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Adherence to Canadian Best Practice Recommendations for Stroke Care: The Case of Post-Stroke Depression

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A thesis submitted in partial fulfillment of the requirements for the degree in Master of Science

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Abstract

Context: Canadian best practice recommendations for identification and treatment of post-stroke depression (PSD) have been established, but whether they have been adopted is not known.

Objectives: To compare current with recommended best practice.

Methods: A retrospective chart review from 5 inpatient rehabilitation programs in Southwestern Ontario was completed and a short online survey addressing current practices, opinions and attitudes regarding PSD conducted.

Results: Screening for PSD was documented in 41 of 294 patient records. Of the 41 patients screened, 16 were referred for assessment and 6 diagnosed with PSD. However, 113 patients (38.9%) received pharmacotherapy. Most staff members reported having access to the recommendations (75%) and were somewhat aware of recommendations for PSD (70%).

Conclusion: A substantial gap exists between current practice and best practice for the identification and treatment of PSD. Respondents expressed positive attitudes toward best practice and identified few barriers suggesting clinicians may be willing to implement the recommendations.

Keywords

Stroke, depression, best practice, guidelines, knowledge translation

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Dedication

Most of all, I would like to thank my longsuffering family...my husband, Steve, and especially my three wonderful sons. It is to them that I dedicate this project and this experience. It really is never too late.

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Chapter 1

1. Introduction

Cerebrovascular disease, in general, and stroke, in particular, is a major health concern worldwide. According to the Global Burden of Disease Study, stroke is the second most common cause of death.[1] Although stroke is perceived primarily as a disease of the elderly, it is reported to be a significant cause of death even among people aged 15 to 44 years of age.[1] It is estimated that for every 5 individuals who experience stroke, one is under the age of 65 years and approximately 5 to 8% of all persons with stroke are under the age of 45 years.[2-4] The average age of individuals who experience a stroke is 70 years in men and 75 in women, and in excess of one-half of all strokes occur in adults over the age of 75.[5] Based on a 51-year follow-up of persons enrolled in the Framingham Study, lifetime risk for stroke in individuals aged 55 to 75 was estimated to be approximately 1 in 6 overall and 1 in 5 for women, based on a longer female life expectancy.[6]

While stroke has a substantial impact on worldwide mortality, the majority of stroke events are not fatal. In a review of population-based epidemiological studies that included more than 3.2 million participants in 13 countries, Feigin et al[5] reported an estimated case-fatality of 22.9% within 1 month of stroke onset based on data provided in 13 of 15 identified studies. Although Feigin and associates reported little geographical variation in reported case-fatality rates,[5] North American-based estimates of stroke-related fatality are lower. In a study of 11 Canadian stroke centres in which 3,756 individuals with stroke were enrolled over a 2-year period (2003 to 2005), overall case fatality was estimated to be 6.9%, 12.6% and 23.6% at 7 days, 30 days and 1 year, respectively.[7] Similarly, authors of the North Manhattan Stroke Study reported one-month case-

fatality rates of 16% in participants aged 45 or older and 17% in those under the age of 45 years.[3] In addition, rates of both death and hospital admission attributable to stroke are declining over time, particularly in the Americas, Western Europe and parts of Oceania.[5, 8, 9] Based on data from the Canadian Mortality Database and information from the Canadian Institute for Health Information's Hospital Morbidity Database for the period of 1994 to 2004, the Canadian Cardiovascular Outcomes Research Team reported a decline in the age and sex-standardised stroke mortality rate of 28.2% (per 100,000 population over the age of 20 years) and in post-stroke hospital admission rates of 27.6%.[9] It is worth noting that, although the overall rates of hospital admission declined, the proportion of elderly patients admitted to hospital following stroke increased. As stroke incidence rates increase substantially for both men and women with each additional decade of age,[5] and mortality rates from stroke continue to decrease, the make-up of the hospitalised population, in both acute and sub-acute care settings also shifts to include a greater proportion of elderly individuals who have experienced stroke and who may require additional care once they are discharged from hospital. Of those individuals who survive a stroke, only 65% may be functionally independent 1 year following the stroke event.[10] In Canada, it has been estimated that 4.1% of all individuals over the age of 65 are living with the consequences of stroke.[11]

It is clear that focusing on mortality alone does not provide an accurate representation of the burden of disease associated with stroke. In the Global Burden of Disease Study, stroke was identified as the sixth leading cause of burden assessed in terms of disability or DALYs, defined as total life years lost due to premature mortality and years lived with disability adjusted for severity.[12] The fourth leading cause of disease burden is depression, which also is a common consequence of stroke.[12-14] In low- to middle-income countries, both stroke and depression are

significant contributors to disability for elderly individuals.[15] The proportion of severe disability that could be avoided if exposure to these conditions were removed is estimated to be 11.4% for stroke and 8.3% for depression.[15]

1.1 What is Post-Stroke Depression?

In the Diagnostic and Statistical Manual of Mental Disorders, fourth edition text revision (DSM-IV-TR) depression is defined as a persistent and prominent mood disturbance characterised by depressed mood or a significantly reduced interest or pleasure in all or almost all activities.[16] When a mood disturbance is attributed directly to a specific medical condition, it is categorised as a "Mood Disorder due to a General Medical Condition" (see Table 1). Authors of the DSM-IV-TR recommend that both major and minor depression be distinguished further from a "Mood Disorder due to a General Medical Condition" when the identified mood disturbance is considered to be a direct consequence of a specific medical condition such as stroke. Post-stroke depression (PSD), is classified as a Mood Disorder due to Stroke with either major-depressive-like episodes (major depression) or depressive features (minor depression). At present, the criteria provided by the DSM-IV-TR are the gold standard against which a diagnosis of PSD is made.

Table 1. DSM-IV-TR Diagnostic criteria for Mood Disorder due to a General Medical Condition[a]

Mood disorder due to a General Medical Condition (stroke)

A. Persistent and prominent disturbance in mood characterized by "depressed mood or markedly diminished interest or pleasure in all, or almost all, activities" and/or "elevated, expansive, or irritated mood".

B. Evidence (patient history, physical examination or laboratory findings) that the disturbance is a direct physiological consequence of the medical condition

C. Disturbance is not better explained by another mental disorder.

D. Disturbance does not occur during the course of delirium.

E. Symptoms of the disturbance result in significant distress or impairment in social, occupational or other important areas of function.

Type

1) With depressive features – depression is dominant, but criteria for major depression is not fulfilled

2) With major-depressive-like episode – criteria for major depression is met (excl. D – see below)

3) With manic features – dominant mood is elevated, euphoric or irritable

4) With mixed features – both depression and elevation are present, but neither dominates

Criteria for Major Depression

A. ≥5 symptoms present during same 2 week period and represent a change in function; one symptom must be either depressed mood or loss of interest

1. depressed mood most of the day, for most days
2. marked reduction in interest or pleasure in most activities
3. significant weight loss or gain; significant increase or decrease in appetite
4. insomnia or hypersomnia
5. psychomotor agitation or retardation
6. fatigue or loss of energy
7. feelings of worthlessness; inappropriate guilt
8. reduced ability to think or concentrate; indecisiveness
9. recurrent thoughts of death; suicidal ideation

B. Symptoms do not meet criteria for mixed episode

C. Symptoms cause significant distress or impairment in important areas of function

D. Symptoms are not due to the direct, physiological effects of a substance or general medical condition.

E. Symptoms are not better accounted for by bereavement.

[a]*DSM-IV-TR, American Psychiatric Association*[16].

Concerns have been raised regarding the use of the criteria provided in the Diagnostic and Statistical Manual for the assessment and diagnosis of post-stroke depression (PSD). As written, the diagnostic criteria include vegetative symptoms such as psychomotor retardation, fatigue, sleep and appetite disturbances which could be a consequence of the stroke. The possible overlap between depressive symptomatology and stroke sequelae could make interpretation of the possible cause of these symptoms more difficult. Morris et al[17] suggested that the somatic features of depression, such as slowness or lethargy and behavioural disturbances, might be more

prominent in depression associated with physical illness while other symptoms, such as feelings of low self-esteem, guilt and self-recrimination, occur less frequently. Gainotti et al[18] demonstrated that the motivated or reactive aspects of depression may be more prevalent in individuals who experience depression following stroke, suggesting that PSD may be, at least in part, a negative mood reaction to the physical consequences of stroke and the associated losses to the individual.

Alternatively, it has been suggested that the DSM criteria for depression are as valid for individuals who have experienced stroke as they are for general psychiatric evaluations. For example, Spalletta et al[19] reported that vegetative symptoms appearing in the DSM-IV were as discriminative of the presence of major and minor depression in a group of stroke patients as were the psychological and cognitive criteria. More recently, Cumming et al[20] demonstrated that the experience of depression in individuals with stroke is similar, though perhaps not identical, to age and sex-matched controls without stroke. Individuals with depression in the non-stroke control group were significantly more likely than individuals with PSD to report symptoms of anhedonia ($p=0.002$) and disturbed sleep ($p=0.008$). There were, however, no differences in scores on either the somatic or psychological factors of depression between the depressed controls vs. those in the PSD group.[20]

1.2 Prevalence and Natural History of Post-Stroke Depression

Depression is a well-documented sequela of stroke. Based on pooled data from published prevalence studies, Robinson[21] 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.[21] 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[14] 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.[14]

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.[22] 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.[23-28] Paolucci et al[29] 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[28] 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 1month 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,[30] PSD may prove to be persistent for a significant proportion of individuals identified as depressed.[30-33] Ostir et al[30] 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.[30]

Ayerbe et al[31]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 (Ayerbe et al. 2011).[31] Similarly, Farner et al[32] 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.

1.3 Consequences Associated with Post-Stroke Depression

Depression in individuals with stroke is associated with enormous personal, social and financial costs that include poorer functional recovery and increased risk for dependence, poorer cognitive function, including impaired executive function, and reductions in social participation. 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.

1.3.1 Functional Impairment and PSD

Research has demonstrated a significant association between dependence in function and the presence of depression during the acute, sub-acute and longer-term or chronic periods following stroke.[34-41] As part of the United Kingdom (UK) Stroke Outcomes Study, physical function and psychological symptoms were assessed at baseline (2 to 6 weeks post stroke) and again at 9, 13, 26 and 52 weeks. Participants identified as being at risk for poor physical outcome at 1 year post stroke included those who were older, had more severe disability soon after the stroke event, and experienced persistent symptoms of depression over the first six months of follow-up.[40] Similarly, Willey et al[41] demonstrated a significant association between depressed mood and functional ability such that the presence of depression within the first 2 weeks of stroke was associated with significantly greater odds for severe disability at both 1 and 2 years post stroke (OR= 2.91, 95% CI 1.07-7.91 and OR=3.72, 95% CI 1.29-10.71). In addition, time does not appear to reduce the association between depressive symptomatology and the risk for poor functional outcome. Feigin et al[39] reported results of a 5-year follow-up of

participants enrolled in the Auckland Stroke Outcomes Study. At 5 years, approximately 30% of participants reported experiencing symptomatology suggestive of the presence of depression. Individuals experiencing depressive symptomatology were more likely to experience dependence (OR = 4.58, 95% CI 2.48, 8.46), reduced Instrumental Activities of Daily Living (IADL) activity (OR = -4.55, 95% CI -6.29 to -2.81) and lower levels of social participation (OR = -7.48, 95% CI -11.06 to -3.9) than individuals with no depression.[39]

While individuals who experience depression following stroke do have an increased risk for poorer functional outcome, they also experience significant recovery over time. However, over the course of recovery, functional ability may begin and end at a lower level than those without depression, despite rehabilitation interventions.[42-45] In a group of patients with stroke admitted to hospital for inpatient rehabilitation, Nannetti and colleagues[44] found that both patients with and without PSD made significant motor and functional recovery over the course of the rehabilitation admission. However, motor recovery was significantly greater for non-depressed individuals at discharge and at 3 months. Functional recovery was also significantly greater for patients without depression at 3-month follow-up.

Experienced concurrently, stroke and depression may be associated with greater physical limitations than either condition individually.[46] Physical impairment and post-stroke depression appear to act upon each other, and each influences the recovery of the other. In a prospective cohort study (n=205), Van de Port et al[47] demonstrated that mobility decline was experienced by 21% of participants between 1 and 3 years post stroke. Significant predictors of this decline in mobility status were level of activity, cognitive problems, fatigue and depression. Given that the relationship between depression and physical impairment might be reciprocal, depression can contribute to a progressive deterioration in mobility which can, in turn, contribute to increased

feelings of depression. As noted by Chodosh et al[48], depression, chronic disease, and physical function probably have multidirectional relationships that confound attempts to understand causation.

1.3.2 Social Activities and PSD

Despite the importance of supportive relationships for social integration post stroke, many individuals can experience feelings of isolation and separation from both family members and friends as relationships are altered, in part, by changes in the way in which individuals perceive themselves and their abilities.[22, 49, 50] In addition, the experience of depressive symptomatology can result in reduced social activity, contact and integration.[23, 51-53] A significant inverse relationship has been identified between PSD and social integration such that increased depressive symptomatology is associated with poorer social integration 6 months following stroke.[51] Over the first year following stroke, the presence of depressive symptoms can significantly increase the odds for social isolation (OR=1.11, 95% CI 1.04, 1.20).[53] Sienkiewicz-Jarosz et al[52] reported that 66.2% of individuals with stroke who experienced symptoms of depression reported reductions in social contact with both friends and family in terms of both frequency and satisfaction.

As for functional impairment, reductions in social interactions, contacts and relationships can be both a risk factor for and a consequence of PSD. Andersen et al[23] reported a significant relationship between social distress prior to the stroke event and PSD, suggesting that individuals who were isolated socially prior to the stroke event were more likely to become depressed post-stroke. Further, individuals with pre-stroke isolation tend to remain isolated,[53] which can increase risk for depression which, in turn, may lead to greater social isolation.[51]

1.3.3. Cognitive Impairment and PSD

Observational studies have shown that depression can contribute to cognitive impairment. In a prospective, longitudinal study of 2220 community-dwelling individuals aged 65 or older and who did not exhibit cognitive impairment at study entry (based on test scores from either the Modified Mini Mental State Examination (3MS) or a review of available data that could include the 3MS, the Digit Symbol Test, the Benton Visual Retention Test, the Telephone Interview for Cognitive Status or Dementia Questionnaire), Barnes et al[54] determined that the presence of depressive symptomatology at baseline was associated with greater odds for developing mild cognitive impairment (OR=1.38 for mild symptoms of depression and 2.20 for moderate to severe symptoms). In studies of depression and cognition following stroke, authors have noted that the presence of depression is associated with higher levels of cognitive impairment,[23, 28, 55, 56] and with slower rates of cognitive recovery.[57] However, as is the case for many of the identified potential consequences of PSD, it is difficult to determine whether cognitive impairment results from depression, is a risk factor for depression or both.[28, 58, 59] Saxena et al[59] reported that the odds of experiencing cognitive impairment at 6 months post stroke were significantly associated with the presence of depression at the time of discharge from inpatient rehabilitation. Conversely, the odds for experiencing depression at 6 months post stroke were associated with the presence of cognitive impairment at discharge.[59]

1.3.4 Mortality and PSD

Individuals with depression can experience not only a greater risk for stroke than those without depression,[60] but also can exhibit a greater risk for stroke-related mortality.[61, 62] Based on observations from a 29-year follow-up of a large sample of community-dwelling adults, Everson and colleagues[61] reported that the presence of 5 or more depressive symptoms was

associated with a significant increase in risk for mortality from stroke in individuals who were healthy and stroke free at the beginning of the surveillance period (HR = 1.66, $p<0.006$). This association maintained significance after adjustment for education, alcohol consumption, smoking, body mass index, hypertension, and diabetes (HR=1.54; $p<0.02$). Every single-point increase in depressive symptomatology was associated with an 8% increase in risk for stroke mortality ($p<0.003$) (Everson et al. 1998).[61] In a 10-year study of older individuals, Kamphuis et al[62] reported a similar, dose-dependent effect. Each 5-point increase on the Zung Self-Rating Depression Scale was associated with a 35% increase in the risk for death from stroke (HR = 1.35, 95% CI 1.19 – 1.53 adjusted for country of origin, education, body mass index, smoking, alcohol intake, cholesterol levels and level of physical activity). When compared to those who reported little depressive symptomatology at study entry, individuals experiencing high levels of symptoms were more than 3 times as likely to die from stroke (HR = 3.41 95% CI 1.69 – 6.90).

An analysis of data collected from over 10,000 participants in the National Health and Nutrition Examination Survey I Epidemiologic Follow-up Study was reported recently.[63] Study participants were grouped according to the presence of stroke and depression as follows: i) no stroke, no depression (reference category), ii) no stroke, depression, iii) stroke, no depression and iv) stroke and depression. Using a multivariate model that accounted for variables considered most likely to mediate associations between stroke, depression and mortality, the authors demonstrated a significant increase in risk for the primary study outcome of all-cause mortality for each category when compared to individuals with neither stroke nor depression. The presence of both stroke and depression resulted in the greatest risk for mortality (HR=1.88, 95% CI 1.27, 2.79), though the impact of these factors was not additive.

1.3.5 Resource Utilization and PSD

The presence of depression in the general population has been associated with increased healthcare utilization and expenditures in both inpatient and outpatient settings.[64-68] This includes inpatient admissions, outpatient visits (for primary care physicians, social workers, physiotherapists, home care nursing, consulting specialists), laboratory and radiologic tests, ER visits, and transportation services. It has been demonstrated that depression is a significant independent predictor of healthcare costs[66, 68] such that the presence of each additional symptom (as assessed on the Centre for Epidemiological Studies Depression scale) is associated with a 1.9% increase in associated costs.[66] Among older individuals, healthcare use and associated costs may be as much as 50% greater for those individuals who experience depression than for those who do not.[65, 66]

Not surprisingly, given the impact of depression on healthcare resource use in older individuals, those who survive stroke and experience PSD may use significantly more healthcare resources than non-depressed stroke survivors. Jia et al[69] reported that, within the first 12 months following stroke, patients with PSD had 1.2 times more inpatient stays, 1.3 times more outpatient visits and 1.4 times longer lengths of stay when compared to stroke patients without PSD. In addition, post-stroke depression is associated with reduced functional ability. Level of functional ability post stroke is a key predictor of healthcare use and expenditure in the months following the stroke event.[70-72] Early detection and successful treatment of post-stroke depression could reduce total healthcare use and overall costs of care, in part, by limiting the impact of depression on functional ability.

1.4 Treatment of PSD

Treatment of post-stroke depression may involve the use of medications, psychosocial or behavioral therapies, light therapy or even electro-convulsive treatments. By far the most common approach to treatment of depression following stroke is pharmacotherapy. In a meta-analysis of 16 studies examining the use of antidepressants in individuals with PSD, Chen et al[73] reported a significant treatment response (e.g., reduction in depressive symptomatology) regardless of the specific definition of response or assessment scale used by individual study authors. The authors also identified a relationship between duration and benefit of treatment. Pooled analysis of studies with treatment durations of 1 and 2 weeks revealed no significant treatment effects. However, from 3 weeks onward, effects were of increasing statistical significance. In an updated Cochrane review, Hackett et al.[74] included 12 studies examining the use of pharmacological interventions for the treatment of PSD. As in the Chen et al[73] review, Hackett and colleagues[74] included trials examining a variety of agents initiated at a variety of times post stroke and for varying intervals. Using pooled analysis where possible, the authors concluded that use of pharmacotherapy was associated with a small, but significant, positive treatment effect.

