Group Cognitive Behavioural Therapy for Stroke Survivors with Depression and their Carers

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Statement of Originality

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying subject to the provisions of the Copyright Act 1968.

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Abstract

Scope: Depression occurs in approximately one third of survivors following stroke and may impede rehabilitation, quality of life and affect caregiver health. Reliable evidence to guide the clinical management of post stroke depression is limited, particularly regarding psychotherapy interventions. The cost effectiveness of group cognitive behavioural therapy and being able to treat more people using the same resources makes it attractive as a psychotherapy intervention. A critical review of the literature and a manuscript of a group Cognitive Behaviour Therapy (CBT) intervention for post stroke depression are provided.

Purpose: The purpose of the current study was to evaluate the effectiveness of a group cognitive behavioural therapy program (*Brainstorm*) for stroke survivors with depression and their carers.

Methodology: This study utilised a repeated measures design with no control group. Participants were 48 community dwelling stroke survivors and 34 carers who attended groups from 2007 to 2013. This closed group intervention consisted of up to 10 sessions covering basic CBT techniques including psycho-education, mood and activity monitoring, activity planning, thought challenging and problem solving. Participants were assessed at baseline, post-treatment and 1 month and 6 months post intervention. Primary outcomes were depression scores for stroke survivors (Beck Depression Inventory-II; Hospital Anxiety and Depression Scale depression subscale). Exploratory

analyses included changes in anxiety, quality of life and the impact on participation and autonomy for stroke survivors, and the assessment of depression, anxiety and carer burden for carers. Statistical analysis used a mixed models approach for repeated measures data.

Results: The post-treatment assessment was completed by 77% of stroke survivors; 46% and 27% of the baseline sample completed 1 month and 6 month follow-up assessments respectively. Stroke survivors' depression scores decreased from baseline to post-treatment ($p < .001$), this was maintained at 1 month ($p < .001$) but not 6 month follow-up. Anxiety scores decreased for stroke survivors between baseline and 1 month follow-up ($p = .012$). Their quality of life, and participation and autonomy scores did not change over time. Carer burden (perceived time spent on and difficulty of caring tasks), depression and anxiety scores at 1 month and 6 month follow-up, for carers, were all reduced when compared with baseline.

General conclusions: The *Brainstorm* group intervention for depression in stroke survivors appears to be effective in the short term. Session attendance rates were high and participant feedback positive.

Implications: The benefit of group CBT for community dwelling stroke survivors with depression is highlighted. Stroke survivors were the primary focus of the current study; however results suggest that carers also benefitted from inclusion in the program.

Critical Literature Review

The Burden of Stroke

A stroke occurs when there is a disruption of the blood supply to the brain due to a burst blood vessel (haemorrhagic stroke) or a blood clot (ischemic stroke)(National Stroke Foundation, NSF, 2010). Even though Australian deaths due to stroke have declined as a result of better prevention, treatment and awareness of risks, 6% of all deaths in Australia in 2009 were attributable to stroke (Australian Institute of Health and Welfare, AIHW,2012). In 2012 in Australia there were over 420,000 people living with the effects of stroke (1.77% of the population), which is estimated to increase to 709,000 Australians (2.4%) of the population by 2032 (NSF, 2012).

Recovery is most rapid in the early weeks post stroke with most recovery generally attained by 6 months. However, only 65% of stroke survivors are independent at 1 year post event (Hankey, Jamrozik, Broadhurst, Forbes & Anderson, 2002).

Stroke has been associated with increased healthcare utilisation, institutionalisation and poor quality of life (Paul, Sturm, Dewey, Donnan & Macdonell, 2005). Predictors of poor outcomes (institutionalisation, disability or death) at 5 years post stroke include low levels of activity prior to the stroke, increased age and subsequent stroke (Hankey et al., 2002).

Post Stroke Depression

Methods of defining depression after stroke vary between studies. Some studies define presence of depression based on particular scores on a depression rating scale (Lincoln & Flannaghan, 2003; Raquin, van de Sande, Praamastra & van Heugten, 2009), while others use clinical interviews to assess for DSM or ICD defined disorders, including major depressive disorder, minor depression, dysthymia, and adjustment disorder (Gainotti et al., 1999; Robinson et al., 2008). There is also variation as to whether a prior history of depression is used as an inclusion or exclusion criteria for sample selection in the assessment of post-stroke depression among stroke survivors. This is due to differing definitions of what 'post-stroke depression' should refer to, that is, should the termonly be used in relation to depression that has arisen following stroke or should the term incorporate any depression experienced in stroke survivors, regardless of timing of onset. Williams (2005) found 30% of depressed stroke survivors in a case management study had been on antidepressants prior to their stroke, and reported that in general "post-stroke depression has tended to refer to any depression present after stroke, regardless of the timing of symptom onset" (p. 399).

