and summary sensitivity and specificity as well as OR of recognition of depression.</td>
<td>23 papers reported sensitivity only; specificity and diagnostic OR could be calculated in 10 of these. In 8 papers, both sensitivity and specificity were reported. In 5 additional papers, sensitivity, specificity and OR could be calculated from data provided. The majority of the studies (75%) were conducted in primary care settings; the remainder took place in the ER and in various in and out-patient settings. Pooled sensitivity = 36.4% and specificity = 83.7% with a diagnostic OR = 4.0 (95% CI 3.2, 4.9). Recalulation of</td>
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<td>Lowe et al. 2004&lt;sup&gt;50&lt;/sup&gt; (Germany)</td>
<td>Validation Study</td>
<td>501 patients at outpatient clinics associated with a single hospital and 12 family practices. Mean age = 41.7 (s.d.=13.8 yrs), 67.1% were female and 72.4% lived with a spouse/partner. 10% of participants reported cardiovascular disease or diseases of the circulatory system. Overall, 13.2% of patients were diagnosed with MDD and 25.1% had &quot;any depressive disorder&quot;.</td>
<td>Participants completed the PHQ-9, Hospital Anxiety and Depression Questionnaire (HADS), and the WHO well-being index (WBI-5) during the waiting times associated with regular clinic visits. They were asked to complete a structured clinical interview on the same day or return within one week. Non-psychiatric physicians provided their psychiatric diagnoses after clinical consultation on the same day that the participants completed the self-report questionnaires. The SCID for the DSM-IV was used as the criterion standard against which the performance of the questionnaires could be evaluated. In this study, it was administered by one of 4 trained raters who were assigned randomly and were blinded to the results of the questionnaires. Each rater also reviewed interviews performed by another rater (k for MDD = 0.88)</td>
<td>Sensitivity, specificity and overall accuracy were evaluated for all three questionnaires and for physician diagnosis. ROC analysis was used to compare AUC values for all instruments in terms of diagnostic accuracy. Cutpoints were calculated and presented.</td>
<td>All scales demonstrated high internal consistency and a high degree of inter-correlation. Major Depressive Disorder: Using a cut-point of ≥11, the PHQ-9 demonstrated a sensitivity of 98% and specificity of 80% for the detection of major depressive disorder. The HADS, at a cut-point of ≥9 points demonstrated a sensitivity of 85 and specificity of 76 while the WBI-5 demonstrated a sensitivity of 94 and specificity of 78 at a cut-off of 5 points. The physician diagnosis of major depressive disorder yielded a sensitivity of 40% and a specificity of 87% when compared to the criterion assessment. Any Depressive Disorder: When compared to the criterion standard, the PHQ demonstrated sensitivity and specificity of 87 and 76, respectively (cut off ≥9). Using a cut off of ≥8, the HADS sensitivity and specificity was 81 and 75, respectively. The WBI-5 showed similar results (sens = 82, spec = 76, cut-off ≥9). AUC (SE) = 0.90 (0.02), 0.86 (0.02), 0.88 (0.02) for the PHQ-9, HADS and WBI-5 respectively. As for major depressive disorder, the physician diagnosis was much less sensitive than any of the screening questionnaires used. Sensitivity = 41% and specificity = 90% for any depressive disorder when compared to the gold standard interview.</td>
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<td>Ruchinksas 2002&lt;sup&gt;51&lt;/sup&gt; (USA)</td>
<td>Prospective observational study</td>
<td>20 physical therapists and 8 occupational therapists rated 102 consecutive (after 12 exclusions) admissions to inpatient geriatric rehabilitation. Patients</td>
<td>Each participant completed the MMSE and the Geriatric Depression Scale under the supervision of a doctoral level psychology intern within 72 hours of admission. At the time of discharge, therapists ranked the presence of cognitive impairment using the Geriatric Depression Scale. Therapists rated the presence of cognitive dysfunction as present or absent.</td>
<td>Agreement GDS, MMSE and therapists’ ratings.</td>
<td>Correlations between the therapist rankings of depression and the results obtained from administration of the GDS were non-significant (for PT r=-0.04; OT r=-0.13). Therapists were much better at identifying individuals with no depression – agreement between GDS and both PT and OT ratings of no depression was reported to be 66%, whereas agreement for possible and probable depression was</td>
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Summary

It is clear that non-psychiatric physicians, nurses and therapists demonstrate poor sensitivity relative to gold standard psychiatric interviews and standardised formal rating scales with regard to identification of depression in individuals who have experienced stroke – although, non-depressed individuals tend to be recognized as non-depressed with far greater accuracy. In the recent CANMAT task force recommendations for the management of patients with mood disorders and co-morbid medical conditions (including stroke), it is noted as part of the guiding principles for assessment and diagnosis, that the use of formal screening instruments is a key component in the diagnostic process in order to promote early detection of depression. While it is acknowledged that screening tools are not diagnostic instruments, they do have clinical utility when used in specialized medical settings or clinics. The CANMAT authors note that the Patient Health Questionnaire-9 (PHQ-9) may be used in primary care settings by primary care physicians to aide in the tentative diagnosis of depression as it includes assessment of both symptoms and functional impairment. However, it should be noted that while the PHQ-9 has been well-studied in a variety of populations, it lacks rigorous validation in populations of individuals with stroke. A single study evaluated the sensitivity and specificity of the PHQ-9 for both major depression and any depression against a structured clinical interview in a subgroup of outpatients with stroke who endorsed either 2 or more symptoms on the PHQ-9 or either of the PHQ-2 items at study baseline. The authors reported sensitivity of 91% and specificity of 89% for major depression as well as sensitivity of 78% and specificity of 96% specificity for any depression associated with a cut-off score ≥10. These numbers may, however, have been influenced by the pre-screening (using items from the PHQ-9) and formal assessment of selected individuals only. deMan-vanGinkel et al. also reported the results of a validation study that evaluated the PHQ-9 against the results of a composite international diagnostic interview for the DSM-IV conducted with 164 individuals with stroke (outpatients approximately 6-8 weeks post stroke). Similar to Williams et al., the authors reported that the accuracy of the PHQ-9 was best using a cutoff of ≥10 with a sensitivity of 80% and specificity of 78%. Using the PHQ-9 in patients pre-screened with the PHQ-2 increased the accuracy of identification (sensitivity = 87%).
In 2006, the Canadian Stroke Strategy and Heart and Stroke Foundation of Ontario supported a best practices in stroke rehabilitation consensus process to identify a standardised basket of outcome assessment tools that could be used to across the stroke continuum of care. Included in the resulting basket of measures were the following screening tools for the identification of possible depression in individuals with stroke: The Hospital Anxiety and Depression Scale (HADS), the Geriatric Depression Scale (GDS) and the Stroke Aphasic Depression Questionnaire (SADQ-10). Detailed reviews of the GDS, HADS and SAD-Q are available from www.ebrsr.com and/or in Salter et al.54

In a recent study, examining the implementation of best practice recommendations for depression post stroke in the province of Ontario, a survey of 304 staff working in inpatient rehabilitation facilities that provide stroke rehabilitation services asked which, if any, tool was used to screen for depression. When formal screening did take place, the HADS and GDS tools were used most frequently, accounting for 77.4% of responses.55
References