Unfortunately, there are relatively fewer studies available on the impact of talk-based or other non-pharmaceutical therapies in the treatment of post-stroke depression. As part of their review, Hackett et al[74] identified and included four trials on the use of psychotherapy, but concluded that there was no evidence of benefit associated with its use. However, use of non-pharmacologic therapies (e.g., light therapy or psychotherapeutic techniques such as cognitive behavioural therapy) can be effective and low-risk adjuvants to antidepressant therapy.[75]

1.4.1 Impact of Pharmacologic Treatment on Rehabilitation Outcomes

Treatment and subsequent remission of PSD have been associated with both improved physical function and cognitive recovery. In an observational study, Gainotti and colleagues[76] demonstrated that treatment of individuals with PSD with the antidepressant fluoxetine was associated with improved functional recovery in addition to remission of symptoms of depression. These observations are well supported by a number of clinical trials examining the effectiveness of various antidepressant agents used to treat PSD.[77-82] Further, individuals with PSD who experience reductions in symptoms may be more likely to achieve functional independence by three months post stroke than individuals for whom depression is persistent.[83]

The positive influences of treatment with antidepressants for individuals who experience PSD may extend well beyond termination of treatment. In a follow-up study to a randomised controlled trial of pharmacological treatment for PSD, Mikami et al[82] examined the course of functional recovery over a 12-month period. In the original study, antidepressant treatment with either nortriptyline or fluoxetine (treatment group) or a matching placebo (control group) was administered to participants over a period of 3 months. At the end of the intervention, individuals assigned to receive treatment demonstrated greater recovery in function assessed on the modified Rankin Scale when compared to those who were assigned to the placebo condition. Follow-up at 6, 9, and 12 months showed that individuals who received antidepressant therapy continued to demonstrate significantly better recovery over time despite cessation of treatment at 3 to 6 months post stroke. It should be noted that not all participants presented with identifiable depression at baseline and that improvements in recovery associated with treatment were not dependent on the presence of depression. Antidepressant therapy was associated with improved recovery over a 1-year period in both individuals with and without identifiable depression at

baseline. Although some have suggested that remission of depression may influence the rate of recovery,[59] the properties of the antidepressant used may have a variety of effects on neural mechanisms that could promote recovery independent of reducing depressive symptomatology.[82]

Regardless of the mechanisms by which treatment can facilitate recovery, the timing for initiation of pharmacotherapy also may be important. While most clinical trials that examined the effectiveness of therapy were initiated more than 1 month after a stroke event, Narushima et al[81] and Gonzalez-Torrecillas et al[77] both focused on treatment beginning within the first month. In an open-label study, Gonzalez-Torrecillas and colleagues demonstrated that early treatment was associated with significant improvements in physical, cognitive and neurological function by the end of the 6-week treatment period[77]. Similarly, over a 12-week treatment period, Narushima et al[81] reported a significantly greater improvement in physical function for participants assigned to receive early treatment than for those whose treatment started later. In addition, during an extended period of observation, participants with late onset of treatment experienced gradual deterioration in function between 12 and 24 months post stroke, while individuals assigned to the early treatment group continued to improve slowly over the same period of time. Logistic regression controlling for treatment type, initial diagnosis, presence/absence of motor impairment, past psychiatric history and continued use of medication past the end of the treatment phase demonstrated a significant effect of early versus late treatment on FIM scores at 12 to 24 months.[81]

1.4.2 Impact of Pharmacologic Treatment on Risk for Mortality

Early treatment with antidepressants, even for a relatively short period, can have a prolonged, protective effect on mortality rates following stroke. As part of a randomized controlled trial examining the effectiveness of a 12-week course of antidepressant

pharmacotherapy with fluoxetine or nortriptyline (vs. placebo), mortality data were gathered for all patients up to 9 years following study entry.[84] At 9 years, almost one-half of the original study participants had died. Not surprisingly, surviving participants were significantly younger ($p=0.0005$). There was no association between the presence of depression at baseline and long-term outcome. However, probability for survival was significantly greater in those individuals who had been assigned to receive pharmacotherapy and in those who had completed the prescribed treatment. The authors speculated that the use of antidepressant medications following stroke may alter pathophysiological mechanisms associated with mortality or with the development of later depression.

1.5 Evidence-Based Practice and PSD

In 2003, the Canadian Stroke Network convened an interdisciplinary consensus panel to examine and evaluate existing research in the area of stroke rehabilitation in order to identify stroke-related problems that were prevalent and whose presence could be significantly detrimental to the health-related quality of life of individuals with stroke. In areas with only weak evidence to support associated interventions, the group identified an evidence gap and assigned priorities for further research efforts. In areas considered to have strong evidence for effective treatments, the panel assigned priorities for guideline development and knowledge translation. Using a modified Delphi approach to reach consensus, three priority areas for guideline development and knowledge translation were identified: 1) lower extremity interventions, 2) upper extremity interventions and 3) detection of individuals at risk for the specific post-stroke complications of depression, dysphagia, cognitive impairment, falls and pressure ulcers.[85]

Since that time, evidence-based recommendations for best practice in stroke care have been created and updated.[86, 87] In keeping with the prioritization of the identification of depression as an area for guideline development, the recommendations contained clear statements intended to guide standardised screening and diagnostic assessment, as well as treatment for post-stroke depression (see Table 2). Like other, previously-available international guidelines,[88] the Canadian recommendations acknowledged the importance of a two-step process of identification of depression that includes screening with a validated tool and diagnostic evaluation based on a clinical interview conducted by an appropriately-trained mental health professional. Treatment recommendations included prescription of an antidepressant medication.

Table 2. Canadian Best Practice Recommendations for Stroke Care – Post-Stroke Depression[a]

Screening (identification)	
i	All patients with stroke should be screened for depression using a validated tool. Screening should take place at all transition points and whenever clinical presentation indicates. Transition points may include: a) admission to acute care, particularly if any evidence of depression or mood change is noted b) before discharge to the community from acute care or during early rehabilitation if transferred to an inpatient rehabilitation setting c) periodically during inpatient rehabilitation and d) periodically following discharge to the community.
Diagnosis	
ii	Patients identified as being at risk for depression during screening should be referred to a healthcare professional with expertise in diagnosis and management of depression in stroke patients. These patients should be referred to a psychiatrist or psychologist where available.
Treatment	
iii	Patients with mild depressive symptoms should be managed by "watchful waiting" with treatment being started only if the depression is persistent.
iv	Patients diagnosed with a depressive disorder should be given a trial of antidepressant medication, if no contraindication exists. No recommendation is made for the use of one class of antidepressants over another; however, side effect profiles suggest that selective serotonin reuptake inhibitors may be favoured in this patient population
v	In adult patients with severe, persistent or troublesome tearfulness, selective serotonin reuptake inhibitors are recommended
vi	Treatment should be monitored and should continue for a minimum of six months if a good response is achieved
vii	Routine use of prophylactic antidepressants is not recommended in post-stroke patients

[a]Lindsay et al.[86, 87]

Implementation of best practice for the identification and treatment of PSD is necessary to maximize each individual's potential for physical, cognitive and social recovery. While the use of formal screening tools has been associated with improved detection and treatment of depression following stroke,[89, 90] previous studies in both the UK and USA suggest that rates of systematic screening are low.[91-93] A recently-published study based on data from the registry of the Canadian Stroke Network reported very low prevalence and treatment rates for PSD in acute care settings where PSD was considered present given documentation of depression, treatment with an antidepressant and a psychiatric consultation or receipt of a new prescription for an antidepressant medication post-admission.[94] Although, the authors did not attempt to record results of formal screening or to evaluate the frequency with which it was performed, they did note that the rates of recorded depression were substantially lower than in studies which used active screening as their means of identifying the presence of depression. These findings reinforce the need for an effective process of screening and diagnosis for PSD.

At the present time we do not know the extent to which the Canadian Best Practice Recommendations for post-stroke depression have been adopted for use in clinical practice. Despite the demonstrated benefits associated with the identification and treatment of PSD and the availability of evidence-based practice guidelines such as our own Canadian Best Practice Recommendations for Stroke Care, PSD may remain unrecognized and under-treated. As a first step in the ongoing process of knowledge translation and implementation, it is important that researchers determine whether current evidence-based recommendations are being followed.[95]

1.6 Study Objectives/Hypotheses

Primary Objective. The current study sought to examine adherence to the Canadian Best Practice Recommendations for post-stroke depression by estimating what proportion of patients

admitted for inpatient stroke rehabilitation care in Southwestern Ontario are i) being screened for depression using a validated screening tool, ii) receive additional detailed assessment, for the purposes of diagnosis, by an appropriately-trained mental health professional and iii) are treated for post-stroke depression. Based on existing literature, it was hypothesized that fewer than 50% of patients admitted to inpatient rehabilitation care in Southwestern Ontario following a stroke event are screened for depression and that few of those individuals identified with "possible depression" are referred for further assessment. Furthermore, it was hypothesized that a substantial proportion of patients receive treatment for depression (i.e., pharmacotherapy) without documented screening and formal diagnosis.

Secondary Objectives:

1) Since it was hypothesized that treatment rates will exceed that which one might expect based on reported assessment and diagnosis, the current study sought to identify factors, including patient-level variables such as established risk factors for PSD that, in current practice, might influence the decision to initiate treatment in the absence of formal screening and assessment.

2) Given that the results of a practice audit may be used to inform an ongoing process of knowledge translation, identification of gaps in care should be supplemented with information intended to help us to understand why such gaps in care exist.[95] Therefore, knowledge and attitudes about PSD and the existing best practice recommendations as well as perceived facilitators and barriers to best practice within identified inpatient rehabilitations settings were examined. It was hypothesized that, at the level of the healthcare professional, poor adherence to best practice recommendations for post-stroke depression might be explained, in part, by provider knowledge/education, skill and

attitudes about depression including lack of recognition of the importance of PSD, inadequate education and training with regard to recommended best practice, social stigma regarding mental illness, and anticipated difficulties around discussing the diagnosis and treatment of depression. Additionally, at the organisational level, poor adherence can be associated with factors such as poor access to current guidelines, low levels of resources designated for mental health post stroke, and having no existing practice policy with regard to detection, diagnosis and treatment.

Chapter 2

2. Method

2.1 Recruitment of Participant Rehabilitation Programs.

All facilities (n=7) providing inpatient stroke rehabilitation services in the Southwestern region of the Province of Ontario were identified for potential inclusion in the study. Inpatient rehabilitation coordinators, managers and district stroke coordinators associated with the rehabilitation programs were identified. A brief description of the background, purpose and method associated with involvement were sent by email to the aforementioned representatives of each rehabilitation program along with an invitation to participate in the study. Each facility representative also was contacted by telephone by the investigator (K.L.S.) to discuss the project and to answer any questions related to the study. For all organisations whose representatives expressed an interest in participating, contact was established with the appropriate ethics board representative(s), research ethics applications completed and submitted and approved according to the requirements of each individual, potential participant facility.

2.2 Data Collection.

Four data collection mechanisms were employed at each participating facility as follows: 1) National Rehabilitation Reporting System (NRS) data reports, 2) retrospective chart review, 3) online rehabilitation staff survey, and a 4) brief survey directed to rehabilitation program management and distributed by email. The first two mechanisms focused on adherence to Canadian Best Practice Recommendations for post-stroke depression by identifying and describing existing practices. The second two approaches focused on the collection of information intended to inform our understanding of why identified gaps may exist.

2.2.1 NRS Data Reports.

For each of the inpatient rehabilitation programs recruited to the study, each facility's submissions to the NRS database were used to identity all stroke rehabilitation patients discharged over a 6-month period beginning 1st September, 2010. In addition, the following, anonymous patient information for this sample was requested from the NRS database by the onsite data analyst or stroke coordinator: patient age, gender, date of stroke onset, dates of admission to and discharge from the rehabilitation service and Functional Independence Measure (FIM™) scores (FIM-total™, FIM-motor™, FIM-cog™) at both admission and discharge.

The FIM™ provides an assessment of physical and cognitive disability in terms of burden of care.[96] The FIM™ is a composite measure consisting of 18 items assessing 6 areas of function (self-care, sphincter control, mobility, locomotion, communication and social cognition). Scores for items range from a rating of 0 (total assistance required) to 7 (total independence). Total scores range from 18 to 126. Subscale scores also may be produced for the physical (13 items) and cognitive (5 items) domains (Linacre et al. 1994). The FIM™ has been reported to be both reliable and valid when used in populations of individuals with stroke.[97] For the purposes of the present study, admission FIM™ scores were used as a surrogate for the severity of initial functional deficit attributable to the stroke event.[98]

Prior to being released to the research project, all NRS reports were anonymised by the onsite data analyst and patient records assigned study identification numbers provided by the researcher (K.L.S.). Master lists connecting hospital or patient chart identification numbers to study identification numbers were maintained at each participating facility in a secured location until all data were entered into the centralised study database held at Parkwood Hospital,

London, Ontario, Canada. Once data entry was complete, participating facilities were contacted by the researcher (K.L.S.) with instructions to destroy existing master lists.

2.2.2 Retrospective Chart Review.

For the purposes of the current practice audit, the Canadian Best Practice Recommendations[86, 87] were operationalized by identifying three simple statements that represent the basic action elements of the recommendations pertaining to PSD: 1) All patients with stroke should be screened for depression using a validated tool, 2) Patients identified as at risk for depression through screening should be referred to a psychiatrist or psychologist for further assessment and diagnosis, and 3) Patients diagnosed with a depressive disorder should be given a trial of antidepressant medication, if no contraindication exists. Based on previous retrospective chart reviews undertaken at Parkwood Hospital, it was established, in consultation with the medical director (Dr. Robert Teasell), that the expectation for these elements (i.e. formal screening, referral for consultation, assessment and prescription of a medication) to be recorded in a patient chart was reasonable. Information abstracted from the health records, therefore, included performance of formal screening, standardised tools used for this task, results of screening, psychiatric or psychological consultations (requested/performed), formal diagnoses with regard to mood or psychological distress made during the inpatient stay, recommendations for treatment, and antidepressant treatment provided at admission and at discharge from inpatient rehabilitation.

Occurrences in the chart of noted depressive symptomatology or references to the patient as “depressed” also were recorded. These data were intended to provide another source of information to enrich our understanding of the current practice culture in terms of awareness and

treatment of PSD. Notations regarding depressive symptomatology were not considered a substitute for formal screening, assessment and diagnosis.

At each participating institution, the health record for each patient identified in the NRS report was requested for review in either paper or electronic form, depending upon the standard used for maintenance of health records at each facility. All health records were reviewed on site by a single researcher who has extensive experience in data abstraction processes and procedures (K.L.S.). Accuracy of the abstraction process was checked on a sample of charts (n=20) at Parkwood Hospital by comparing abstraction results with a chart review conducted by a summer student employed to complete a series of abstractions for several other projects. There were no discrepancies noted between the two reviewers. In addition, following chart review, the researcher retained access to the charts for a period of up to one year, so that any discrepancies or inconsistencies found within the data during data entry could by clarified by consulting the original data source. The data abstraction form used to complete the retrospective chart review is provided in Appendix 1.

Information regarding patient age, gender, severity of functional deficit, previous stroke and history of previous episodes of depression or other mood disorders addresses the presence or absence of some of the most salient risk factors for depression identified in current research literature.[99, 100] Information addressing known risk factors for depression collected through both the NRS database and retrospective chart review was used to address study objectives by informing our understanding of current assessment and treatment practices for post-stroke depression.

2.2.3 Staff Survey

A short anonymous, online survey was used to identify issues in current practice, attitudes toward PSD and barriers to its identification and treatment, as experienced at the level of the healthcare practitioner. This survey, based upon the previous work of Hart and Morris[92] on the topic of adherence to best practice guidelines for assessment and treatment of post-stroke depression, was used with the consent of the original authors.[101] The survey consisted of a series of questions in five areas: 1) professional background information (3 questions), 2) knowledge of and access to the Canadian Best Practice Recommendations for Stroke Care (3 questions), 3) information about the respondent's rehabilitation unit specific to management of depression (7 questions), 4) views about screening for depression (20 questions) and 5) a single question regarding the relative importance of observed symptoms of depression in terms of initiating formal screening. In the first three sections of the survey, the item response format used was primarily multiple choice with limited open-ended options to provide clarification as required (e.g. "other – please specify"). Items addressing opinions about screening and assessment for PSD each were rated on a scale of 1to 7, where 1 represented "strongly disagree" and 7 represented "strongly agree". Ten of the 20 items were worded in a negative direction in order to reduce possible response bias. Completion of the final question asked that the respondent rate each symptom of depression on a scale from 1 to 5 in terms of how great an influence that symptom would have on the decision to screen for the presence of PSD, where 1 represented "very likely to make me consider screening" and 5 represented "very unlikely to make me consider screening". The survey was made available to all respondents via the online survey utility, Survey Monkey (www.surveymonkey.com) and required approximately 10 minutes to complete. A copy of the survey as it appeared online is provided in Appendix 2.

All rehabilitation staff involved in patient care (i.e., nurses, all therapists, therapy assistants or aides, social workers, physiatrists, etc.) was invited to complete the survey through email. Letters of information and consent, as well as debriefing information, were provided to all rehabilitation staff via email (see Appendix 3). Invitations to participate were followed by reminder invitations two weeks after the initial invitation was offered. Survey access remained open for all invited respondents for a maximum of 60 days per facility, at which time a debriefing letter explaining the study and its purpose was sent to all staff that had been invited to respond to the survey. All email invitations, reminders and debriefing notices were distributed to staff by the rehabilitation coordinator on site at each facility using her or his own distribution lists to which the researcher had no access. In this way, there was no direct contact established between the researcher and clinical staff and no single respondent at any participating facility could be identified. In order to promote completion by as many respondents as possible, each site was also provided with the option to complete a pen-and-paper version of the survey, at the time of the site visit.

2.2.4 Rehabilitation Management Questionnaire

It is recognized that the presence of care gaps can be explained, in part, by issues at the level of the healthcare provider or organisation. A brief, email-administered questionnaire was undertaken to identify current practices, facilitators and barriers to the use of best practice at the level of the organisation and to provide important context for all data collected. Rehabilitation managers were asked to provide a brief description of their service and to identify whether or not an official protocol or strategy for the identification and management of PSD was in place at their facility. Questions addressed topics such as familiarity and use of the best practice recommendations, in addition to perceived barriers and facilitators associated with the

development and implementation of a protocol for PSD within the rehabilitation unit. Completion of the questionnaire required approximately 10 minutes. Questionnaires were sent to each rehabilitation coordinator or district stroke coordinator, as appropriate, at each participating facility as soon as possible after data collection was complete in order to capture organisational practices and policies concurrent with staff survey responses. The management questionnaire is provided in Appendix 4.

2.3 Data Analyses

2.3.1 Description of Participant Programs and Identified Patient Populations

For each rehabilitation program that agreed to participate, information describing the location, type of program (general vs. specialized), and size of unit (number of beds) was summarized. In addition, the patient population, whose records were identified for inclusion at each facility, is described in terms of mean (± standard deviation/S.D.) age, length of stay, and both admission FIM™ and discharge FIM™ (FIM-total™, FIM-motor™, FIM-cog™) scores. Proportions were calculated for categorical descriptors such as sex, previous stroke and presence/absence of history of psychiatric illness or depression. Between facility differences were examined using multivariate analyses of variance (MANOVA) for continuous data and chi-square analyses (Pearson), as appropriate. The alpha level of statistical significance for these analyses and all others used in the study was set at $p < 0.05$. P-values between 0.05 and 0.10 were labelled as "approaching significance".

2.3.2 Adherence to Guidelines

To address the primary study objective, the overall rate of reported adherence within each participant program was calculated for 1) formal screening, 2) referral for assessment by a mental healthcare professional and 3) treatment with an antidepressant. A between-facilities

comparison of overall adherence rates was performed using the Pearson chi-square statistic. However, it was recognized that best practices for PSD cannot be defined by adherence to a single element. Adherence in one area of the recommendations was not necessarily related to adherence in another area. Therefore, the primary outcomes of interest are more accurately represented by the following four conditional probabilities, which were calculated both overall and per facility: 1) the proportion of patients who were screened; 2) the proportion of patients screened (in item 1) who were referred for assessment; 3) the proportion of (2) who were diagnosed with depression; and 4) the proportion of (3) who received treatment with an antidepressant at the time of discharge from rehabilitation.

2.3.3 Examining Treatment Patterns *(secondary objective)*

In a preliminary analysis, between-group differences were examined for patients treated with an antidepressant at the time of discharge from rehabilitation and those who were not for all variables identified as risk factors for PSD, as well as elements indicative of current clinical practice. Data designated as risk factor variables were collected from patient records or from the NRS database reports and included history of stroke, previous history of psychiatric illness, age, sex and severity of impairment at admission. Data considered representative of current clinical practice were gathered from the chart review and included the presence/absence of notations regarding depressive symptomatology, whether the patient had been formally screened or assessed for PSD, and whether or not the patient was treated with an antidepressant at the time of admission. Between-group differences were assessed using either analysis of variance (ANOVA) or chi-square (Pearson), for continuous and categorical variables, respectively.

Multiple logistic regression using the backward stepwise method was conducted to build an explanatory model for antidepressant treatment in rehabilitation. Variables identified as

having a significant, or nearly significant ($p<0.1$), association with treatment through the preliminary, between-group analyses were selected for inclusion in the model. Wald χ^2 statistic and associated significance, odds ratio (OR) and 95% confidence intervals (CI) are reported for all variables included in the final model. The accuracy of the model in terms of prediction of treatment is presented. Given the presence of both continuous and categorical variables used in the regression model goodness-of-fit was assessed using the Hosmer-Lemeshow test.[102] Amount of variance in the dependent variable (treatment at discharge) accounted for by the final model was assessed using the Nagelkerke pseudo-R^2 statistic.[102]

2.3.4 Analyses of Supplemental Information – Staff and Rehabilitation Management Surveys *(secondary objective)*

Descriptive, summary information gathered from the first three sections of the staff survey (professional background, knowledge of and access to the Canadian Best Practice Recommendations, and current practices around the identification and treatment of PSD) are expressed as proportions of the total number of survey respondents. For the section addressing views or opinions regarding the identification and treatment of PSD, responses to individual items were explored based on summary values calculated for each item. Items worded in a negative direction were reverse coded to create a consistent scoring metric for all items. Both median (interquartile range/IQR) and mean (± S.D.) values were calculated for each item. As per Hart and Morris, mean item scores of 4 were considered neutral.[92] Those items with a mean score above 4 were considered reflective of a facilitating influence for best practice for PSD, while those items with mean scores below 4 were considered reflective of a negative influence or barrier.[92] Similarly, median ratings for each symptom of depression were examined to

determine which, if any, symptoms were most likely to trigger formal screening from the point of view of the survey respondents.