DSM-5 criteria for major depression requires depressive symptoms to have persisted for a minimum duration of two weeks, which suggests a diagnosis of major depression (related to stroke) should not be given in the first 14 days post stroke (Herrmann et al. 2011). Townsend et al. (2007) used the term Mood Disorder Post Stroke (MDPS) to describe stroke related reactive symptoms in the acute phase (2 days – 3 months post stroke) and to differentiate it from later occurring organic depression. Townsend et al.

(2007) suggested "early MDPS can reflect a more transient reaction to adjustment to stroke while late MDPS has a more delayed but enduring effect on mood" (p.433).

Prevalence of Post Stroke Depression

Approximately one third of patients, experience depression in the year following stroke (Hackett, Yapa, Parag & Anderson, 2005).Gainotti, Azzoni and Marra (1999) assessed the frequency and symptom profile of post stroke depression in an assessment of different stroke survivors at 2 months (acute phase), 2 – 4 months (post-acute phase) and 4+ months (chronic phase) post stroke. The results indicated that the severity and frequency of major depression increased from acute to post-acute and chronic time periods. While the symptom profiles of stroke survivors with depression were very similar at these different phases, the profiles were quite different from a comparison group of inpatient psychiatric patients diagnosed with major depression. The post-stroke depressed individuals displayed more "motivated" symptoms such as anxiety, catastrophising, hyper-emotionalism and reactive diurnal mood variation whereas the inpatient sample presented with more anhedonia, suicidal thoughts and guilt feelings.

Stroke survivors with a prior history of depression were not excluded in the Townsend et al. (2007) study of the prevalence rate of MDPS (defined by a score > 8 on the Hospital Anxiety and Depression Scale). Prevalence rates from the single cohort of 125 Australian stroke survivors was found to be 5% at 2-5 days post stroke, 16% at 1 month post stroke and 21% at 3 months post stroke . These findings illustrate that the time period between 2-5 days and 1 month was the period of greatest increase in the prevalence of depression. The dynamic nature of MDPS in the early stages was

highlighted by the finding that "patients with MDPS at 1mth were not necessarily affected at 3 months and vice versa" (p. 429). This study also highlighted high rates of anxiety in the sample, with prevalence (defined as a score > 8 on the HADS Anxiety subscale,HADSA) at the three time points being 5%, 8% and 14%.

Fure, Wyller, Engedal and Thommessen's (2006) Norwegian based study assessed depression (using a cut-off point of >6 on HADS Depression subscale, HADSD) and anxiety (using a cut-off point of >8 on HADSA) in 178 stroke survivors during the acute stroke period (3-7 days after admittance to a stroke unit). This study found that 14% of patients suffered from depressive symptoms, 26% from anxiety symptoms and 8% from both. The authors suggested that the lower depression scores relative to anxiety scores at 3-7 days post stroke may indicate that stroke survivors have not yet developed insight into the consequences of their stroke, with an increase in depressive symptoms occurring later in the post-stroke period as this awareness develops.

Differences in depression and anxiety prevalence in the first week post stroke seen by Townsend et al. (2005) and Fure et al. (2006) may be related to the use of a higher HADSD cut-off score and the exclusion of stroke survivors with severe cognitive impairment in the Townsend et al. (2005) study, suggesting that their prevalence rates may be an underestimate.

Ayerbe, Ayis, Wolfe and Rudd (2013) conducted a systematic review and meta-analysis of 50 studies from 1983 – 2011, reviewing estimates of the prevalence of depression

post stroke. Studies included within the review were classified into four time periods: acute phase (within 1 month of stroke); medium-term phase (1-6 months); long-term phase (6 months to 1 year); and very long-term phase (more than 1 year). Prevalence of depression was 29% across the different time periods, remaining stable up to 10 years. This study included 15 new studies not reviewed in an earlier study by Hackett, Yapa et al. (2005), and yet both reviews reported remarkably consistent prevalence rates of depression after stroke.