The rehabilitation management survey provided quantitative estimates of the proportion of facility participants who reported compliance with the Canadian Best Practice Guidelines at the program level. Responses from program management were reviewed to identify commonly reported barriers and facilitators to implementation of or adherence to best practice recommendations.

Chapter 3

3. Results

3.1 Participant Rehabilitation Programs and Patient Population

A total of 7 inpatient rehabilitation programs in Southwestern Ontario (SWO) providing services to individuals with stroke were identified for possible inclusion in the present study. Contact information was obtained for all facilities and invitations to participate in the research project were issued as per study protocol. Representatives from five programs agreed to participate. Research ethics were obtained for all five sites. A total of 294 patient charts were identified as representing individuals discharged from inpatient rehabilitation over the 6-month study period. Descriptions of the facilities included in the present study and number of patient charts identified at each one are provided in Table 3.

Table 3. Participant Inpatient Stroke Rehabilitation Programs.

Facility	Location	Unit Type	Number of beds	Study N[a]
St. Joseph's Healthcare London, Parkwood Hospital Site	London	Specialized stroke unit	30	118
Chatham-Kent Health Alliance	Chatham	General	32 (19 stroke/orthopaedic)	39
Huron Perth Health Alliance	Stratford	General	14	28
Grey-Bruce Health Services	Owen Sound	General	16	48
Windsor Regional Hospital	Windsor	General	52 (20 stroke-dedicated)	61

[a]number of patient records identified as discharged over the specified 6-month period and included in the study

Descriptions of the patients whose records were included from each rehabilitation program are provided in Table 4. Overall, there were no between-program patient-level differences in terms of sex, pre-admission history of psychiatric illness or depression, FIM-motor™ scores or

FIM-total™ scores on admission to rehabilitation. However, between-program analyses revealed that there was a significantly greater proportion of patients admitted with previous stroke at the Huron-Perth facility than at any of the other participant facilities (χ^2=0.41, df=4, p=0.41). In addition, there were significant between-program differences demonstrated in terms of patient age (F=2.74, df=4, p=0.029), admission FIM-cog™ scores (F=13.96, df=4, p<0.0001), length of stay (F=3.55, df=4, p=0.008), and all discharge FIM™ scores, both total and subscale scores (FIM-total: F=3.16, df=4, p=0.015; FIM-motor: F=3.48, df=4, p=0.009; FIM-cog: F=3.27, df=4, p=0.012). Results of pairwise comparisons are noted in Table 4.

Table 4. Patient Characteristics by Program.

Patient Characteristics	Parkwood Hospital	Chatham-Kent Health Alliance	Huron-Perth Health Alliance	Grey-Bruce Health Services	Windsor Regional Hospital
Number of participants	118	39	28	48	61
Sex (F)[a]	48.3%	48.7%	67.9%	41.7%	47.5%
Previous stroke (Y)	31.9%	30.8%	60.7%	29.2%	31.7%
Psychiatric History (Y)	26.3%	20.5%	10.7%	25%	11.5%
History of Depression (Y)	18.6%	12.8%	7.1%	16.7%	11.5%
Age at Admission	67.74[b] (15.79)	74.9 (12.68)	74.75 (15.1)	70.93 (10.37)	70.64 (12.77)
Length of Stay – days (LOS)	33.74 (16.61)	27.23 (20.62)	33.61 (23.17)	26.85 (23.24)	41.82[c] (31.72)
Admission FIM-total™	75.16 (23.95)	76.49 (22.37)	69.46 (26.48)	72.22 (21.26)	68.2 (30)
Admission FIM-motor™	49.07 (21.1)	50.31 (17.31)	43.64 (22.77)	47.66 (17.82)	50.98 (23.76)
Admission FIM-cog™	26.09 (6.17)	26.18 (8.34)	25.82 (7.01)	24.56 (8.81)	17.29[d] (9.27)
Discharge FIM-total™	99.91[e] (22.67)	92.38 (31.92)	86.71 (32.51)	100.39[e] (16.56)	88.48 (29.6)
Discharge FIM-motor™	70.97[f] (20.18)	64.44 (23.64)	58.75 (27.39)	73.54[f] (11.56)	63.67 (22.9)
Discharge FIM-cog™	28.95 (4.88)	27.95 (9.63)	27.96 (6.99)	26.85 (7.32)	24.82[g] (8.95)

[a]categorical variables are reported as a proportion of the total number of patients identified at that institution. Continuous variables are reported as mean (±SD).
[b]Patients admitted to Parkwood Hospital were significantly younger than those at either Chatham-Kent (p=0.006), or Huron-Perth (p=0.019) rehabilitation programs.
[c]Patient length of stay at Windsor Regional Hospital was significantly longer than Parkwood Hospital (p=0.028), Chatham-Kent (p=0.002) and Grey-Bruce (p=0.001).
[d]Patients admitted to Windsor Regional Hospital had significantly lower FIM-cog™ scores than at any other program (p<0.0001).
[e]Discharge FIM-total™ scores were significantly higher at i) Parkwood (p=0.016 and p=0.008) and Grey-Bruce (p=0.032 and p=0.027) than at either Huron-Perth or Windsor, respectively.
[f]Discharge FIM-motor™ scores were significantly higher at i) Parkwood (p=0.006 and p=0.035) and Grey-Bruce (p=0.005 and p=0.024) than at either Huron-Perth or Windsor, respectively.
[g]FIM-cog™ scores at discharge were significantly lower at Windsor Regional hospital than at either Parkwood (p<0.0001) or Chatham-Kent (p=0.008).

3.2 Adherence to Guidelines

Overall, 41 patients (41/294 = 13.9%) were screened using a standardized screening tool for the possible presence of depression, 36 (12.2%) were referred for psychiatric assessment, 13 (4.4%) were diagnosed with depression during their inpatient stay, and 113 (38.4%) were treated with an antidepressant at the time of discharge from rehabilitation. Chi-square analyses demonstrated significant differences between institutions for rates of screening (χ^2=15.4, df=4, p=0.004) and referral for assessment (χ^2=49.887, df=4, p<0.0001). It should be noted that, for both assessment referrals and diagnosis of depression, more than 20% of cells had expected cell counts of less than 5 and observed cell counts of less than 1. Therefore, the results of these analyses may not be valid. Rates of treatment with an antidepressant did not vary significantly between institutions (χ^2=1.22, df=4, p=0.88). Overall rates of screening, referral, diagnosis and treatment by institution are provided in Table 5.

Table 5. Overall Adherence to Best Practice Recommendations by Program[a].

Elements of Best Practice	Parkwood Hospital	Chatham-Kent Health Alliance	Huron-Perth Health Alliance	Grey-Bruce Health Services	Windsor Regional Hospital
Screened for PSD	25 (21.2)	3 (7.7)	1 (3.6)	1 (2.1)	11 (18)
Referred for Formal Assessment	9 (7.6)	4 (10.3)	0	0	23 (37.7)
Diagnosis of Depression Recorded	4 (3.4)	2 (5.1)	0	0	7 (11.5)
Treatment with Antidepressant (Discharge)	47 (39.8)	17 (43.6)	11 (39.3)	16 (33.3)	22 (36.1)

[a]Recorded adherence is reported as n (% within institution)

Examination of the four conditional probabilities created to address the primary hypothesis revealed that of the 41 patients who were screened formally for depression, 16 (39%) were

referred for assessment by a qualified mental healthcare professional. Of these 16 individuals, 6 received a diagnosis of depression and 3 were treated with an antidepressant. It should be noted that referral for assessment occurred in only 3 of the 5 participant programs; Parkwood Hospital (n=4), Chatham-Kent (n=1) and Windsor Regional Hospital (n=11). A formal diagnosis of depression was recorded in patient records identified at the Parkwood (n=3) and Windsor (n=3) sites only. Patients diagnosed with depression received treatment with an antidepressant at a single facility (n=3). Given the presence of a large number of expected and observed cell counts ≤ 5, it was not possible to conduct a reliable statistical examination of between-institution performance for each of the established conditions.

3.3 Examining Treatment Patterns

An examination of data gathered for those patients who were treated with an antidepressant vs. those who were not demonstrated significant between-group differences for the following categorical variables: pre-admission history of psychiatric illness (χ^2=50.232, df=1, p<0.0001), notation of depressive symptomatology in the patient record (χ^2=17.51, df=1, p<0.0001), formal screening for depression (χ^2=4.67, df=1, p=0.03), referral for assessment (χ^2=3.57, df=1, p=0.06), and use of an antidepressant at the time of admission to rehabilitation (χ^2=179.08, df=1, p<0.0001). Although the recorded diagnosis of depression was significantly associated with treatment, this may not have been a valid result given the presence of expected cell counts of less than 1. Therefore, this variable was not included in the regression analysis. In addition, there were significant between-group differences demonstrated for both FIM-motor™ (F=30.78, df=1, p<0.0001) and FIM-cog™ (F=212.03, df=1, p=0.08) scores at admission to rehabilitation. The results of between-group analyses for all known risk factors and current practice variables are presented in Table 6.

Table 6. Risk Factors and Current Practice Variables: Treated Vs. Untreated Groups[a].

	Treated with Antidepressants (n=113)	Not Treated with Antidepressants (n=181)	Test Statistic	p-value
Known Risk Factors for PSD				
Age at Admission[b]	70.08 (13.37)	70.68 (14.65)	F=0.13	0.72
Admission FIM-motor™	40 (19.64)	53.4 (20.37)	F=30.78	<0.0001
Admission FIM-cog™	22.86 (9.1)	24.61 (8.04)	F=2.96	<0.086
Sex (F)[b]	57 (50.4)	87 (48.1)	χ^2=0.16	0.39
Previous stroke	43 (38.4)	56 (31.3)	χ^2=1.55	0.21
Pre-Admission History of Psychiatric Illness	44	18	χ^2=35.141	<0.0001
Practice Indicators				
Observations/symptoms of depression noted in chart	77 (68.1)	78 (43.1)	χ^2=17.51	<0.0001
Screened for depression	22 (19.5)	19 (10.5)	χ^2= 4.67	0.03
Referred for assessment	19 (16.8)	17 (9.4)	χ^2= 3.57	0.06
Diagnosed with depression	9 (8.0)	4 (2.2)	χ^2= 5.6	0.06[c]
Treated with antidepressant at time of admission	81 (71.7)	0 (0.0)	χ^2= 179.08	<0.0001

[a]At discharge from rehabilitation; [b]Continuous variables are reported as mean(±sd).Categorical variables are reported as n(%); [c]Expected cell count <1, therefore, results may not be valid.

Based on the results of the preliminary analyses, the following seven variables were included in the regression model: admission FIM-motor scores, admission FIM-cog scores, history of psychiatric illness, charted symptoms of depression, formal screening, referral for psychiatric assessment and recorded treatment with antidepressants on admission. Although the association between diagnosis and treatment approached statistical significance, diagnosis of depression was not included in the regression given that this may not be a valid result based on low expected cell counts within the chi-square analysis. In addition, given that there were no

significant differences between institutions in terms of proportions of patients receiving treatment with antidepressant medications at the time of discharge from rehabilitation (χ^2=1.22, df=4, p=0.875), a single regression analysis was conducted to address current treatment patterns across the region.

Inclusion of seven possible explanatory variables for the dependent variable, treatment with an antidepressant at discharge, resulted in a calculated events-per-variable (EPV) value of 16, which exceeds the EPV of 10 recommended to minimize bias and produce a valid model using stepwise logistic regression techniques.[103, 104] Seven variables were, therefore, entered into the backward stepwise regression. The level of significance for inclusion in the final model was set to 0.05.

The model resolved after 5 iterations at which time only 3 variables remained in the model. These included admission FIM-motor™, charted symptoms of depression, and treatment with an antidepressant at the time of admission. Overall predictive accuracy of the model was 89.1%. Results of the Hosmer and Lemeshow Test (χ^2=7.23, df=8, p=0.51) indicated that the observed outcomes regarding treatment with an antidepressant did not differ significantly from those predicted by the model and that the goodness-of-fit was acceptable. Examination of the Nagelkerke-R^2 revealed that this model could account for approximately 76% of the variance in the dependent variable. The model is presented in Table 7.

Table 7. Results of Logistic Regression: Treatment with Antidepressant at Discharge.

	Wald χ^{2a}	Sig	OR	95% CI
Admission FIM-motor™	13.49	<0.0001	0.97	0.94,0.98
Charted symptoms of depression	8.68	0.003	3.97	1.59,9.94
Treated with an antidepressant on admission	0.00	0.996	1405205…	n/a[b]

[a]df=1; [b]n/a=not available

However, the model produced may not be stable. The practice indicator of treatment at admission contributed no variability to the model insofar as all patients who received treatment with an antidepressant at admission were treated with an antidepressant at discharge. Therefore, a second, *post hoc*, logistic regression was performed, without treatment at admission, to determine what other factors may be influencing treatment given that all patients treated with an antidepressant at admission continued to be treated with an antidepressant at discharge.

When the 6 remaining explanatory variables were entered in a backward stepwise regression, the model resolved after 4 steps after which the following variables remained: admission FIM-motor™ scores, previous history of psychiatric illness and charted symptoms of depression. Overall predictive accuracy of the model was reduced to 70.3%, although results of the Hosmer and Lemeshow Test (χ^2= 5.87, df=8, p=0.66) demonstrated that the observed outcomes regarding treatment with an antidepressant still did not differ significantly from those predicted by the model. This indicated that the goodness-of-fit was acceptable. Examination of the Nagelkerke-R^2 revealed that this model could account for only 28% of the variance in the dependent variable. The results of the *post hoc* regression analysis are presented in Table 8.

Table 8. Results of *Post Hoc* Logistic Regression: Treatment with Antidepressant at Discharge.

	Wald χ^{2a}	Sig	OR	95% CI
Admission FIM-motor™	21.13	<0.0001	0.97	0.97,0.98
History of psychiatric illness	25.75	<0.0001	5.64	2.89,10.99
Charted symptoms of depression	5.95	0.015	1.97	1.14,3.39

[a] *df=1*

3.4 Staff and Rehabilitation Management Surveys

3.4.1 Staff Survey

Based on the staffing information provided by rehabilitation managers at all participant programs, the total number of potential survey respondents was 189. Seventy-two individuals responded by the time that the survey site was closed (response rate = 38.1%). However, not all of the respondents chose to provide responses to all items. Given that items were to be considered individually and no summary scores produced, it was decided that, in order to maintain the maximum amount of contributed information for each item, list-wise exclusions of missing information would not be performed. The number of responses received are reported for individual items and proportions calculated as a percentage of the total number of responses for that item.

Overall, the rehabilitation professionals who chose to respond to the survey invitation were experienced healthcare practitioners. The majority of respondents (83.3%) reported having more than 10 years of experience in their profession; 31.9% reported 10 to 20 years and 51.4% reported more than 20 years of experience. A summary of survey respondents by profession is provided in Table 9.

Table 9. Survey Respondents (n=72)

Profession	N	Percent
Nurse, Nurse Practitioner (NP)	36	50
Physiotherapist/Physiotherapy Aide or Assistant (PT or PTA)	10	13.9
Occupational Therapist/Occupational Therapy Aide or Assistant (OT or OTA)	8	11.1
Social Worker	5	6.9
Speech-Language Pathologist or Therapist (SLP)	4	5.6
Psychologist, Psychometrist, Psychiatrist	3	4.2
Attending Physician, Physiatrist, Neurologist	3	4.2
Recreation Therapist (RT)	2	2.8
Dietician	1	1.4

Although 76.4% of respondents reported having access to the best practice recommendations, 44.4% had not read them and an additional 31.9% had read only the summary version of the recommendations. Less than one-third (30.8%) of respondents were aware of the specific recommendations pertaining to PSD, while an additional 38.9% reported being "somewhat aware". A summary of survey responses pertaining to perceived screening and assessment practices is presented in Table 10.

Table 10. Summary of Screening and Assessment Practices

	N[a]	Response Options	Response Count	Percent
Screening a part of routine assessment?	66	Yes	32	48.48
		No	6	9.1
		Don't Know	3	4.54
		Yes, but not all patients	25	37.87
How often is a formal screening tool used?	56	0-20% of the time	10	17.86
		21-40%	13	23.21
		41-60%	12	21.42
		61-80%	0	0.0
		81-100%	21	37.5
Do you know which tool is used for formal screening?	66	Yes	38	57.58
		No	28	42.42
Which screening tools are used?[b]	38	HADS	21	46.67
		GDS	19	42.22
		PHQ-2	2	4.44
		BDI	1	2.22
		VAMS	2	4.44
Who screens for depression on your unit?[c]	64	Nurse/NP	39	30.95
		Physiotherapist	1	0.79
		Psychologist or Psychiatrist	19	15.08
		Social Worker	36	28.57
		SLP	3	2.38
		Doctor/physiatrist	22	17.46
		Occupational Therapist	4	3.17
		Don't know	2	1.59
Do you have access to a psychologist or psychiatrist?	65	Yes	53	81.54
		No	10	15.38
		Don't know	2	3.01
How is depression assessed?	66	Clinical Observation	15	22.73
		Depression Questionnaire	21	31.82
		Clinical Interview	8	12.5
		A mixture	22	34.38

[a]Number of responses for this item; [b]HADS=Hospital Anxiety and Depression Scale, GDS=Geriatric Depression Scale, PHQ-2 = Patient Health Questionnaire 2-item version, BDI=Beck Depression Inventory VAMS=Visual Analog Mood Scale. Please note that respondents could indicate more than one screening tool used; 45 responses were given by 38 individuals; [c]Respondent could indicate more than one discipline that screens for depression resulting in 126 total responses provided by 64 individuals.

A total of 54 respondents provided an estimate of the number of patients screened formally for PSD within their respective programs in a one-month period. These estimates ranged from 0 (35.19%) to 50 (1.85%). The most frequent estimates were for 0 (n=19, 35.19%), 2 (n=10, 18.52%) and 3 (n=8, 14.81%) patients screened per month.

For the section of the survey addressing the views or opinions of health care professions regarding the identification and treatment of PSD, responses to individual items were explored as potential facilitators or barriers to best practice based on mean values calculated for each item. Item level results are provided in Table 11.

Table 11. Staff Opinions Regarding the Identification and Treatment of PSD

Item[a]	Mean (SD)	Median (IQR)
Screening patients for depression after their stroke is important.	6.52 (0.94)	7 (1)
My professional colleagues think I should screen patients for depression after their stroke (or ask for them to be screened).	4.85 (1.78)	5 (3)
Screening patients for depression (or asking for them to be screened) after their stroke is expected of me.	4.39 (1.9)	4 (3)
I feel comfortable screening patients for depression.	4.26 (2.08)	5 (4)
I have adequate skills and training to screen patients for depression (or to know when to ask for screening).	4.6 (1.97)	5 (3)
Whether or not I screen patients (or ask for them to be screened) for depression is my decision.	3.41 (2.04)	3 (4)
Screening for depression (or asking for someone to be screened) is part of my role.	5.8 (1.58)	6 (2)
Most screening questionnaires are suitable for use with stroke patients (e.g. those with communication difficulties, cognitive impairment, etc).	4.58 (1.44)	4 (2)
Time pressures do not make it less likely that I screen patients (or ask for someone to be screened) for depression.	4.77 (1.88)	5 (2)
Screening patients for depression can reduce uncertainty about whether or not they have depression.	5.37 (1.33)	6 (2)
Screening questionnaires for assessing depression are clinically useful.	5.41 (1.2)	5 (1)
Screening for depression is more effectively achieved through the use of screening questionnaires than clinical observation.	3.92 (1.56)	4 (2)
Understanding that a patient is depressed by screening helps me to engage them in rehabilitation.	5.3 (1.16)	5 (2)
Recognising symptoms of post stroke depression is not difficult.	4.34 (1.38)	5 (2)
It is not difficult to treat post stroke depression once a diagnosis is made.	5.26 (1.28)	5 (2)
Discussing depression treatment options with patients is not difficult and is not likely to upset them.	4.47 (1.48)	4 (3)
Most patients do not feel that a diagnosis of depression is an indication of personal weakness.	3.76 (1.4)	4 (2)
Antidepressant medications are effective for treatment of post-stroke depression.	5.97 (0.98)	6 (1)
The presence of communication issues does not prevent you from screening an individual for depression.	4.33 (1.61)	4 (3)
The presence of cognitive issues does not prevent you from screening an individual for depression.	4.24 (1.57)	4 (3)

[a]Scored on a scale of 1-7, where 1 represents "strongly disagree" and 7 represents "strongly agree". Items originally worded in a negative direction were reversed for scoring.

For seven items, mean scores were 5 or more and were considered representative of facilitating influences. Respondents felt that screening is important and indicated that they consider it to be part of their current role. Screening was viewed as a clinically useful activity that could reduce uncertainty and help the clinician to engage patients in rehabilitation. In addition, pharmacotherapy was viewed as an effective approach to management for PSD.

Potential barriers to best practice included in the survey were time constraints, the presence of cognitive or communication impairments in patients following stroke, anticipated negative opinions or reactions from patients regarding depression, feeling uncomfortable talking to patients about depression, perceived lack of skills or education, and believing screening tools to be ineffective or unsuitable. These items received neutral rather than the expected low (<4) summary ratings associated with a negative influence. Only one item had a mean score indicative of a negative influence; staff did not feel that the decision to screen patients was under their control.

Symptoms rated as very likely to trigger a formal screening for depression included apathy, hopelessness, thoughts of death, suicidal thoughts, lack of motivation, reports of feeling worthless and loss of interest. Overall, there were no symptoms of depression that were rated as unlikely to prompt formal screening. Only two symptoms were rated as neither likely nor unlikely to make one consider screening. These included poor concentration and distractibility. The summary ratings for all symptoms are reported in Table 12.

Table 12. Importance of Symptoms in Triggering Screening for Depression

Item[a]	Median (IQR)[b]
1. Emotional lability	2 (2)
2. Apathy	1 (1)
3. Tension	2 (1)
4. Poor concentration	3 (1)
5. Reports of feeling guilty	2 (2)
6. Hopelessness	1 (0)
7. Agitation	2 (1)
8. Early waking or insomnia	2 (1)
9. Thoughts of death	1 (0)
10. Suicidal thoughts	1 (0)
11. Lack of motivation	1 (1)
12. Sleepiness	2 (2)
13. Reports of feeling worthless	1 (0)
14. Loss of energy	2 (2)
15. Loss of interest	1 (1)
16. Weight gain or loss	2 (1)
17. Distractibility	3 (1)

[a]Scored on a scale of 1-5, where 1 represents "very likely to make me consider screening".
[b]IQR=Interquartile Range.

3.4.2 Rehabilitation Management Survey

Rehabilitation managers of all five participant inpatient programs (n=5) reported familiarity with the Canadian Best Practice Recommendations for Stroke Care. Three of five managers reported having an official protocol or strategy in place for the identification and management of PSD, although in one case, the protocol was reported as "not yet formalized". Of the two who identified using protocols, only one included the three steps of best practice as operationalized within the current study (i.e., screening, referral for formal assessment and diagnosis, and treatment with a trial of an antidepressant agent). Limited resources and lack of access to psychological and/or psychiatric services were reported as barriers to referral for assessment and diagnosis at the other facility. A summary of responses from rehabilitation

managers regarding best practice protocols, including identified facilitators and barriers to the development of a best practice protocol for PSD, is provided in Table 13.

Table 13. Summary Results of Rehabilitation Management Survey: Implementation of Recommendations

	Parkwood Hospital	Chatham-Kent Health Alliance	Huron-Perth Health Alliance	Grey-Bruce Health Services	Windsor Regional Hospital
1. Official protocol or strategy?	Yes	No	No	Yes*	No
2. Familiar with the Canadian Best Practices Recommendations?	Yes	Yes	Yes	Yes	Yes
3. Specific to stroke?	N/A	No	Yes	N/A	N/A
4. Were they used in the development of your protocol?**	Yes	N/A	N/A	No	Yes
5. Are the best practice recommendations available to staff on your unit?	N/A	Yes	Yes	N/A	N/A
6. Has PSD been identified as a problem on your unit?	N/A	Yes	Yes	N/A	N/A
Programs with no-protocols					
1. Identified barriers and challenges to possible protocol development	Constant leadership and staff changes; program changes are slow; resource limitations – PSD is not a priority; not enough social work support, need more training and information available to management, clinical staff and patients about PSD; lack of acceptance regarding the use of antidepressants (patients don't like taking them)				
2. Factors perceived as potentially helpful in protocol development	Access to protocols used elsewhere and specific recommendations for management of depression; standardized rehabilitation orders that include screening; a quick and easy screening tool; simple interventions; recommendations from pharmacists; available information/handouts regarding depression.				
Programs with protocols					
1. Factors that were perceived as helpful in protocol development	Ongoing team education; available assistance from research staff; getting screening as part of a standardised admission package – without it, screening was just another piece of paper to keep track of and complete; setting up quality assurance checks				
2. Identified barriers/challenges encountered	Difficult to change team behaviour; ensuring that all patients are screened; no resources are available for psychological or psychiatric services; difficult to ensure follow-up with psych				

** Official strategy reported as "not yet formalized"; ** Note: Managers completed either section A or B of the survey depending on whether or not there was a protocol for PSD used within their program. Responses to questions that did not appear in the portion of the survey completed by a given institution will be reported as N/A*

Chapter 4

4. Discussion

The use of formal screening is associated with improved detection and treatment of depression.[89, 90] However, depression following stroke may remain under-diagnosed and under-treated. Results of previous studies, originating in both the UK and the USA, demonstrated that rates of systematic, formal screening for depression following stroke in those countries were approximately 50% at the time of their respective audits.[91, 93] In the present retrospective practice audit, it was hypothesised that the frequency of formal screening for depression in inpatient rehabilitation settings would not reach 50%. Indeed, findings from this study showed that there was recorded evidence of formal screening for depression in the audited medical records of only 13.9% of individuals with stroke admitted for inpatient rehabilitation services at 5 facilities in Southwestern Ontario over a 6-month period. The reasons why screening rates in Southwestern Ontario fell far short of those recorded in the USA or the UK are unknown and a thorough examination of differences in health policy and/or provision of rehabilitation services across countries is beyond the scope of the present study.

Although 12.2% of patients were referred for consultation with a psychologist or psychiatrist overall, only 16 of 41 (39%) individuals who had been formally screened for depression were referred for further assessment and only 6 patients in total received a diagnosis of depression following formal screening and assessment. In spite of very low recorded rates of both screening and assessment, more than one-third of patients in all participant rehabilitation programs received pharmacotherapy for depression (range: 33.3% - 43.6%), as hypothesised *a priori*. In fact, examination of the recommendations as a conditional sequence of actions based on the best practice recommendations revealed that only 3 of the 113 patients receiving

pharmacotherapy for depression were treated subsequent to formal screening, assessment and diagnosis of depression.

At first glance, the proportion of patients who were treated with depression may seem an encouraging result. After all, the proportion of individuals treated appears to approximate the proportion of individuals who will experience depression following a stroke event.[14] This is, however, a lifetime estimate of prevalence that does not take into account either the natural history of PSD or the time between the stroke event and initiation of treatment. Bour et al.[28] reported the cumulative incidence of PSD to be 18.8% at 1-month, 23.1% at 3-months and 26.7% at 6-months post stroke. In the present sample, mean time between the stroke event and admission to rehabilitation was approximately 25 days. Eighty percent of all patients were admitted within 21 days of the index stroke event. In addition, mean time from stroke onset to discharge from rehabilitation was approximately 56 days and 90% of all patients were discharged by 3 months. Therefore, the anticipated incidence of PSD during the timeframe of inpatient rehabilitation within the present audit ranges from approximately 19% to 23%, which is far lower than the documented rates of treatment. Given that published estimates of incidence may be under-estimates,[14] it is possible that the frequency of depression simply exceeded anticipated rates over the 6-month review period and all cases of depression were managed appropriately. Unfortunately, given the paucity of recorded information pertaining to screening, assessment and diagnosis of depression for those individuals receiving treatment, it was not possible to ascertain whether prescribed treatment was appropriate based on recommended best practices for PSD.

4.1 Understanding Current Treatment Practices

It was, however, possible to inform our understanding of current treatment practices by examining a variety of factors that might influence the decision to treat PSD in the absence of screening, assessment or diagnosis. These included known risk factors for PSD and selected indicators of current practice such as charted clinical observations. Regression analyses demonstrated that the decision to prescribe an antidepressant medication for the treatment of depression was influenced by a limited number of variables not associated with the identified elements of best practice for PSD. Of these variables, the use of antidepressants at admission proved to be the single most important factor influencing treatment. If there was documented pharmacotherapeutic treatment in the patient record at the time of admission, that patient continued to receive treatment with antidepressants throughout her/his rehabilitation stay in every case. A model for receipt of pharmacological treatment PSD that included this variable together with motor function at admission and the presence of notations regarding depression in the patient chart accounted for 76% of the variance in the decision to provide treatment. However, inclusion of 'treatment at admission' resulted in an unstable model. In a second, *post hoc* model, removal of this variable resulted in the inclusion of previous history of psychiatric illness as a significant predictor; however, this new model, without treatment at admission, accounted for a substantially smaller proportion of variance.

While elements of best practice were not identified as significant predictors of which individuals received treatment, the variables that were associated with treatment have reasonable face validity. Severity of functional limitations and previous history of depression or other psychiatric illness, for instance, are both well-documented risk factors for post-stroke depression.[99, 100, 105] Informal observations of mood documented in the medical record suggest

that, to some unknown extent, observation of mood or mood-related behaviour is part of current clinical practice within the participant inpatient rehabilitation programs. However, charted notations that reflect possible clinician awareness of depressive symptomatology and/or the prescription of an antidepressant should not be considered an appropriate substitute for formal screening and assessment practices in the diagnosis of depression.

4.1.1 Clinical Observation

In the present study, there were notations regarding depression or mood recorded in 138 of the abstracted patient records (47%). A cursory examination of the content of these notes revealed notations that were very brief and most often described the patient as "depressed", "teary" or as displaying "flat affect". Informal or *ad hoc* observations such as flat affect and depression, sadness or tearfulness can correspond to symptoms of depression such as apathy and lack of motivation or emotional lability noted by staff as important and likely to prompt screening. However, the rate of formal screening was low overall (13.9%), despite the frequency with which these important symptoms were recorded. Given that notations regarding mood were identified as a significant predictor of treatment, it is likely that clinical observations were being used as a substitute for formal screening and assessment in the identification of post-stroke depression rather than as a trigger for the process of identification and assessment associated with best practice. Practitioners relied more often on their skill and experience in clinical observation to inform treatment than on the results of formal screening and assessment.

In the staff survey administered as part of the current audit process, approximately 57% of respondents indicated that clinical observation, either alone or in combination with more formal processes, was used to assess depression at the time of the study. Although screening questionnaires were considered useful and a means to reduce uncertainty, when asked about the

relative usefulness of clinical observation compared to formal screening tools, survey respondents indicated that they did not believe formal screening to be more or less helpful than clinical observation. While survey respondents did not rate the recognition of symptoms of depression as difficult, it is well-documented within the research literature that physician, nurse, or therapist recognition of depression based on clinical observation alone is often inaccurate.[106-113]

Su et al.[113] examined referrals to a psychiatric service made by non-psychiatric physicians over a 5-year period in order to determine the accuracy of clinical observations in the identification of several psychiatric disorders. The authors reported that, in the case of depression, observations made by referring non-psychiatric physicians were accurate in only 31.4% of cases referred for additional assessment. Similarly, the authors of a report describing a meta-analysis of 36 studies examining the recognition of depression using clinical observation by non-psychiatric physicians reported a summary sensitivity of 36.4%.[108] However, in the same study, summary specificity was 83.7%, suggesting that non-psychiatric physicians may be more adept at recognizing individuals who are not depressed than those who are. It should be noted that, in this analysis, some of the studies identified for inclusion by the authors did not use a clinical interview or DSM-based diagnosis as the gold standard against which physician performance was assessed. Several studies used self-report measures, such as the Beck Depression Inventory or the Geriatric Depression Scale, instead.

Mitchell and colleagues[109]reported the meta-analysis of 41 studies in which physician diagnosis based on clinical observation alone was compared to the results of a gold-standard diagnostic interview. Pooled analysis based on data collected from 50,371 patients demonstrated that, overall, general practitioners identified depression correctly 47.3% of the

time. In studies that examined both the ability to identify and to rule-out depression, it was determined that the sensitivity and specificity of clinical observation was 50.1% and 81.3%, respectively. As in the analysis performed by Cepoiu et al.[108], physicians appeared more skilled at ruling out depression. However, Mitchell et al.[109] also demonstrated a tendency toward over-diagnosis of depression such that the number of false positives generated through clinical observation may exceed true positives by as much as 3 to 1. Further, the greatest risk for generating false positive diagnoses occurred in populations of individuals with known risk factors for depression. In addition, accuracy of clinical observation can be reduced in cases of late life or minor rather than major depression.[111, 112] Given that the average age of individuals who experience stroke is 70 to 75 years and that there is an elevated risk for depression following stroke, there also may be an elevated risk for misdiagnosis of PSD associated with the use of clinical observation by non-psychiatric physicians. The tendency toward over-diagnosis in the older, high-risk population of individuals with stroke based on clinical observation could have contributed to the elevated rate of treatment found in the present study.

Fortunately, the potential for false positives in the identification of depression can be managed effectively by a multi-step assessment process, such as the one recommended within the Canadian Best Practice Recommendations.[109] These recommendations begin with the identification of possible cases of depression through formal screening. This process of classification of individuals as possibly depressed or not depressed can be enhanced by the addition of standardised screening tools. Lowe et al.[107] conducted a study in order to perform direct comparisons between the results of a gold standard, DSM-based clinical interview for the diagnosis of depression and a variety of standardised screening tools as well as unassisted non-psychiatric physician diagnosis. Clinical observation by a physician was associated with 40%

sensitivity and 87% specificity for major depression and 41% sensitivity and 90% specificity for any depressive disorder. However, use of a formal screening tool was associated with a dramatic improvement in sensitivity. For example, the authors reported that the Hospital Anxiety and Depression scale was associated with a sensitivity of 81%. Interestingly, this is the tool that was reported most frequently by survey respondents as the one used on their unit for formal screening. It also should be noted that, while the classification sensitivity associated with the use of a standardised screening tool is much greater than clinical observation by a non-psychiatric physician, the same is not true for specificity. In fact, Lowe et al.[107]demonstrated that, relative to a gold standard diagnosis for depression, physician assessment specificity was substantially higher (90%) than that associated with the HADS tool (75%).

Of course, it may not always be the attending physician who is responsible for making the clinical observations used in the decision to treat PSD. The physician may be taking into consideration both written observations as documented in the chart and uncharted, verbal, observations made by other members of the clinical team. Unfortunately, there is no evidence to suggest that the clinical observations made by other healthcare professionals are any more accurate than those made by non-psychiatric physicians. In a review and meta-analysis of 22 studies, Mitchell and Kakkadasam reported a pooled sensitivity of 43% and a specificity of 79.6% for the classification of depression based on the clinical observation of nurses working in inpatient settings.[110] Across all care settings (i.e., primary practice and community, inpatient and nursing homes), overall sensitivity and specificity were 42.1% and 83.6%, respectively. The authors proposed that, while nurses typically spend more time with patients and, therefore, might be expected to produce more accurate patient classification based on their observations, they are more cautious about diagnosis than physicians. [110, 112]

Rehabilitation therapists also can contribute to clinical observations influencing the diagnosis of depression. However, like physicians, therapists may have a tendency to over-pathologize. Ruchinskas[106] asked physical and occupational therapists about the presence of depression in individuals to whom they had provided services at the time of discharge from a geriatric rehabilitation service. When the therapist ratings were compared to the results of the Geriatric Depression Scale (GDS), there was no association between therapist experience and the identification of possible depression for either the physical therapists (r=-0.12) or the occupational therapists (r=-0.05). One-third of patients were rated as depressed by the rehabilitation therapists, but only 17% were identified with possible depression using the (GDS). In addition, contrary to what might be expected, increased patient contact was not associated with improved accuracy and, in fact, as length of stay increased, the accuracy of therapists' observations decreased. [106]

The clinical significance of the relative accuracy of clinical observation in the diagnosis of depression is determined by the actions taken based on accurate and timely observations. Based on the findings from the current study of inpatient rehabilitation programs in Southwestern Ontario, clinical observation may be taking the place of screening, assessment and diagnosis of depression following a stroke. Rather than triggering the first step in a multi-step assessment process that would lead to an informed and accurate diagnosis followed by treatment, pharmacotherapy may be prescribed based on clinical observation alone, in the majority of cases. Given the elevated risk of false positive diagnoses within this patient population, this approach could contribute to the inflated rate of treatment documented by the present audit.

4.1.2 Risks Associated with Over-Treatment

Treatment and remission of PSD may result in improved physical and cognitive recovery as well as reduction in risk for mortality. However, use of antidepressant agents, even SSRIs, is not without risk, particularly for individuals who are not experiencing depression. Based on data reported by 570 general practices in the United Kingdom from 1996 to 2007, Coupland et al.[114] demonstrated that, in individuals 65 years of age or older, the use of any type of antidepressant therapy was associated with an increased risk for mortality, attempted suicide/self-harm, falls, fractures and upper GI bleeding. However, patterns of risk varied with the type of antidepressant used. Use of SSRIs, the most commonly prescribed antidepressant, also was associated with increased risk for stroke/transient ischemic attack, myocardial infarction (MI), seizures and hyponatraemia. In the present study, SSRIs accounted for 72% of all antidepressants prescribed.

It should be noted that, although approximately 10% of patient records included in Coupland et al.[114] were obtained from individuals with previous stroke, there were no analyses reported that examined the use of antidepressant agents within this subgroup specifically. Instead, analyses of risk were adjusted for the presence of previous stroke as a potentially confounding factor.[114] In a retrospective study conducted in the United States, Ried et al.[115] examined the impact of SSRI use on mortality risk specifically in individuals with stroke. Maximum follow-up time was approximately 7 years. The authors reported that a diagnosis of depression either after the stroke or both before and after the stroke event was associated with a significantly increased risk for mortality when compared to no depression. Use of an SSRI antidepressant following stroke was associated with a significant reduction in mortality risk only for those individuals receiving treatment both before and after the stroke (HR=0.31 95% CI 0.11,

0.86) when compared to no treatment. Although there may have been some benefit associated with treatment after the stroke only for individuals with PSD, this effect did not reach statistical significance (HR=0.57; 95% CI 0.25, 1.32).

Both of these studies were retrospective and based on the abstraction of information from either databases or medical records and, therefore, susceptible to bias. Results should be interpreted with some caution. However, as with any drug, use of antidepressants should be considered within the context of possible risks as well as potential benefits. Treatment in the absence of appropriate identification, assessment or diagnosis may place individuals at unnecessary risk for any or all of the adverse effects associated with the use of antidepressant medications. Although SSRI use following stroke may be associated with a reduction in mortality risk, this may apply only to those individuals who also received treatment with an SSRI in the 6-month period preceding the stroke event.

In the present study, a total of 44 individuals were identified as having a recorded history of depression on admission to inpatient rehabilitation. Previous history of depression was identified as a significant predictor of treatment, indicating that individuals who had experienced depression previously were more likely to receive pharmacotherapy for depression. Although the receipt and timing of treatment for any pre-stroke episodes of depression were not recorded, these individuals may be among those most likely to benefit from treatment, at least in terms of reduction of risk for mortality. For the three individuals receiving a formal diagnosis of PSD, it is likely that the risks of treatment would be outweighed by the benefits. However, for many patients who received treatment, no formal diagnosis was made and the potential for harm given the risks associated with antidepressant use should be considered.

4.2 Understanding Adherence to Best Practice Recommendations

The creation and dissemination of evidence-based recommendations for best practice does not guarantee that they are read, understood or implemented in clinical practice. Many factors influence the uptake and implementation of best practice recommendations. In any attempt to understand compliance with recommendations, attention should be paid to variables functioning at different levels within the implementation process that include the individual healthcare practitioner as well as the program or organisational context.[116]

4.2.1 Organisational Factors

Management support is an important facilitator in the process of implementation. A supportive organisational structure can enhance the effectiveness of implementation interventions such as education and training or audit and feedback.[117, 118] Lack of support from superiors, in addition to insufficient staff and time, have been acknowledged as the most commonly-identified barriers to guideline implementation at the level of the organisation.[119] Leadership support and an organisational vision in line with the adoption of best practices, provision of staffing and other resources, as well as embedding best practice within organisational protocols and documentation systems promote positive staff attitudes and beliefs and facilitate adherence.[116]

In the present study, post-stroke depression was identified as a priority issue by rehabilitation managers at three of the five participating rehabilitation programs. Prioritisation was accompanied by the development and implementation of a formal protocol or strategy for the identification and treatment of PSD at two of these three facilities. When one examines the overall frequency with which adherence to the elements of best practice were recorded at each participant program, the two facilities with an established strategy, endorsed by program

management, had the highest rates of adherence to best practice recommendations in terms of screening and assessment. However, it is not possible to determine whether this was attributable to the presence of a management-endorsed protocol. The facilities that reported having a strategy in place for the assessment of depression also were the largest of the participating programs and may have had more staff and other resources available to them to facilitate adherence.