Natural History of Post Stroke Depression

The natural history of depression after stroke was assessed in a study of 1233 stroke survivors at 3 months after stroke, 1 year after stroke and annually up to 15 years after stroke between 1995 and 2009 (Ayerbe, Ayis, Crichton, Wolfe & Rudd, 2013). Depressive episodes tended to start within the first year post stroke, with one third of cases beginning in the first 3 months with 50% of those recovering by 1 year, while the remaining 50% gradually recovered between years 2 and 9. There was a significant risk of recurrence in the long term ranging from 38% in the second year to 100% in years 14 and 15. Ayerbe, Ayis, Crichton, et al. (2013) concluded that there was a "dynamic natural history of depression in the long term after stroke" (p. 1107), with the risk of depression persisting over time, although the depressive episodes themselves were of a relatively short duration (less than one year). The findings of this study were consistent with previous research into the natural history of post stroke depression (Morrison, Pollard, Johnston & MacWalter, 2005; Lincoln et al., 2013).

Factors Related to the Development of Post Stroke Depression

Direct stroke related factors such as physical disability, stroke severity and cognitive impairment have been associated with depression following stroke (Hackett & Anderson, 2005a; Ayerbe, Ayis, Wolfe et al., 2013). Ischemic inflammation associated with the stroke may also contribute to the development of post stroke depression, through biological mechanisms (Pascoe, Crewther, Carey & Crewther, 2011). Identification of factors related to the development of post stroke depression is difficult due to the variability between studies, including issues of recruitment and selection into studies as well as the use of different methods to detect and assess depression (Williams, 2005). Despite these limitations other identified psychosocial predictors of depression after stroke have included increased age, poor social support and a past history of depression (Ayerbe, Ayis, Wolfe, et al., 2013; West, Hill, Hewison, Knapp & House, 2010).

Impact of Post Stroke Depression

In stroke survivors, depression may impede rehabilitation, reduce socialisation and QoL and affect caregiver health (Hackett & Anderson, 2005a; Hackett, Anderson & House, 2005). Severity of depression was related to increased dependence in stroke survivors at 12 weeks post stroke (Schmid et al. 2011). Stroke survivors with persistent psychological symptoms in the first 26 weeks post stroke had poorer physical function outcomes at 1 year post-stroke (West et al. 2010).

Depression after stroke has also been associated with increased mortality. Ellis, Zhao and Egede (2010) used Cox Proportional Hazard ratios to evaluate the effect of

depression on mortality. When compared with people with no history of stroke or depression, risk of mortality in 8 years was 88% higher for stroke survivors with depression, 74% higher for stroke survivors without depression and 23% higher for people with depression with no history of stroke. The exact mechanisms by which stroke and depression were associated with increased mortality were unclear. However, physiological contributions and behavioural aspects, such as poor adherence to treatment, management of risk factors (smoking, physical activity and body mass index) and co-morbidity were considered as possible mechanisms.

Barton (2012) suggested that stroke survivors with depression are less proactive in their recovery due to lowered motivation to attend rehabilitation sessions, adhere to diet and exercise recommendations or comply with medications. Additionally, depression in the general population has been associated with hypertension and lower cessation rates of smoking (Morrison, 2008) both considered risk factors for stroke. Ayerbe, Ayis, Crichton, et al. (2013) report that "depression is a risk factor for stroke therefore the proportion of patients at risk of depression may be increased among stroke patients." (p. 1109).

Impact of Post Stroke Depression on Carers

Depression in stroke survivors has also been associated with increased caregiver emotional distress, with Williams (2005) reporting that caregivers of stroke survivors with depression may also be at higher risk of having depression themselves. Cameron, Cheung, Streiner, Coyte, and Stewart (2011) conducted a longitudinal cohort study of 399 stroke survivor/carer dyads over a period of 2 years, and found caregivers reported

more emotional distress when caring for stroke survivors with increased depressive symptoms and more cognitive impairment. Emotional distress was also higher in carers who were younger, female, in poor health themselves, expressed lower levels of mastery regarding the provision of care and felt provision of care caused greater interference upon their lifestyle.

Stroke survivor disability was not a predictor of caregiver distress but rather caregiver challenges were related to the emotional and behavioural consequences of the stroke experienced by the stroke survivor (Cameron et al., 2011). These findings were supported in a study by Bakas, Austin, Jessup, Williams and Oberst (2004) in an assessment of 116 family caregivers of stroke survivors, using the Oberst Caregiving Burden Scale (OCBS). Results indicated that tasks such as managing finances, patient behaviours and providing emotional support were considered difficult, time consuming and were predictive of lowered mood and negative caregiver outcomes (including reduced social functioning, well-being and physical health).