Despite prioritisation of PSD, the frequency of screening and assessment within the institutions where official strategies were in place was not as high as one might have anticipated. Program managers from these facilities reported problems with resource limitations in addition to difficulties with the development of standardised documentation systems that would ensure all screening efforts were recorded and placed in the chart. It is possible that documentation issues had not been resolved at the time of the audit, and that screening for depression was performed more frequently than was recorded.

4.2.1.1 Revising Professional Roles and Team Processes

National guidelines, such as the Canadian Best Practice Recommendations for Stroke Care, do not provide instructions regarding the development of strategies for implementation at the local level.[120] Each local facility or program often is faced with the daunting task of developing their own protocols in isolation. Practical organisational considerations for developing and implementing protocols include identification of managers and staff to function as champions, revision of professional roles to improve performance of the targeted behaviours, and staff training, in addition to documentation or information management.[116, 117, 121] Revising professional roles and setting team priorities and expectations can contribute to successful implementation of best practice and improve quality of care.[117] This process should not be

undertaken by leadership alone. Participation of the rehabilitation team in the process of developing implementation strategies, including revisions to professional roles and responsibilities, increases agreement with and adherence to best practice recommendations.[122]

Team involvement in the process of change leading to collective agreement in how care is delivered can result in a higher uptake than when change is directed by an individual leader or by a single professional group, particularly where a team approach to care is already the norm,[121, 123] as is the case in the stroke rehabilitation programs identified in the current study. In responding to the survey, rehabilitation managers identified difficulties in changing team behaviour as a barrier to implementing strategies for the adoption of best practice recommendations for PSD. However, it is unclear to what degree the clinical team at each participating facility has been involved in the development of strategies for implementation. For instance, in one of the two facilities with an official protocol, the process of strategy development and implementation involved only the rehabilitation manager and a single representative of the professional group being given responsibility for the practice of formal screening. The team should be given the opportunity to discuss the recommendations within the context of its own program and to evaluate which changes should be undertaken to support best practice.[123] This approach has the potential to prevent functions such as formal screening for depression from becoming "*just another piece of paper to keep track of and complete*" (response from rehabilitation management survey).

Within the team environment, identification of a staff champion or champions who take primary responsibility for implementing and sustaining best practice can help to facilitate change.[116] Screening or identification of depression might fall reasonably within the roles of social workers, for instance, since psychosocial aspects of stroke rehabilitation already are

considered to reside within their professional domain.[124] In the staff survey, respondents indicated most often that social workers and nurses were responsible for screening. This is not surprising given that, at one of the large institutions with an official protocol in place, social workers had been assigned responsibility for screening, while nurses had been given that responsibility at the other facility.

4.2.1.2 Resource Limitations

It is acknowledged that including mental healthcare professionals on rehabilitation teams is associated with increased accuracy of diagnosis of depression.[106, 113] However, in the context of inpatient stroke rehabilitation, mental healthcare professionals are an under-resourced profession. In the present audit, four of five participant programs reported that a lack of resources and poor or no access to psychiatrists or psychologists are important barriers to implementation of best practice recommendations for post-stroke depression. This finding was substantiated by a marked reduction or elimination of recorded adherence to recommendations pertaining to referral for formal assessment and diagnosis of depression by a qualified mental healthcare professional at most facilities.

In an audit of stroke services in the UK, Bowen et al.[91] discovered that only 28% of specialised stroke units, representing 75% of all stroke units in that country, had some, though often limited, access to clinical psychology or psychiatry services. The authors suggested that, while the addition of mental healthcare professionals to the stroke unit team is valuable, it may be cost-prohibitive given the relatively high rates of reimbursement required to access these services. Even when the psychiatrist or psychologist is viewed as an occasional consultant to the program rather than hired as a team member, the fees for service associated with consultation may exceed the amounts designated for this use within current departmental budgets. Without

access to a qualified mental healthcare professional, team members must rely upon a non-psychiatric physician's ability to recognise and diagnose depression.[113] Indeed, this may be the situation within the rehabilitation programs participating in the current study. In the absence of access to mental healthcare resources, practitioners may rely on clinical observation to guide treatment decisions, as noted earlier.

It may be possible to find solution to the problem of formal assessment and diagnoses within the climate of limited resources for mental healthcare reported by rehabilitation managers. Examination of the guidelines within the local context of care might reveal potential adaptations that could facilitate assessment and diagnosis without compromising the integrity of the original, evidence-based recommendations.[120] For instance, it is suggested that social workers could play a key role in the assessment and diagnosis of depression given that depression is already within their professional domain.[124] Other rehabilitation team members expect their involvement in this area and they are skilled in active listening, observations of behaviour, reflection and exploration through open-ended questioning, all of which are skills required to conduct a standardised interview. There are tools, such as the Mini International Neuropsychiatric Interview (MINI), which can be used to improve the process of identifying cases of depression accurately.[124] Although social workers cannot provide a formal diagnosis, they can provide non-psychiatric physicians with the results of an interview-based assessment such as the MINI, in order to facilitate a more informed, thorough and sensitive assessment and diagnosis by attending physicians. Of course, any such adaptation should be developed using a team approach in which possible role revisions and changes to processes of care are examined and agreed upon collectively.[116, 121] In addition, adaptations that include interview-based assessments other than the recommended gold standard clinical interview and diagnosis by a qualified professional

should be validated. Of course, in the present study, managers reported a lack of resources in terms of access to psychiatrists or psychologists. It is also possible that the staffing complement of social workers would not be sufficient to assume increased responsibilities associated with the administration of clinical interviews and provision of recommendations for diagnosis and treatment of PSD.

4.2.2 Clinician-Level Factors

To understand adherence to best practice recommendations for screening, assessing and diagnosing post-stroke depression, it is important to explore characteristics of the rehabilitation team members as well as organisational conditions which facilitate or impede implementation.[117] Common factors associated with adherence to recommendations at the level of the healthcare practitioner include awareness of the existence of the recommendations or guidelines, familiarity and agreement with the content of the guideline.[119] Although access may be provided, education and training are important to promote both awareness and familiarity with the guideline content and with the skills and abilities necessary to apply the recommendations correctly.[125, 126]

In the present study, access to the guidelines did not appear to be a concern. Approximately three-quarters of respondents indicated that they had access to the guidelines. However, in spite of having access, only 30% of individuals with access were aware of the specific recommendations made regarding the identification, assessment and treatment of PSD. In addition, respondents provided only neutral ratings overall with regard to their training, skills, and comfort in performing screening for PSD. Provision of additional information and educational opportunities regarding the best practice recommendations and the skills required for clinical implementation could improve both awareness and adherence.[125, 126] Indeed,

rehabilitation managers suggested that additional training and educational resources for staff would be beneficial to the process of implementation of best practice recommendations.

Clinician age and experience also may have played a role in the level of adherence found in the present study. It has been reported previously that younger or less experienced healthcare professionals are more likely to use guideline recommendations in their practice than their older or more experienced counterparts.[119] Belief in one's own competence as well as the inertia of previous practice, which may increase with experience, also can be a barrier to the adoption of best practice.[126] In the present study, 83% of survey respondents reported having more than 10 years of experience within their reported profession. Respondents may have been mostly experienced and confident clinicians, comfortable with their current skills and practices, and less likely to adopt best practice recommendations.

4.2.2.1 Behavioural Intent and the Adoption of Best Practices

The theory of planned behaviour comes from the field of social psychology and is based on the principle that there is a positive association between intention and overt behaviour.[127-129] Behavioural intent is composed of attitude (beliefs about the behaviour), subjective norms (expectation and motivation to perform the behaviour) and perceived control. Perceived control over the behaviour is influenced by several factors including the knowledge and skills of the individual, time and opportunities to complete the behaviour, and perceived autonomy in decision-making about the behaviour. Theoretically, the more positive the beliefs and the subjective norms, and the greater the perceived control over the behaviour, the stronger the intent will be and the more likely it becomes that the individual will perform the behaviour.[129, 130]

The theory of planned behaviour has been used frequently in studies of health-related behaviour. Godin et al.[131] performed a systematic review and analysis of the use of this theory in

examining intention and behaviour in healthcare professionals. Based on data reported in 78 studies, application of the theory of planned behaviour could account for 59% of the variance in behavioural intention and 31% of the variance in observable behaviour. The authors suggested that the theory of planned behaviour provides a valid model for the study and prediction of the behaviour of healthcare professionals within defined contexts of performance.[131] In fact, the questions and content of the staff survey used in the present study are based on the theory of planned behaviour.[92] In its original application, the survey was used to examine differences in attitudes, norms and perceived control in groups of behavioural intenders and non-intenders, classified on the basis of a response to a single survey item in an attempt to predict adherence to guidelines. However, this type of classification and analysis were beyond the scope of the current study. Rather than attempting to predict behaviour, the current project gathered information to inform a retrospective examination of documented behaviour within a specific clinical context.

Nash et al.[129] examined adherence to established guidelines regarding the assessment of pain and discovered that nurses who believed in the importance of assessment and felt that it was expected of them were more likely to carry out the required assessment. In the present study, survey items addressing beliefs about the identification and management of PSD received the strongest, most positive endorsements overall. Staff indicated that screening is an important and useful task and that depression can be easily and effectively treated once diagnosed. Unfortunately, belief in the importance of identification and management of PSD did not appear to be associated with higher levels of documented compliance with best practice recommendations. In addition, while respondents generally viewed screening as part of their professional roles, perceptions regarding specific expectations associated with screening

behaviour were less clear. In part, this may be attributed to the fact that, for respondents from the two largest participating programs, responsibility for screening had already been assigned to designated individuals within specific professional groups, thereby shifting expectations for task completion away from many respondents.

Identification of barriers to adoption of best practice is particularly important, given the juxtaposition of positive attitudes and beliefs about identification of PSD with the lack of documented formal screening. However, item responses with respect to perceived control were often ambiguous. Mean (and median) scores for most items representing anticipated barriers were neutral with only some respondents rating items as obstacles. The only item that emerged clearly as a potential barrier reflected perceived autonomy in decision-making. Respondents did not feel that it was their decision to either screen or ask for an individual with stroke to be screened. Overall, in terms of behavioural intent, there was no distinctly negative result in terms of attitude, beliefs, or expectations that would prevent the implementation of best practice recommendations for post-stroke depression. Instead, the positive result in terms of attitude and belief suggests that clinical staff may be more inclined to participate in a strategy for adoption of best practices, particularly should they be provided with greater autonomy within the process of implementation, as was discussed earlier.

4.2.2.2 Perceived Barriers to Adherence

Agreement with the content of guidelines or recommendations is an important factor in compliance.[119, 120, 125] Although explicit agreement with the recommendations was not solicited by any of the items in the staff survey used in the current project, respondent attitudes and beliefs regarding screening for PSD were favourable, in general. However, clinicians did not provide a clear endorsement of formal screening over clinical observation, which appears to be

representative of current practice. As mentioned previously, continued reliance on clinical observation to identify and to diagnose depression may be explained, in part, by a lack of resources and poor access to mental healthcare services or by duration of experience and practice inertia. It also could also be that clinical staff considers the implementation of formal screening as unnecessarily rigid when compared to the current practice of clinical observation. Perception of a recommendation as too artificial or rigid within the local context has been identified as a barrier to implementation.[120]

Other commonly identified barriers with respect to the implementation of best practice recommendations include objections by health care professionals that the guidelines are inappropriate to patients, the perception that compliance would not be in accord with patient preferences, and the lack of time or opportunity to comply with the guidelines.[120, 125] The appropriateness of using screening questionnaires to assess individuals with stroke received a neutral rating as did statements addressing the impact of cognitive and communication impairments on screening. Although the mean and median scores for items assessing patient perceptions regarding depression were generally neutral, it is clear that some respondents feel that patients regard depression in a negative light and would be upset by a discussion of depression. Lack of time was not identified as a barrier to screening in the present study.

4.3 Parkwood Hospital Pilot Study

A pilot audit of charts for patients admitted for inpatient stroke rehabilitation over a period of 6 months (May to October 2009) was completed at Parkwood Hospital in 2010. The purpose of that audit was to examine best practice recommendations for depression, and to test the audit tool, the staff survey and the NRS data reporting processes. Following completion of the initial chart audit, interactive information and education sessions were held to review the best practice

recommendations and to present the pilot audit results. Subsequently, implementation of the best practice recommendations for PSD was endorsed by the hospital Stroke Council. The responsibility for identification of PSD was assigned to the departmental social workers and a protocol for formal screening was created by rehabilitation management together with the lead social worker and implemented on the unit. With the repeat audit complete, the pilot audit at Parkwood Hospital may be viewed as a very basic audit and feedback intervention.

In the 2009 audit, formal screening for depression was recorded in 4.9% of identified patient records (n=123). This rate, which pre-dates the development of an official strategy for the adoption of best practices for PSD at Parkwood Hospital, is much closer to the rates recorded in smaller, non-protocol facilities participating in the current audit. This suggests that the initial audit and the subsequent development of a protocol did have a positive impact on the implementation of the best practice recommendation for formal screening. This effect was, like the initial Parkwood protocol, limited to formal screening for the possible presence of PSD. The frequency of referral for formal assessment decreased from 9.8% to 7.6%, since the pilot study was completed. In spite of the decline in assessment, treatment rates increased from 32.5% to 39.8%. Of the 47 patients in the present study who were treated for depression at Parkwood, only 3 had been screened, assessed and diagnosed with PSD according to best practice recommendations.

It seems reasonable to anticipate that if healthcare practitioners receive constructive feedback that their current clinical practices are not in keeping with accepted best practice recommendations, they would be motivated to change their practice patterns. However, the modest increase in rates of formal screening demonstrated at Parkwood Hospital as part of the current study are in keeping with a recent Cochrane review in which the authors suggested that

audit and feedback strategies are effective but result in only small to moderate improvements in practice. [132]

A team-based approach to implementing best practice guidelines which encourages participation in information exchange, including the development of feedback that is tied to reasonable and specific goals, can improve adherence to best practices, particularly within a context in which a team-based approach to care is already the norm.[93, 122] Rather than limit participation in the process of developing a strategy for the adoption of best practices for post-stroke depression to the rehabilitation manager and a single social worker, more team members whose practice may be affected by the implementation of these best practice recommendations should be invited to become engaged in the process. At the time of the second chart audit, there continued to be difficulty in creating clear expectations around documentation and, although discussed, there was no mechanism created for the provision of frequent, goal-based feedback. Provision of more frequent, meaningful feedback tied to specific goals may help to establish accountability, increase knowledge of best practices and improve adherence.[122]

4.4 Limitations of the Present Study

4.4.1 Proxy Assessment of Clinical Practice

The quality of clinical practice often is assessed indirectly using a proxy measure rather than via direct observation of clinician behaviour. Abstraction of data from patient records, or retrospective chart review, is currently the most common form of proxy assessment used in quality assurance studies.[133, 134] While this is the simplest and best understood measure, the chart may not be an accurate or reliable representation of all processes of care.[133] Results of studies using this form of proxy assessment may be subject to recording bias. Busy practitioners may do more than they record and the chart may not reflect all of the clinical events occurring over the

course of an inpatient stay accurately.[133] The accepted gold standard for the evaluation of clinical practice is the direct assessment of standardised patients.[133, 134] However, this approach is difficult logistically, time-consuming and prohibitively expensive, particularly for large, regional studies.[133] In addition, direct assessment may promote changes in practice in order to comply with perceptions of what clinicians should be doing.[134]

Although incomplete recording practices can result in underestimation of the frequencies of some clinical behaviour, some types of behaviour are more susceptible to underestimation than are others. Data pertaining to physical examinations, blood pressure, lab test orders and results, prescription of medications and referrals for specialist assessment are recorded more reliably and less ambiguously than are activities related to counselling or prevention interventions.[133, 134] In the present study, the elements of best practice for PSD were represented by formal screening, referral for specialist assessment and prescription of medication(s). The latter two elements (referral for specialist assessment and prescription of medications) are among the types of information most likely to be recorded accurately within the patient record. However, elements such as formal screening for depression, patient history of mental illness or previous stroke, and clinical notes regarding depression may have been affected by recording bias.

Other identified problems associated with retrospective chart reviews include illegibility, missing reports and variability in the skill and experience of the individuals completing the chart abstractions.[133] Although some investigators and clinicians might assume that eventually the electronic patient record will improve the quality of the health record, changing the medium does not guarantee that the information stored will be more accurate, more complete or more useful.[133] In the present study, illegibility remained a problem despite an increase in electronic information

management. Paper charts are still used to some extent in most centres and the majority of information is still handwritten. Even in centres with electronic patient records, these most often consist of scanned copies of the mostly hand-written paper chart created for the inpatient stay. In the present study, abstractions were conducted by an experienced researcher trained in chart abstraction in an effort to minimise bias.

4.4.2 Response Biases

Data collected using the online survey could have been subjected to a number of different forms of response biases. Due to the requirements for anonymity for survey respondents, responses could not be differentiated by participant rehabilitation program. Therefore, between-program differences in responses or response patterns could not be examined.

4.4.2.1 Non-Response Bias

In general, non-response bias becomes a concern when there is less than a 50% response rate.[135] In those instances, there is a greater chance that there is something inherently different about those individuals who chose to respond versus those who did not. Responders are more likely to be a self-selected group distinguishable from non-responders or from those who refused to participate.[135] The response rate for the staff survey used in the present study was 38%. It was not possible to evaluate differences between responders and non-responders because there were few data available relative to the potential pool of survey respondents. All rehabilitation managers (100%) provided responses to the management survey.

In the case of examining adherence to guidelines, a low response rate could be associated with lack of access to or familiarity with the guidelines as well as limited agreement with the guidelines.[125] Non-responders may not consider PSD to be an important issue and are unfamiliar or disagree with the current evidence-based recommendations for PSD. Responders, on the other

hand, may represent a self-selected group of clinicians who place more importance on PSD, and who are more familiar or in agreement with the recommendations than non-responders.

Other obstacles to participation in surveys include lack of time, lack of encouragement to participate in research activities or a perceived lack of opportunity to participate.[125] To address these types of obstacles to participation, the survey used in the present study was short, required approximately 10 minutes to complete, and was easily accessible through available on-site or personal home computers with access to the internet. Invitations to participate were followed by written, email reminders and each site was presented with the opportunity for pen-and-paper administration of the survey.

Admittedly, non-response bias is a concern and interpretation of the survey results should be approached with the appropriate caution. However, low response rate, on its own, may be a poor predictor of bias associated with non-response.[136] In a recent study, Ziegenfuss et al.[137] examined response bias in a group of physicians who were asked to complete a survey examining care processes and systems for individuals with diabetes. Despite a response rate of 36%, the authors were unable to demonstrate response bias based on the comparison of responders with non-responders using summary patient and clinician characteristics. The authors suggested that the greater concern with low response rates may be the attenuation of statistical power due to reductions in sample size.[137]

4.4.2.2 Social Desirability Responding

Social desirability responding refers to the tendency of respondents to give what they perceive to be socially desirable answers. When the individual seeks to put her/his best foot forward in order to create a positive impression, it may be referred to as “faking good” or “impression management”.[138(p110)] Topics that reflect good citizenship in some way, such as

being well-informed or fulfilling one's responsibilities, are particularly prone to this type of responding. Questionnaires that address these issues may suffer from over-reporting or inflated estimates of compliance with behavioural standards from which respondents gain nothing other than an exaggerated appearance of compliance.[138] The process of guideline dissemination may expose healthcare practitioners to socially-based pressures for compliance that, in turn, promote provision of socially desirable responses that are not an accurate reflection of current clinical practice.[139] This may be especially true when clinicians are aware of guidelines and know they should be implemented, but do not change their practice given the presence of barriers such as lack of resources, time pressures or deficits in specific training or skills.[139]

In a review of studies evaluating adherence to guidelines, Adams and colleagues[139] discovered that self-reported rates of adherence exceeded objectively-determined rates by a mean absolute difference of 27%. Of the 37 self-report measures identified, 87% were associated with over-estimates of adherence. In the present study, the examination of adherence to best practice guidelines was not based on the self-report of clinical practice contained in the online survey. However, survey responses provided elevated estimates when compared to objective data for numbers of patients screened, the implementation of routine formal screening and the proportion of patients screening with a formal screening tool.

4.4.2.3 Central Tendency Bias

Continuous scale item response formats, such as the Likert scale, may be susceptible to central tendency bias, or the reluctance of respondents to endorse extreme categories of the scale.[138] In general, respondents find it difficult to make judgements without provision for extenuating circumstances. In the present study, respondents may have been influenced to some degree by this tendency. In the section of the survey addressing attitudes and opinions, median

scores for seven items were neutral with IQR values (where IQR=Q3-Q1) that indicated 50% of responses occurred within a 2 or 3 point range of the neutral value. However, the response set for survey items included strong rather than absolute statements as anchor points to the 7-point Likert scale, which may have improved the probability that all categories were used appropriately.[138]

Chapter 5

5. Conclusion

Efforts to promote the adoption of best practice recommendations are best preceded by an effort to understand current clinical practice.[95, 121] Understanding and achieving change in practice occurs on multiple levels including the individual healthcare practitioner, the clinical care team and the program or organisation.[121] In the current study, a practice audit of adherence to Canadian Best Practice Recommendations for Post-Stroke Depression was performed using retrospective patient record review at five inpatient rehabilitation programs in Southwestern Ontario. Objective results were supplemented by clinician and rehabilitation management surveys.

Overall, documented compliance with the best practice recommendations for screening, assessment and management of PSD was poor. Approximately 14% (41/294) of patients were screened formally and very few of those individuals were referred for treatment and diagnosed with depression before receiving treatment. In spite of the lack of formal assessment and diagnoses, almost 40% of all patients received treatment with an antidepressant medication for depression. Only three patients who were treated with an antidepressant had been screened, formally assessed by a psychiatrist or psychologist and diagnosed with depression. Overall,

individuals who were treated for depression at the time of admission, with more severe functional deficits, a history of psychiatric illness and for whom there were documented observations about depression were more likely to receive treatment for depression, even in the absence of formal screening, assessment or diagnosis.

The development of protocols or strategies and systems of documentation to support best practice promotes adoption. Two of the participant programs reported developing official strategies for the implementation of best practice recommendations for PSD. While the existence of an official strategy appeared to be associated with a modest increase in rate of formal screening, it did not improve the progress of patients identified with possible depression through the 3 stages of best practice from screening to assessment to treatment. Referral for assessment was not dependent on the results of formal screening in most cases.

Management from both programs that had developed a protocol for the identification of PSD reported difficulty creating clear expectations around a standardised system of documentation. In fact, in all participating programs, the audit process was made more difficult by the current systems of documentation employed by each facility. Documentation of screening, assessment or observation of depression or mood in the current study data was unsystematic and often difficult to find, despite the acknowledged importance of PSD. Ideally, the development of standardised documentation would include a mechanism for the provision of frequent feedback linked to reasonable goals agreed upon by team members.

Perhaps one of the greatest challenges experienced by rehabilitation programs is the lack of resources with which to access mental healthcare services. Of the 5 participant programs, staff in only one had access to a psychiatrist or psychologist who could be consulted in the event of a positive result on a formal screening test. One additional program reported limited access but no

funding to support the use of consultation services. Although patients benefit when there is a psychiatrist or a psychologist on the rehabilitation team, the cost associated with their involvement may not be available within existing budgets.

This project represents the beginning attempt to promote the implementation of best practices for the screening, assessment and treatment of post-stroke depression. Facilitation of adherence to evidence-based recommendations is a complex process that may depend on a variety of program or organisation-level as well as clinician-level factors, such as practitioner knowledge and skill as well as familiarity and agreement with the specific elements or actions required by the recommendations. Findings from this study should not be viewed within the context of a single audit and feedback intervention. This project is part of an ongoing effort to examine adoption of best practice recommendations for depression across the province. Results from this project will be disseminated to all participating facilities and will be made available to interested parties through the Ontario Stroke Network. It is hoped that, in the future, results of the current practice audit will be used to inform the development of a multi-component strategy to facilitate adherence to guidelines that relies on a participatory team-based approach, including strong administration involvement, especially related to documentation and resource allocation. Given that clinician respondents expressed attitudes representative of a climate of positive intent, rehabilitation teams may be willing to engage in a process of building and tailoring strategies to support implementation of best practice recommendations within their local context. Clearly, the problem of lack of funding for mental health services and limited or no access to these services must be addressed by administration, policy makers and/or funders if best practices for the identification and treatment of depression are to be implemented in their entirety. In the

meantime, the use of alternative assessment methods in keeping with the integrity of the evidence-base should be explored.

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Appendix 1. Data Abstraction Form

Pt. ID code	Stroke (type, location)	Pre-admission Psychiatric diagnosis	Dep[1] screen (Y/N)	Tool used	Score	Notes re: possible dep.	Ref for dep Ax (Y/N)	Tx for dep	Notes
								A[2]:	
								D:	
								A:	
								D:	
								A:	
								D:	
								A:	
								D:	
								A:	
								D:	

***Dep = depression; A=admission, D=discharge**

Appendix 2. Staff Survey

STAFF QUESTIONNAIRE ABOUT SCREENING FOR POST STROKE DEPRESSION

For this survey, screening refers to the use of a questionnaire to assess depression in patients that you see. If you do not carry out screening for depression personally, please still complete the questionnaire as your responses are equally valuable.

For each question please tick (or circle) your chosen response. All the information you provide is completely anonymous. Thank you.

PERSONAL INFORMATION

1. What is your profession?

- □ Nursing
- □ Physiotherapist
- □ Social Worker
- □ Psychologist
- □ SLP
- □ Physician - Attending Primary Care
- □ Physiatrist (physician)
- □ Psychiatrist
- □ Neurologist
- □ Occupational Therapist
- □ Other (please specify) ……..

2. For how many years have you been in practice?

- □ Less than 5 years
- □ 5 – 10 years
- □ 10 – 20 years
- □ More than 20 years

3. Are you employed on a Full-time or Part-time basis?

- □ Full-time
- □ Part-time

ABOUT THE CANADIAN BEST PRACTICE RECOMMENDATIONS FOR STROKE CARE

1. Do you have access to a copy of the Canadian Best Practice Recommendations for Stroke Care?

   □ Yes
   □ No
   □ I don't know

2. What form, if any, of the Canadian Best Practice Recommendations for Stroke Care have you read regarding the assessment of depression?

   □ I have read the full version
   □ I have read the summary/concise version
   □ I have not read the recommendations

3. Are you aware of the Canadian Best Practice Recommendations regarding the assessment of post-stroke depression?

   □ Yes
   □ No
   □ Somewhat

INFORMATION ABOUT YOUR REHABILITATION UNIT

1. Does your unit have access to a clinical psychologist or psychiatrist?

   □ Yes
   □ No
   □ I don't know

2. Is screening for depression part of your teams' *routine* assessment?

   □ Yes
   □ No
   □ I don't know
   □ Yes, but not all patients are screened (only when it is considered necessary)

3. How is depression assessed in your unit (check all that apply)?

   □ Clinical observation
   □ Clinical interview

□ Depression questionnaires
□ Other (please elaborate)……..

□ I don't know

4. When depression is suspected, in what percentage of cases is a formal screening tool used (Check the answer).

0-20%	21-40%	41-60	61-80	80-100

5. What screening tools are routinely used in your unit for assessing depression?

□ HADS (Hospital Anxiety and Depression Scale)
□ GDS (Geriatric Depression Scale)
□ BDI (Beck Depression Inventory)
□ VAMS (Visual Analogue Mood Scales)
□ SADQ (Stroke Aphasia Depression Questionnaire)
□ Others (please specify) ……

□ I don't know

6. Which professional disciplines do the screening on your unit (check all that apply)?

□ Nursing
□ Physiotherapist
□ Psychologist
□ Social Worker
□ SLP
□ Doctor
□ Physiatrist
□ Neurologist
□ Psychiatrist
□ Occupational Therapist
□ Other (please specify) ……

7. Please estimate the number of patients you have screened for depression (or requested that someone else screens for depression) in the last month.

YOUR VIEWS ABOUT SCREENING FOR DEPRESSION

Please provide answers based on your own personal opinion.

1. Screening patients for depression after their stroke is important.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

2. My professional colleagues think I should screen patients for depression after their stroke (or ask for them to be screened).

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

3. Screening patients for depression (or asking for them to be screened) after their stroke is expected of me.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

4. I feel comfortable screening patients for depression.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

5. I have adequate skills and training to screen patients for depression (or to know when to ask for screening).

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

6. Whether or not I screen patients (or ask for them to be screened) for depression is my decision.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

7. Screening for depression (or asking for someone to be screened) is not part of my role.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

8. Most screening questionnaires are unsuitable for use with stroke patients (e.g. those with communication difficulties, cognitive impairment etc).

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

9. Time pressures make it less likely that I screen patients (or ask for someone to be screened) for depression.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

10. Screening patients for depression can reduce uncertainty about whether or not they have depression.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

11. Screening questionnaires for assessing depression are clinically useful.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

12. Screening for depression is more effectively achieved by clinical observation (rather than using screening questionnaires).

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

13. Understanding that a patient is depressed by screening helps me to engage them in rehabilitation.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

14. Recognising symptoms of post stroke depression is difficult.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

15. It is difficult to treat post stroke depression once a diagnosis is made.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

16. Discussing depression treatment options with patients is difficult and may cause them to become upset.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

17. Most patients feel that a diagnosis of depression is an indication of personal weakness.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

18. Antidepressant medications do not work in post-stroke depression.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

19. Does the presence of communication issues prevent you from screening an individual for depression?

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

20. Does the presence of cognitive issues prevent you from screening an individual for depression?

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

ABOUT POST STROKE DEPRESSION

The following are all symptoms of post-stroke depression. Considering each one in turn, please indicate to what extent it would influence your decision to screen for depression (or ask for screening to be carried out).

Symptoms present	**Very likely to make me consider screening**				**Very unlikely to make me consider screening**
Emotional lability	1	2	3	4	5
Apathy	1	2	3	4	5
Tension	1	2	3	4	5
Poor concentration	1	2	3	4	5
Reports of feeling guilty	1	2	3	4	5
Hopelessness	1	2	3	4	5
Agitation	1	2	3	4	5
Early waking/insomnia	1	2	3	4	5
Thoughts of death	1	2	3	4	5
Suicidal thoughts	1	2	3	4	5
Lack of motivation	1	2	3	4	5
Sleepiness	1	2	3	4	5
Reports of feeling worthless	1	2	3	4	5
Loss of energy	1	2	3	4	5
Loss of interest	1	2	3	4	5
Weight gain or loss	1	2	3	4	5
Distractibility	1	2	3	4	5

Thank you for taking the time to complete the questionnaire. Your support and involvement in this research is greatly appreciated.

Appendix 3. Letters of Consent, Information and Debriefing.

1) Invitation to Participate and Informed Consent

Subject Line**:** Staff Questionnaire, Screening for Post-Stroke Depression

You are being invited to participate in a research study because you are a healthcare professional working in an inpatient rehabilitation setting. The purpose of this study is to investigate current practices regarding the screening and assessment of post-stroke depression in Ontario inpatient rehabilitation units. Participation in this study involves the completion of an online survey that asks questions relating to depression screening. This survey should take approximately 10 minutes to complete.

There are no known physical or psychological risks associated with this study. Your participation in the study is voluntary and you are free to withdraw at any time or refuse to answer any questions without penalty. Your responses will be entirely anonymous, kept strictly confidential, and will not be shared with any other staff members. No personal identifiers are collected or retained. Information collected will only be used for research purposes. Please note that completion of the survey confirms informed consent to participate.

The dead-line for completing the survey is *dateline date*. After this date, the survey will no longer be available. **The survey is available at: http://www.surveymonkey.com/s/G9KYLVK** *(to access the survey simply click on the link above or cut and paste the link into your browser's address bar)*

Please feel free to ask questions at any time. If you have any further questions or concerns you may contact XXXXXXXXXXXX. Once you have completed the survey you will receive a debriefing form that more clearly describes the purposes and hypotheses of this study.

If you have any questions about your rights as a research participant or the conduct of the study you may contact The Office of Research Ethics XXXXXXXXXXX.

If you have additional questions regarding the study in general, you may also contact the principal investigator, XXXXXXXXXXXXX.

Thank you in advance for your time and consideration,

2) Reminder Invitation

Subject Line**:** Staff Questionnaire, Screening for Post-Stroke Depression : Survey reminder.

Last week an invitation was sent to you requesting your completion of a survey gathering information regarding screening for post-stroke depression. If you have already completed the survey, thank you. If you have not, I invite you to complete this survey.

The survey is available at: http://www.surveymonkey.com/s/G9KYLVK
(to access the survey simply click on the link above or cut and paste the link into your browsers address bar)

This survey should take about 10 minutes to complete. **The dead-line for completing the survey is (*deadline date*).** After this date, the survey will no longer be available.

Your completion of this survey is completely voluntary. If you have decided not to participate in this study, simply delete this e-mail message. You are free to withdraw at any time or refuse to answer any questions without penalty. Your responses will be entirely anonymous, kept strictly confidential, and will not be shared with any other staff members. No personal identifiers are collected or retained.

Please feel free to ask questions at any time. If you have any further questions or concerns you may contact XXXXXXXXXX. Once you have completed the survey you will receive a debriefing form that more clearly describes the purposes and hypotheses of this study.

If you have any questions about your rights as a research participant or the conduct of the study you may contact The Office of Research Ethics at XXXXXXXX.

If you have additional questions regarding the study in general, you may also contact the principal investigator, XXXXXXXXXXXXXX.

Thank you in advance for your time and consideration.

3) Debriefing Letter

Subject Line**:** Staff Questionnaire, Screening for Post-Stroke Depression – ***Study Information (debriefing)***

Adherence to Canadian Best Practice Recommendations for Stroke Care: Assessment of Post-Stroke Depression

The Canadian best practice recommendations for stroke care were published in 2008 and updated in 2010 (Lindsay et al. 2008, 2010). This document was developed to coordinate Canada's approach to stroke prevention, treatment, rehabilitation, and community reintegration by enhancing access to high-quality and efficient stroke services for all Canadians across the country. The primary goal of these recommendations is to improve patient care by applying best-practice evidence.

Several best practice recommendations are made regarding the assessment and management of post-stroke depression during inpatient rehabilitation. For example, it is recommended that all patients in stroke rehabilitation should be screened for depression and that patients identified as being at risk during screening should be referred for further assessment. However, it is currently not known what proportion of stroke rehabilitation patients are screened for depression nor is it know what proportion of patients are referred for additional assessment.

The objective of this study is to assess the extent to which rehabilitation in Ontario have adopted the Canadian best practice recommendations pertaining to the identification, assessment and management of post-stroke depression. The survey you have just completed will be used to supplement and give context to information gathered through retrospective methods.

It is hypothesized that a relatively large percentage of patients are not screened for the presence of depression and that many individuals identified as being at risk are not referred for further assessment. Because adherence to the Canadian best practice recommendations should enhance the quality and efficiency of stroke rehabilitation, it is of great importance that we determine if these recommendations are being implemented. Identification of our shortcomings in meeting these goals is the first step towards ensuring that patients in Ontario receive the best stroke care possible. In the next step of the process, we hope to use the information gained in the present study to inform a process of knowledge implementation that will include addressing identified barriers, finding ways to improve the local relevance of existing guidelines and developing clinically applicable implementation strategies. It is hoped that, through this process, we will promote improvements in the recognition and treatment of post stroke depression which may result in improved physical and cognitive recovery for individuals who have experienced stroke.

References:

Lindsay P, Bayley M, Hellings C, Hill M, Woodbury E, Phillips S. Canadian best practice recommendations for stroke care: Summary. CMAJ 2008;179(12 suppl):S1-S25.

Lindsay MP, Gubitz G, Payley M, Hill MD, Davies-Schinkel C, Singh S, Phillips S. Canadian Best Practice Recommendations for Stroke Care (Update 2010). On behalf of the Canadian Stroke Strategy Best Practices and Standards Writing Group. 2010; Ottawa, Ontario Canada: Canadian Stroke Network.

Appendix 4. Rehabilitation Management Survey

CANADIAN BEST PRACTICE RECOMMENDATIONS FOR STROKE CARE
POST-STROKE DEPRESSION
REHABILITATION MANAGEMENT SURVEY

1. Does your facility have an official protocol or strategy for identification and management of post-stroke depression? Y N

    a. If yes, proceed to Part A
    b. If no, proceed to Part B

Part A

1. Are you familiar with the updated Canadian Best-Practice Recommendations for Stroke Care? Y N

    a. If Yes, were the recommendations used when developing your depression management strategy? Y N

    b. If No, were other guidelines/recommendations used to develop your depression management strategy? Y N

    c. If yes to (b), please specify:_____

2. Can you briefly describe your existing protocol for management of post-stroke depression?

3. Can you please describe any barriers or challenges you experienced when developing your protocol?

4. Can you please describe any factors that were helpful when developing your protocol?

5. Were resources an issue when developing your protocol and, if so, how were these issues addressed?

Part B

1. Are you familiar with the updated Canadian Best-Practice Recommendations for Stroke Care? Y N

   If yes:
   a. Have these recommendations been made available to staff members on your unit? Y N

   b. Are you familiar with the specific recommendations for management of post-stroke depression? Y N

2. Has post-stroke depression been identified as a concern on your unit? Y N

3. In your opinion, why has no protocol for management of post-stroke depression been developed?

4. If a post-stroke depression management strategy were to be developed on your unit, what do you feel would be the greatest challenges that would need to be overcome?

5. What factors or features of your unit might be most helpful in developing a practice protocol for depression?

Appendix 5. Research Project Approvals

Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Robert Teasell
Review Number: 17943E
Review Level: Delegated
Approved Local Adult Participants: 130
Approved Local Minor Participants: 0
Protocol Title: Adherence to Canadian Stroke Rehabilitation Guidelines Regarding the Assessment and Treatment of Post-Stroke Depression: a quality assurance initiative.
Department & Institution: Physical Medicine & Rehab, St. Joseph's Health Care London
Sponsor:
Ethics Approval Date: April 12, 2011 **Expiry Date:** April 30, 2012
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
UWO Protocol		
Letter of Information & Consent		
Other	Email - Initial	
Other	Email - Reminder	
Other	Telephone Message	
Other	Debriefing Form	

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research

Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The UWO HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

LAWSON HEALTH RESEARCH INSTITUTE

FINAL APPROVAL NOTICE

RESEARCH OFFICE REVIEW NO.: R-11-141

PROJECT TITLE: Adherence to Canadian Stoke Rehabilitation Guidelines Regarding the Assessment and Treatment of Post-stroke Depression: a Quality Assurance initiative. Grant # OSN1101-000122

PRINCIPAL INVESTIGATOR: Dr. Robert Teasell

DATE OF REVIEW BY CRIC: April 27, 2011

Health Sciences REB#: 17943E

Please be advised that the above project was reviewed by the Clinical Research Impact Committee and the project:

Was Approved

PLEASE INFORM THE APPROPRIATE NURSING UNITS, LABORATORIES, ETC. BEFORE STARTING THIS PROTOCOL. THE RESEARCH OFFICE NUMBER MUST BE USED WHEN COMMUNICATING WITH THESE AREAS.

GREY BRUCE Health SERVICES

P.O. Box 1800, 1800 8th Street East
Owen Sound, Ontario N4K 6M9
(519) 376-2121

June 1, 2011
Dr. Robert Teasell, MD, FRCPC
Dept of Physical Medicine and Rehabilitation
Parkwood Hospital, 801 Commissioner's Rd. E
London, Ontario
N6C 5J1

Re: Adherence to Canadian Stroke Rehabilitation guidelines regarding the assessment and treatment of post-stroke depression: a quality assurance initiative.

The review process of the Grey Bruce Health Services Ethics Committee has given expedited approval to our participation in the above named study.

This approval will last for only one year. If the study extends beyond one year, you are required to request re-approval for the next year at least three weeks prior to June 1 2012. If any modifications occur, you must report as a change in protocol, to the Clinical Research Advisory Group.

Please notify this Committee of any new advertisements or recruiting material, change of Investigator, Study Coordinator or site location, serious adverse events, amendments or changes in the protocol, significant protocol deviations, patient death or termination of the study. Please note that you must submit all protocol amendments and/or advertising to the Committee, prior to implementing the amendments and or advertisements. Continued approval is contingent on timely submission of reports.

The Clinical Research Advisory Group is in compliance with the regulations of the Food & Drug Administration as described in 21 CFR parts 50 & 56 as well as the International Conference of Harmonization (ICH) Good Clinical Practice (GCP) Guidelines for IRB's. and complies with the ethical standards forwarded in Tri-council Policy

Data Transfer Agreement ("Agreement")
Academic Research Use of Personal Health Information

BETWEEN:	AND
Lawson Health Research Institute ("Lawson") 375 South Street C210 Nurses' Residence London, ON, N6A 4G5 Canada	Huron Perth Healthcare Alliance Stratford General Hospital 46 General Hospital Drive Stratford Ontario N5A 2Y6
Lawson Investigator: (together with Lawson: "RECIPIENT")	**Provider Investigator: Insert name** (together with PROVIDER Institution: "PROVIDER")

Name of Study ("Study"): Adherence to Canadian Stroke Rehabilitation Guidelines regarding the assessment and treatment of post-stroke depression: a quality assurance initiative (UWO REB # 17943E)

Description of data (append if necessary):

1) **NRS data set (patient ID, age, gender, most responsible condition, time from onset to admission, admission & discharge dates, FIM scores at admission and discharge (motor, cognitive, total scores) for patients discharged from inpatient rehabilitation September 1, 2010 through March 1, 2011**
2) **Information abstracted from identified patient charts regarding the screening, assessment and treatment of post stroke depression (stroke type/location, history of psychiatric diagnoses, screening performed, screening tool used, score, referral for assessment, results, treatment initiated, antidepressant prescribed)**

Method of data transfer:

As per the approved protocol, data will be transported between the collection site (s) and Parkwood Hospital (ARGC) in hard copy form by one or two research associates employed by the project and trained in confidentiality procedures. Transport will occur by private vehicle. Paperwork will be housed in a locked file box (purchased for this purpose) while in transit. Abstracted data will not be housed at the collection site, but rather at the central site, at Parkwood Hospital (Aging, Rehabilitation and Geriatric Care research centre) on a computer connected to a secure system that is password protected, and has both available in-house encryption and existing firewalls.

Data to be provided: As per a Research Ethics Board approved Study Protocol, incorporated herein by reference.

This Agreement, effective as of the last date of signature below, is entered into between the parties to govern the transfer of the Data from PROVIDER to RECIPIENT for use in the Study, in compliance with applicable laws. PROVIDER retains the right to refuse transfer of the Data requested.

PROVIDER will prepare and furnish to RECIPIENT the Data (as applicable) in accordance with Ontario's *Personal Health Information Protection Act*, and specifically warrants that transfer of the Data by PROVIDER will be in compliance with Research Ethics Board ("REB") approved subject informed consent forms ("ICFs") provided by the individuals from whom the Data were collected, or terms of an REB Waiver of Consent ("REB Waiver"), as applicable (incorporated herein by reference). Data will not be transferred until each party's REB provides written approval for the Study. RECIPIENT will not use Data until RECIPIENT obtains a copy of the PROVIDER's REB approved ICF or REB Waiver, as applicable.

RECIPIENT shall use the Data in compliance with all applicable laws; and shall specifically only use or disclose the Data for the conduct of the Study in accordance with the permitted uses of the Data specified in the applicable ICFs or REB Waiver, or otherwise as required by law. RECIPIENT shall keep personally identifying information confidential and shall not include any personally identifying information in any publication or presentation.

No right, title or interest in and to the Data is granted or implied to the RECIPIENT hereunder. PROVIDER shall retain ownership of the Data.

RECIPIENT intends to publish the results of the Study and shall advise PROVIDER of the results of the Study and recognize PROVIDER'S contributions to the Study in any publication in accordance with academic standards.

RECIPIENT shall use appropriate safeguards to prevent any unauthorized use or disclosure of the Data and shall report to the PROVIDER any unauthorized use or disclosure of which RECIPIENT becomes aware, or of any breach of this Agreement. RECIPIENT shall not use the Data to identify or contact the individuals from whom such Data were collected. RECIPIENT shall securely destroy the Data as required by the

Protocol or PROVIDER and provide a written confirmation of the manner of destruction in a form acceptable to PROVIDER. PROVIDER may conduct audits of the RECIPIENT concerning the maintenance of appropriate security safeguards to ensure compliance with this Agreement, which may include completing a privacy assessment tool questionnaire.

RECIPIENT shall give access to the Data only to its staff with a need to know for the purpose of conducting the Study, and who are bound by RECIPIENT to comply with the terms of this Agreement.

Data are provided on an "as-is" basis and PROVIDER makes no representations or warranties, express or implied, with respect thereto. RECIPIENT accepts that there are no representations, warranties, conditions or liabilities expressed or implied herewith in relation to the Data by PROVIDER or its trustees, directors, officers, affiliates, investigators, students, employees, servants, authorized representatives or agents.

RECIPIENT agrees to indemnify PROVIDER and its trustees, directors, officers, affiliates, investigators, students, employees, servants, authorized representatives or agents and their respective successors and assigns against all liabilities, claims, damages, losses or expenses (including reasonable lawyers' fees) brought by third parties arising out of RECIPIENT's use of the Data or RECIPIENT's failure to substantially adhere to the terms of this Agreement.

This Agreement may be executed in one or more counterparts, each of which together shall constitute one and the same Agreement. For purposes of executing this Agreement, a facsimile (including a PDF image delivered via email) copy of this Agreement, including the signature pages, will be deemed an original.

CHATHAM-KENT
Health Alliance
Alliance de Chatham-Kent pour la santé

Campuses
80 Grand Ave. W.
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Wallaceburg, ON

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Tel: (519) 352-6400
Web: www.ckha.on.ca

April 14, 2011

Research Project Title: Adherence to Canadian Stroke Rehabilitation Guidelines regarding the assessment and treatment of post-stroke depression: a quality assurance initiative

Principal Investigator: Dr. Robert Teasell
Professor and Chief/Chair
Department of Physical Medicine and Rehabilitation,
Schulich School of Medicine and Dentistry
Parkwood Hospital
801 Commissioner's Road E
London, ON N6C 5 J1

Copies To: Nancy Snobelen
Program Director, Rehabilitation, Complex Continuing Care and Chronic Disease Management Program
Chatham-Kent Health Alliance

CKHA Reference No. 11APR003

The Research Project noted above, consisting of:
- Request to Participate In/Conduct Research or a Pilot Project
- Form 2F002 – UWO HSREB Delegated Review dated June 2010

was granted expedited approval on behalf of the Chatham-Kent Health Alliance Ethics Review Board (ERB). This approval is granted for a one-year period from the date of this letter.

A Status Report and/or Final Report is due within 30 days of the close of the research project, or when a request for annual renewal is submitted.

During the course of the research, no deviations from or changes to the protocol or consent form may be initiated without prior written approval from the ERB except when necessary to eliminate immediate hazards to the subject (e.g. increased risk), or when the changes involve only logistical or administrative aspects of the study (e.g. change in monitor, change in contact information). Expedited review of minor changes in ongoing studies will be considered.

All Serious Adverse Events must be submitted to the ERB in writing confirming the Principal Investigator has reviewed the documentation. If changes are required of

CHATHAM-KENT
Health Alliance

Alliance de Chatham-Kent pour la santé

the protocol as a result of the SAE, an explanation and additional documentation of the changes is required.

Campuses
80 Grand Ave. W.
Chatham, ON

We wish you every success in your research

WINDSOR REGIONAL HOSPITAL
OUTSTANDING CARE – NO EXCEPTIONS!

Research Ethics Board

Windsor Regional Hospital
1995 Lens Avenue
Windsor, Ontario
N8W 1L9

Meeting Review Date: June 16, 2011

Project Title: Adherence to Canadian Stroke Rehabilitation Guidelines Regarding the Assessment and Treatment of Post-Stroke Depression: A quality assurance initiative.

Principal Investigator: Dr. Robert Teasell, Department of Physical Medicine and Rehabilitation Parkwood Hospital, London, Ontario.

REB File Reference: 11-221

Submissions Reviewed:
- WRH Ethics Submission Form for Archival/Secondary Use of Data (Chart Abstraction) dated April 28, 2011.
- Appendix A: Staff Survey: Letter of Information; Staff Questionnaire.
- Chart Abstraction Form.

Type of Approval: Category A: Approved. **Approval Expiry: June 15, 2012.**

This Research Ethics Board is constituted and operated in accordance with the Tri-Council Policy Statement for Ethical Conduct of Research Involving Humans (TCPS2), Canadian Food & Drug Regulations, Division 5 (Clinical Trials), ICH Good Clinical Practice Guidelines E6, Personal Health Information Protection Act, 2004 (PHIPA), U.S. Code of Federal Regulations Title 21 & 45.

Only Research Ethics Board members who are independent of the investigator(s) conducting the study participated in decisions relating to this research.

Please use the above file reference number on all correspondence pertaining to this study.

Curriculum Vitae

Katherine Lee Salter, Master of Science

Education

1984	B.A. (conc. Psychology), Huron University College, University of Western Ontario, London, Ontario, Canada *Dean's Honours List & Tony DuMoulin Scholarship*
2010-2012	M.Sc., Rehabilitation Science, Faculty of Health and Rehabilitation Science, University of Western Ontario, London, Ontario, Canada

Experience

2003 – present	Research Associate, Aging, Rehabilitation and Geriatric Care, Stroke Rehabilitation and the Collaboration of Rehabilitation Research Evidence (CORRE) Research Group, Lawson Health Research Institute, Parkwood Hospital site, London, Ontario, Canada Stroke Rehabilitation Evidence-based Review
2011-2012	Teaching Assistant, Faculty of Health Sciences Course: HS2711 (Health and Aging), Winter term, 2011 and 2012 Professor Dr. Aleksandra Zecevic
2002 – 2003	Research Assistant, Department of Geriatric Medicine Parkwood Hospital, St. Joseph's Health Centre, London, Ontario, Canada Health Canada Research Grant – Community Capacity Building Literature Synthesis and Review
1996-2001	Exec. Assistant, Paediatric Emergency Department, Paediatric Trauma Program, Child Protection Program, Children's Hospital of Western Ontario, London, Ontario, Canada
1990-present	Desktop Publisher/Designer, Technical Writer Salter Programming Services, London, Ontario, Canada

Continuing Education

- *Community-based Research (CBR101),* Resource Centre for Community-based Research, Wellesley Central Health Corporation, Toronto, Ontario, March 2003
- *Experimental Design and Data Analysis*, Faculty Development Workshop, University of Western Ontario, April, 2004
- *Power Analysis*, Faculty Development Workshop, University of Western Ontario, May, 2004
- *Test Construction,* University of Western Ontario, Fall, 2004
- *Clinical Epidemiology (Intro),* University of Western Ontario, Winter 2005
- *Qualitative Analysis,* Resource Centre for Community-based Research, Wellesley Central Health Corporation, Toronto, Ontario October 2005
- *Introduction to Meta-Analysis*, One-day workshop offered by the American Statistical Association, Newark, New Jersey. April 2009

Academic/Professional Conferences

- Canadian Stroke Network Stroke Rehabilitation Research and Guidelines Consensus Conference, Toronto, Ontario, October 2-3, 2003.
- Heart & Stroke Foundation Annual Clinical Update, Toronto, Ontario, December 12, 2003.
- Canadian Stroke Network Rehabilitation Guideline Consensus Conference, Montreal, Quebec, March 23-25, 2004.
- 25th Annual Meeting of the InterUrban Stroke Academic Association, London, Ontario, April 30, 2004.
- 5th World Congress of Stroke, Vancouver BC, June 23-26, 2004
- GTA Stroke Association, Building Best Practice Stroke Care Together: The 2004 Symposium, September 2004
- 11th Annual Academic Day for Ontario Physiatrists, Toronto, Ontario, October, 2004.
- 26th Annual Meeting of the InterUrban Stroke Academic Association, Toronto, Ontario, April 8, 2005.
- CAPM&R 2005 Annual Scientific Meeting, Ottawa, Ontario, June 2005
- 12th Annual Academic Day for Ontario Physiatrists, Toronto, Ontario, November 4, 2005.
- Canadian Stroke Strategy Consensus Panel – Secondary Prevention of Stroke, Toronto, Ontario, November 2005
- Lawson Health Research Institute, Aging, Rehabilitation and Geriatric Care Research Day, London, Ontario, November 25, 2005.
- Canadian Stroke Strategy Consensus Outcome Measures in Stroke Rehabilitation, Toronto, Ontario, February 6-7, 2006.
- GTA Rehabilitation "Best Practices" Day, Toronto, Ontario, February 28, 2006.
- 27th Annual Meeting of the InterUrban Stroke Academic Association, Ottawa, Ontario, May 5, 2006.
- LHRI Aging, Rehabilitation and Geriatric Care Annual Research Day, London, Ontario, November 9, 2006.
- International Stroke Conference 2007, San Francisco, California, February 7-9, 2007
- GTA Best Practices Day, Toronto, Ontario, March 2, 2007
- 28th Annual Meeting of InterUrban Stroke Academic Association, Hamilton, Ontario, April 20, 2007
- 1st National Stroke Rehabilitation Conference, Winnipeg Manitoba, September 13-14, 2007.
- 55th Annual Meeting of the Canadian Association of Physical Medicine and Rehabilitation. London, Ontario, June 13-16, 2007.
- Aging, Rehabilitation and Geriatric Care Research Day St. Joseph's Health Centre, Parkwood Site, London, Ontario, November 1, 2007.
- 29th Meeting of the Inter-Urban Stroke Academic Association, Kingston, Ontario, April 18, 2008.
- 2nd National Stroke Rehabilitation Conference, Winnipeg, Manitoba, September 18-19, 2008.
- 2008 American Congress Rehabilitation Medicine-American Society of Neurological Rehabilitation Joint Educational Conference, Pre-meeting Symposium: Measurement of Participation in Rehabilitation Research. Toronto, Ontario, October 14-15, 2008.
- 2008 American Congress Rehabilitation Medicine-American Society of Neurological Rehabilitation Joint Educational Conference, Toronto, Ontario, October 15-19, 2008
- Aging, Rehabilitation and Geriatric Care/Faculty of Health Sciences Research Symposium, Elborn College, University of Western Ontario, London, Ontario, February 6, 2009.
- Greater Toronto Rehab Network, Best Practices Day. Toronto, Ontario, March 9, 2009.
- Showcase of Health Policy at Western. University of Western Ontario, London, Ontario, May 7, 2009.
- Annual General Meeting of the Canadian Stroke Network, Ottawa, Ontario. October 14-15, 2009.
- 9th Stroke Symposium & 31st Meeting of the Inter-Urban Stroke Academic Association. Toronto, Ontario, January 28-29, 2010.
- Aging, Rehabilitation and Geriatric Care/Faculty of Health Sciences Research Symposium, Parkwood Hospital, London, Ontario, February 5, 2010
- IBIA World Congress on Brain Injury, Washington DC, March 10-14, 2010.
- Canadian Congress of Stroke, Quebec City, Quebec, June 7-8, 2010.
- American Congress of Rehabilitation Medicine and American Society of NeuroRehabilitation Combined Annual Meeting, Montreal, Quebec, October 20-23, 2010.
- GTA Best Practices Day, Toronto, Ontario, March 4, 2011.

- 2nd Canadian Stroke Congress of Stroke, Ottawa, Ontario, October 2-4, 2011.
- Stroke Collaborative, Heart and Stroke Foundation of Ontario and Ontario Stroke Network, October 17, 2011.
- UWO Knowledge Synthesis / Knowledge Translation Symposium, London, Ontario, November 18, 2011.
- International Stroke Conference 2012, New Orleans, Louisiana, February 1-3, 2012.
- GTA Best Practices Day 2012, Toronto, Ontario, February 27, 2012.

Research Reports, Government Reports and Monographs

1. Stroke Rehabilitation Evidence-Based Review. Ministry of Health and Long-Term Care and Heart and Stroke Foundation of Ontario, November 2003, 4th edition; April 2004, 5th edition; November 2004, 6th edition.

2. Stroke Rehabilitation Evidence-Based Review, Canadian Stroke Network. July 2005 7th edition; February 2006 8th edition; September 2006 9th edition; September 2007 10th edition; September 2008 11th edition; September 2009 12th edition, September 2010 13th edition, September 2011 14th edition.

   Chapters in Stroke Rehabilitation Evidence-Based Review: 13th Edition

   1. Teasell R, Foley N, **Salter K**, Bhogal S, Jutai J, Speechley M. Foreword.
   2. Teasell R, Foley N, **Salter K**, Bhogal S, Bayona N, Jutai J, Speechley M. Executive Summary of the Stroke Rehabilitation Evidence-Based Review.
   3. Foley N. Teasell R, **Salter K**, Bhogal S, Jutai J, Speechley M. Introduction and Methods.
   4. **Salter K**, Teasell R, Foley N, Bhogal S, Speechley M. Secondary Prevention of Stroke.
   5. Teasell R, **Salter K**, Bitensky J, Foley N, Bhogal S. Cognitive Disorders and Apraxia.
   6. Teasell R, **Salter K**, Bitensky J, Bhogal S, Foley N, Menon A, Jutai J. Perceptual Disorders.
   7. **Salter K**, Teasell R, Bhogal S, Zettler L, Foley N. Aphasia.
   8. Teasell R, Foley N, **Salter K**, Bhogal S. Medical Complications Post-Stroke.
   9. **Salter, K**, Bhogal S, Teasell R, Foley N, Speechley M. Post-Stroke Depression.
   10. **Salter K**, Teasell R, Bhogal S, Foley N. Community Reintegration.
   11. **Salter K**, Jutai J, Zettler L, Moses M, Foley N, Teasell R. Outcome Measures in Stroke Rehabilitation.
   12. Graham JR, Kruger E, Teasell R, Foley N, **Salter K**. The Rehabilitation of Younger Stroke Patients.
   13. Teasell R, Graham JR, Moses M, **Salter K**, Foley N. The Rehabilitation of Severe Strokes.

3. Teasell R, Bayona N, Marshall S, Cullen N, Bayley M, Chundalama J, Hellings C, Villamere J, Mackie D, Rees L, Hartridge C, Lippert C, Hilditch M, Welch-West P, Weiser M, Ferri C, McCabe P, McCormick A, Aubut J, Comper P, **Salter K**, van Reekum R, Collins D, Foley N, Fullington N, Jutai J, Speechley M. (The ERABI Group). Evidence-Based Review of Moderate to Severe Acquired Brain Injury: 1st Edition. Ontario Neurotrauma Foundation, July 2005.

4. Teasell R, Bayona N, Marshall S, Cullen N, Bayley M, Chundalama J, Hellings C, Tu L, Villamere J, Mackie D, Rees L, Hartridge C, Lippert C, Hilditch M, Welch-West P, Weister M, Ferri C, McCabe P, McCormick A, Aubut J, Comper P, **Salter K**, Van Reekum R, Collins D, Foley N, Nowak J, Jutai J, Speechley M. The Acquired Brain Injury Evidence-Based Review: 2nd Edition. Ontario Neurotrauma Foundation, October 2006.

5. Teasell R, Foley N, **Salter K**, Zettler L, Kruger E, Jutai J. Important Findings of the Stroke Rehabilitation Evidence-Based Review. Canadian Stroke Network, 2006, 83 pages.

6. Teasell R, Foley N, **Salter K**, Zettler L, Kruger E. 50 of the Most Important Clinical Studies in Stroke Rehabilitation. Canadian Stroke Network, 2006, 111 pages.

7. Teasell R, Evans M, Jutai J, Foley N, **Salter K**. A Blueprint for Stroke Rehabilitation: Improving Outcomes and Maximizing Efficiencies. Canadian Stroke Network, 2006, 105 pages.

8. Teasell R, Foley N, Salter K, Ricci MJ, Pretty J, Moses M, Evans M, Jutai J. A Blueprint for Stroke Rehabilitation: Improving Outcomes and Maximizing Efficiencies. Canadian Institutes of Health Research, 2007, 423 pages.

9. Meyer MJ, Pan C, McClure A, Foley N, Salter K, Willems D, McHale H, Hall R, Mehta S, Speechley M, Murie-Fernandez M, Jutai J, Teasell R. Blueprint for Transforming Stroke Rehabilitation in Ontario: Research Synthesis of Effectiveness and Cost-Benefits. Ontario Stroke Strategy, 2009.

10. Meyer MJ, Pereira S, McClure A, Foley N, Salter K, Willems D, Hall R, Asllani E, Fang J, Speechley M, Teasell R. An Economic Model for Stroke Rehabilitation in Ontario: Mapping Resource Availability and Patient Needs. Ontario Stroke Network, March 2011 (66 pages).

Acknowledgements

Crilly R, Kloseck M, Lubell J. Health Canada Community Capacity Building Synthesis Research, 2003 (research assistant).

Book Chapters

1. Teasell R, Foley N, **Salter K**. Stroke Rehabilitation. In: Hachinski V, Starke R (eds): American Heart Association Cardiovascular Self-Study Series: Stroke: Assessment and Management, American Heart Association, 2006.

2. Teasell R, Foley N, **Salter K**. Factors contributing to stroke recovery. In: Zorowitz R (ed), Stroke Recovery and Rehabilitation Demos Medical, New York, New York, 2009.

Articles in Peer-Reviewed Journals

1. **Salter K**, Jutai J, Teasell R, Foley N, Bitensky J. Issues for selection of outcomes measures in stroke rehabilitation: Bodily functions. Disability and Rehabilitation 2005, 27(4): 191-207.

2. **Salter K**, Jutai J, Teasell R**,** Foley N, Bitensky J, Bayley M. Issues for selection of outcome measures in stroke rehabilitation: Activities. Disability and Rehabilitation 2005, 27(6): 315-340.

3. **Salter K**, Jutai J, Teasell R, Foley N, Bitensky J, Bayley M. Issues for selection of outcome measures: Participation. Disability and Rehabilitation 2005; 27(9): 507-528.

4. Sangha H, Lipson D, Foley N, **Salter K**, Bhogal S, Pohani G, Teasell RW. A comparison of the Barthel Index and Functional Independence Measure as outcome measures in stroke rehabilitation: Patterns of disability scale usage in clinical trials, International Journal of Rehabilitation Research 2005, 28(2): 135-139.

5. Teasell R, Bitensky J, **Salter K**, Bayona N. The role of timing and intensity of therapies*:* animal vs. clinical. Topics in Stroke Rehabilitation 2005; 12(3):45-56.

6. Bayona N, Bitensky J, **Salter K,** Teasell R. Task-specific training post-stroke: animal vs. clinical. Topics in Stroke Rehabilitation 2005; 12(3):57-63.

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44. McClure A, Teasell R, Meyer M, Marshall MS, Cullen N, Bayley M, Aubut, J, Foley N, Salter K. A systematic review of cognitive therapy in stroke and acquired brain injury. GTA Best Practices Day, Toronto, Ontario, March 9, 2009. 30th Meeting of the Inter-Urban Stroke Academic Association, London, Ontario, April 24, 2009.

45. Graham R, Kruger E, Teasell R, Foley N, Salter K. Rehabilitation of young stroke patients. Aging, Rehabilitation & Geriatric Care Research Centre & The Faculty of Health Sciences, University of Western Ontario Research Symposium, London, Ontario, February 6, 2009. 30th Meeting of the Inter-Urban Stroke Academic Association, London, Ontario, April 24, 2009.

46. Meyer M, Marshall S, Cullen N, Bayley M, Aubut J, Foley N, Salter K, Teasell R. Prevention of venous thromboembolism in stroke and acquired brain injuries: A systematic review. GTA Best Practices Day, Toronto, Ontario, March 9, 2009.

47. Meyer M, Marshall S, Cullen N, Bayley M, Aubut J, Foley N, Salter K, Teasell R. Prevention and treatment of seizure disorders in stroke and acquired brain injuries: A systematic review. GTA Best Practices Day, Toronto, Ontario, March 9, 2009.

48. Dale J, Foley N, Salter K, Teasell R. Assessing the Nutritional Status of Stroke Rehabilitation Patients Using Mini Nutritional Assessment. Aging, Rehabilitation & Geriatric Care Research Centre & The Faculty of Health Sciences, University of Western Ontario Research Symposium, London, Ontario, February 6, 2009. 30th Meeting of the Inter-Urban Stroke Academic Association, London, Ontario, April 24, 2009.

49. Teasell R, Foley N, Salter K. The stroke rehabilitation evidence-based review (SREBR) 11th edition. 57th Annual Meeting of the Canadian Association of Physical Medicine and Rehabilitation . Abstract A16, p. 15.

50. Meyer M, McClure A, Pan C, Muria-Fernandez M, Foley N, Salter K, Teasell R. An Economic Review of Best Practice in Inpatient Stroke Rehabilitation, Showcase Health Policy at Western. University of Western Ontario, London, Ontario, May 7, 2009. 57th Annual Meeting of the Canadian Association of Physical Medicine and Rehabilitation . Abstract A43, p. 40.

51. Foley N, Meyer M, McClure A, Salter K, Britt E, Teasell R. A Survey of Scheduled Therapy Time for Assessment and Treatment of Patients Admitted for Inpatient Stroke Rehabilitation. 9th Stroke Symposium & 31st Meeting of the Inter-Urban Stroke Academic Association. Toronto, Ontario, January 28-29, 2010. Canadian Stroke Congress Quebec City, Quebec, June 5-6, 2010. (Stroke 2010. 41(7))

52. Foley N, Meyer M, Salter K, Bayley M, Hall R, Liu Y, Willems D, McClure A, Teasell R. Stroke Rehabilitation in Ontario (2006-2008): A Comparison of Selected Process Indicators between Facilities that Provided Stroke-Specialized and Non-Specialized Services. 9th Stroke Symposium & 31st Meeting of the Inter-Urban Stroke Academic Association. Toronto, Ontario, January 28-29, 2010. Canadian Stroke Congress Quebec City, Quebec, June 5-6, 2010.(Stroke. 2010; 41(7): e506)

53. Salter K, Foley N, Teasell R. Interpreting change in functional mobility post stroke: Minimal detectable change scores for the Clinical Outcome Variable Scale (COVS). 9th Stroke Symposium & 31st Meeting of the Inter-Urban Stroke Academic Association. Toronto, Ontario, January 28-29, 2010; Canadian Stroke Congress Quebec City, Quebec, June 5-6, 2010.(Stroke 2010; 41(7): e:502)

54. Salter K, Foley N, Teasell R. The impact of treatment for hypertension on cognitive function in individuals with stroke/TIA. 9th Stroke Symposium & 31st Meeting of the Inter-Urban Stroke Academic

Association. Toronto, Ontario, January 28-29, 2010; Canadian Stroke Congress Quebec City, Quebec, June 5-6, 2010. (Stroke 2010: 41(7): e485)

55. Meyer M, Murie-Fernandez M, Hall R, Lin Y, Salter K, Foley N, Kapral M, Teasell R. The effect of t-PA administration outcomes: Does thrombolysis facilitate functional recovery? Canadian Stroke Congress, Quebec City, Quebec, June 5-6, 2010. (Stroke 2010; 41(7): e500)

56. McClure A, Salter K, Meyer M, Foley N, Kruger H, Teasell R. Prolonged length of stay in patients admitted to stroke rehabilitation with high levels of functional independence. 9th Stroke Symposium & 31st Meeting of the Inter-Urban Stroke Academic Association. Toronto, Ontario, January 28-29, 2010; Canadian Stroke Congress Quebec City, Quebec, June 5-6, 2010 (Stroke 2010; 41(7): e99)

57. Teasell R, Foley N, Salter K. The impact of the stroke evidence-based review (12th edition). 9th Stroke Symposium & 31st Meeting of the Inter-Urban Stroke Academic Association. Toronto, Ontario, January 28-29, 2010; Canadian Stroke Congress Quebec City, Quebec, June 5-6, 2010 (Stroke 2010; 41(7): e503)

58. McClure A, Salter K, Zettler L, Teasell R. A profile analysis exploring the impact of comorbidity on functional recovery post stroke. Canadian Stroke Congress Quebec City, Quebec, June 5-6, 2010 (Stroke 2010; 41(7): 499-500).

59. Teasell R, Foley N, Salter K, Meyer M, McClure A, Graham R. Impact of the Stroke Rehabilitation Evidence-Based Review (SREBR). Canadian Association of Physical Medicine and Rehabilitation (CAPMR), Journal of Rehabilitation Medicine 2010. 42(11): 1001-1002.

60. Salter K, McClure A, Teasell R. Community Integration Following TBI and the ICF: An examination of the Community Integration Questionnaire and the Reintegration to Normal Living Index. IBIA 8th World Congress on Brain Injury, Washington D.C., March 10 – 14, 2010. (Brain Injury 2010; 24(3): 0171)

61. Murie-Fernandez M, Meyer M, Carmona M, Hall R, Salter K, Foley N, Teasell R. The Effect Of tPA Administration On Rehabilitation Outcomes: Does Thrombolysis Facilitate Functional Recovery? XIX. European Stroke Conference, Barcelona Spain, May 25-28, 2010. (oral presentation – Cerebrovascular Diseases 2010 29 (suppl. 2): I-XXXII)

62. Salter K, McClure A, Foley N, Teasell R. Performance-based Assessment in High-Functioning Individuals Post Stroke: Validity and Sensitivity to Change of the 2-Minute Walk Test. 2010 American Congress Rehabilitation Medicine-American Society of Neurological Rehabilitation Joint Educational Conference, Montreal, Quebec; October 20 - 23, 2010 (Archives of Physical Medicine and Rehabilitation 2010; 91(10) e37)

63. Mehta S, **Salter K**, Teasell R, Hsieh J, Townson A, Aubut J, Short C, Wolfe D, and the SCIRE Research Group, Effectiveness of Gabapentinoids in improving neuropathic pain intensity post-SCI: A Meta-Analysis. 4th National Spinal Cord Injury Conference. Niagara Falls, ON. October 28-30, 2010; ACRM-ASNR Joint Educational Conference. Montreal, QC. October 20-23, 2010 (Archives of Physical Medicine and Rehabilitation. 2010; 91(10) e18.)

64. Mehta S, **Salter K**, Teasell R, Hsieh J, Aubut JA, Townson A, Short C, Wolfe D and the SCIRE Research Group. Improvement in neuropathic pain intensity by Gabapentinoids in individuals with SCI: A meta-analysis. GTA Best Practice Day. Toronto, ON. March 7, 2011.

65. Macaluso S, Sequeira K, Teasell R, Potter P, **Salter K**, Woolner A. . The impact of computer-assisted technology on patients with spinal cord injuries. Canadian Association of Physical Medicine and Rehabilitation (CAPMR), Annual Scientific Meeting, Victoria BC, June 8-11, 2011 (published: Journal of Rehabilitation Medicine)

66. Macaluso S, Teasell R, McClure A, Walton D, Pretty J, **Salter K**, Meyer M, Sequeira K, Death B. Developing an evidence-based approach to whiplash-associated disorder (WAD). Canadian Association of Physical Medicine and Rehabilitation (CAPMR), Annual Scientific Meeting, Victoria BC, June 8-11, 2011 (published: Journal of Rehabilitation Medicine)

67. Meyer M, Murie-Fernandez M, Hall R, Fang J, Liu Y, Salter K, Foley N, Kapral M, Teasell R. Assessing the effect of tPA on patient progression through inpatient rehabilitation: A multivariable modeling approach. GTA Rehab Network's Best Practices Day, Toronto, Ontario, March 7, 2011.

68. Foley N, McClure A, Meyer M, Salter K, Britt E, Teasell R. How Much Therapy Do Patients Receive during Inpatient Stroke Rehabilitation and does it Matter? GTA Rehab Network's Best Practices Day, Toronto, Ontario, March 7, 2011.

69. Foley N, Willems, D, Salter K, Meyer M, McClure A, Teasell R. Application of a Standardized Assessment Method to Evaluate Candidacy for Inpatient Rehabilitation Following Acute Stroke: Results from 8 Ontario Hospitals. GTA Rehab Network's Best Practices Day, Toronto, Ontario, March 7, 2011.

70. Pereira S, Brown J, Foley N, McClure A, Meyer M, Salter K, Speechley M, Teasell R. Discharge destination of individuals with severe stroke undergoing rehabilitation: A predictive model. GTA Rehab Network's Best Practices Day, Toronto, Ontario, March 7, 2011.

71. McClure A, Salter K, Kruger H, Foley N, Teasell R. Adherence to Canadian Best Practice Recommendations for Stroke Care: Vascular cognitive impairment practices in an Ontario inpatient stroke rehabilitation facility. GTA Rehab Network's Best Practices Day, Toronto, Ontario, March 7, 2011.

72. Foley N, Teasell R, Salter K, Meyer M, McClure A, Willems D. Alternative level of care days following acute admission for stroke: What are we waiting for? 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011. Stroke Collaborative, Toronto, Ontario, October 17, 2011.

73. Foley N, Salter K, Pereira S, McClure A, Meyer M, Miller, T, Sequeira K, Murie-Fernandez M, Teasell R. Does treatment with botulinum toxin improve upper-extremity function following stroke? A systematic review and meta-analysis. 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011.

74. McClure A, Salter K, Kruger H, Foley N, Teasell R. Adherence to Canadian best practice recommendations for stroke care: vascular cognitive impairment screening and assessment practices in an Ontario inpatient stroke rehabilitation facility. 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011.

75. Meyer M, Pereira A, McClure A, Foley N, Salter K, Willems D, Hall R, Asllani E, Fang J, Speechley M, Teasell R. An Economic Model for Stroke Rehabilitation in Ontario: Using Patient Data to Inform Investment Recommendations. 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011.

76. Salter K, McClure A, Kruger H, Foley N, Teasell R. Examining adherence to Canadian best practice recommendations for stroke care: Attitudes, beliefs and barriers to the identification and management of post-stroke depression in current practice. 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011.Stroke Collaborative, Toronto, Ontario,October 17, 2011; GTA Rehab Network Best Practices Day, Toronto, Ontario, February 27, 2012.

77. Salter K, McClure A, Kruger H, Foley N, Teasell R Adherence to Canadian best practice recommendations for stroke care: assessment and management of post-stroke depression in an Ontario inpatient stroke rehabilitation facility. 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011.

78. Pereira S, Meyer M, McClure A, Salter K, Foley N, Lee D, Speechley M, Teasell R. Predicting discharge destination following stroke rehabilitation: A systematic review of multivariable models. 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011. Stroke Collaborative, Toronto, Ontario, October 17, 2011.

79. Pereira S, Meyer M, Foley N, Salter K, McClure A, Brown J, Speechley M, Teasell R. Functional gains during inpatient rehabilitation after severe stroke: Does caregiver availability make a difference? 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011. Stroke Collaborative, Toronto, Ontario, October 17, 2011. GTA Rehab Network Best Practices Day, Toronto, Ontario, February 27, 2012.

80. Pereira S, Brown J, Foley N, McClure A, Meyer M, Salter K, Speechley M, Teasell R. Discharge destination of individuals with severe stroke undergoing rehabilitation: A predictive model. 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011. Stroke Collaborative, Toronto, Ontario, October 17, 2011.

81. Teasell R, Foley N, Salter K, Meyer M, Periera S, McClure A, Britt E. The Stroke Rehabilitation Evidence-Base Review; Research knowledge applied to clinical practice-the I's have it. 2nd Canadian Stroke Congress, Ottawa, Ontario October 2-4, 2011.

82. Meyer M, Pereira S, McClure A, Foley N, Salter K, Willems D, Hall R, Asllani E, Fang J, Speechley M, Teasell R. Inpatient rehabilitation after stroke: Who's not being admitted? 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011. Stroke Collaborative, Toronto, Ontario, October 17, 2011. GTA Rehab Network Best Practices Day, Toronto, Ontario, February 27, 2012.

83. Leci E, Meyer M, Pereira S, McClure A, Foley N, Salter K, Teasell R. Improving therapy staffing levels for stroke rehabilitation in Ontario Canada: A cost analysis. Stroke Collaborative, Toronto, Ontario, October 17, 2011. GTA Rehab Network Best Practices Day, Toronto, Ontario, February 27, 2012.

84. Foley N, Pereira S, Salter K, Meyer M, McClure A, Teasell R. Translating evidence into clinical practice. Can it always be done? The example of intensive stroke rehabilitation. International Stroke Conference, New Orleans, Louisiana February 1-3, 2012.

85. Salter K, Mahon H, McClure JA, Foley N, Teasell. Does exercise post stroke have a beneficial effect on post-stroke depression: a meta-analysis. International Stroke Conference, New Orleans, Louisiana, February 1-3, 2012 (podium presentation).

86. Donaldson S, Leci E, Meyer M, Janzen S, Foley N, Salter K, Teasel R. Implementing best practice to address urinary incontinence post stroke. Stroke Collaborative, Toronto, Ontario, October 17, 2011. International Stroke Conference, New Orleans, Louisiana February 1-3, 2012. GTA Rehab Network Best Practices Day, Toronto, Ontario, February 27, 2012.

87. Meyer M, Pereira S, McClure A, Salter K, Foley N, Lee D, Teasell R. Predicting functional independence after post-stroke rehabilitation: A systematic review of multivariable models. Stroke Collaborative, Toronto, Ontario, October 17, 2011.

88. Pereira S, Miller T, Foley N, Salter K, Donaldson S, Sequeira K, Teasell R. Toning it down: Toward a consensus for standardized assessment in spasticity. GTA Rehab Network Best Practices Day, Toronto, Ontario, February 27, 2012.

Oral Presentations/Workshops

1. Teasell R, Sangha H, **Salter K**. Is FIM the Best Functional Outcome Measure? Department of Physical Medicine & Rehabilitation Grand Rounds, University of Western Ontario, London, ON Canada, September, 2003.

2. Teasell R, Jutai J, **Salter K.** Outcome measures in stroke rehabilitation: Selecting the right tool for the job. Department of Physical Medicine & Rehabilitation Grand rounds, University of Western Ontario, London, ON Canada, February, 2004.

3. Bitensky J, Jutai J, **Salter K**. Risk for cognitive impairment and depression post-stroke. Canadian Stroke Network Expert Conference to Develop Best Practice Recommendations of Risk Assessment of Pressure Ulcers, Falls, Dysphagia, Depression and Cognition. Montreal, Quebec, March 24 – 25, 2004.

4. **Salter K**, Jutai J, Teasell R, Bayley M. Selection of outcomes measures in stroke rehabilitation (workshop), 25th Annual Meeting of InterUrban Stroke Academic Association, London, Ontario, April 30, 2004.

5. **Salter K**, Jutai J, Foley N, Bitensky J, Teasell R, Bayley M. Issues for selection of outcome measures in stroke rehabilitation. 5th World Congress of Stroke Book of Abstracts, Vancouver, BC, June 24, 2004, p.37 (platform presentation).

6. **Salter K**, Jutai J, Teasell R, Bayley M. Selection of outcomes measures in stroke rehabilitation (workshop), Building Best Practice Stroke Care Together: The 2004 Symposium, Toronto, Ontario, September 2004 (invited presentation)

7. **Salter K**, Jutai J, Teasell R, Bayley M. Selection of outcomes measures in stroke rehabilitation (workshop), 11th Annual Physiatry Day, Toronto, Ontario, October 22, 2004.

8. **Salter K**, Jutai J, Teasell R. Assessment Tools in the SREBR. Best Practices in Stroke Rehabilitation Outcomes Panel. Toronto, Ontario. February 6 & 7, 2006.

9. **Salter K**, Zettler L, Foley N, Teasell R**.** Impact of comorbidities on the prediction of functional recovery post-stroke. LHRI Aging, Rehabilitation and Geriatric Care Research Day, London, Ontario, November 9, 2006. (podium presentation)

10. **Salter K**, Lindsay P. Development of a National Consensus for Outcome Measurements Post-Stroke. 1st National Stroke Rehabilitation Conference, Heart and Stroke Foundation of Manitoba, Winnipeg Manitoba, September 13-14, 2007 (invited workshop).

11. **Salter K**. Let's Talk Measurement. 2nd National Stroke Rehabilitation Conference, Heart and Stroke Foundation of Manitoba, Winnipeg, Manitoba. September 18-19, 2008 (invited workshop).

12. **Salter K**. Invited Guest Lecturer, Brescia University College, Division of Food and Nutritional Sciences, London, Ontario. "Nutritional Epidemiology" – Issues in Measurement (Graduate course); February 2009, 2010

13. **Salter K**. The Burden of Caring: Evidence and Interventions. 9th Stroke Symposium and 31st Annual Meeting of the Inter-Urban Stroke Academic Association. January 28, 2010 (invited workshop).

14. **Salter K**. The Burden of Caring: Evidence and Interventions. Central East Ontario Stroke Symposium – "Discovering the Mosaic of Stroke" on April 14th 2010 (invited workshop).

15. **Salter K**. Post stroke Depression. Social Worker Stroke Network Workshop – "Depression and Grieving, Similar or Different" on September 10, 2010 (invited workshop).

16. **Salter K**. The Burden of Caring: Evidence and Interventions. Social Worker Stroke Network Workshop – "Depression and Grieving, Similar or Different" on September 10, 2010 (invited workshop).

17. **Salter K**, McClure JA, Kruger H, Foley N, Teasell R. Adherence to Canadian Best Practice Recommendations for Stroke Care: Assessment and management of post-stroke depression in an Ontario inpatient stroke rehabilitation facility. GTA Best Practices Day, Toronto, Ontario, March 4, 2011 Podium 09. Winner – Best Podium Presentation.

18. **Salter K**, Mahon H, McClure JA, Foley N, Teasell R. Does exercise post stroke have a beneficial effect on post-stroke depression: a meta-analysis. International Stroke Conference, New Orleans, Louisiana, February 1-3, 2012 (podium presentation).