Psychological Interventions for Post Stroke Depression

Reliable, empirical evidence to guide clinical management of post-stroke depression is limited (Hackett et al., 2008). NICE guidelines (National Collaborating Centre for Mental Health. Depression, 2010) recommend a "stepped-care model" with the use of both antidepressants and psychological therapy. As in other clinical populations,(Huntley, Araya & Salisbury, 2012) stroke survivors are often prescribed medication prior to involvement in psychological therapy, making it difficult to ascertain the benefits of therapy alone.

A Cochrane review of the efficacy of pharmacotherapy and psychotherapy for treating depression after stroke provided tentative support for the use of antidepressant medication particularly in the case of moderate and severe depression (Hackett et al., 2008). Caution was advised in the use of antidepressants however, due to the side effects, compliance problems, unknown risks associated with these medications and the finding that 30% of patients do not respond to their first prescribed medication (Hackett et al., 2008; Hackett & Anderson, 2005b).

Hackett et al. (2008) concluded that there was no evidence to support the use of psychotherapy in the treatment of depression after stroke, however there were a number of methodological flaws in the research studies included in the review. Studies have tended to lack a definition of counselling interventions; assessed small sample sizes; rarely used a treatment manual or appropriated trained therapists; or used inappropriate experimental designs to demonstrate treatment efficacy (Laidlaw, 2008).

Investigations of interventions for post-stroke depression have utilised approaches including behavioural and cognitive therapies, and problem solving approaches.

Behavioural Therapy Based Interventions

Behaviour therapy is based on the notion that mood is linked to behaviour and through the use of behavioural activation, the number of pleasurable activities increase with a related improvement in a participant's mood (Lincoln, Kneebone, Macniven & Morris,

2012). In an early randomised controlled trial (RCT), Drummond and Walker (1996) failed to demonstrate an improvement in post stroke depression after a behavioural activation intervention as part of a leisure rehabilitation program (being provided with equipment and advice for leisure pursuits and liaison with support agencies) conducted by occupational therapists. Participants in the intervention group, were seen for 30 minutes each week for 3 months and then for 30 minutes fortnightly for a further 3 months. Their outcomes were compared with 21 patients receiving conventional occupational therapy (with no encouragement, help or advice provided) and 23 patients in a no treatment control group. Despite the lack of significant effect on post-stroke depression, the intervention did demonstrate short term improvements in stroke survivors' mobility, psychological well-being and participation in leisure activities.

Kneebone and Dunmore (2000), in a review of the Drummond and Walker (1996) study, commented that treatment of post stroke depression was not the direct objective of the intervention, but rather the prevention of depression post stroke, with fewer "diagnosable cases of depression" being reported post intervention.

Behaviour therapy has been shown to improve self-reported and observer reported mood and self-esteem in stroke survivors with aphasia (Thomas, Walker, Macniven, Haworth & Lincoln, 2012). This RCT compared an average of 9 one hour sessions of behaviour therapy in addition to usual care (n=51) with usual care alone (n=54). Manualised behaviour therapy was delivered by assistant psychologists with treatment strategies focusing on education, activity monitoring and scheduling and graded task assignments. Outcomes were assessed at the end of the three month period and again at

6 months, using the Visual Analogue Mood Scale and the Stroke Aphasia Depression Questionnaire. Significant improvements in observer rated mood were maintained at 6 months.

Most research on behavioural therapy based interventions has been conducted in the area of chronic stroke with one study on the prevention of depression. There is a great degree of variability in session content and duration across studies, making comparison of studies difficult.

Cognitive Behavioural Therapies (CBT)

CBT refers to a group of structured psychotherapeutic approaches and is considered effective in the treatment of depression (particularly for mild-moderate depression) in the general population (Ellis, Hickie & Smith, 2004; Roth & Fonagy, 2005) and with depressed older adults (Laidlaw, 2008). Lincoln, Worthington and Mannix (2012) in a survey of the management of mood problems after stroke by clinical psychologists in the UK (reviewing 140 patients across 10 services), found that 42% of patients with mood problems after stroke received psychological treatment, with cognitive and behavioural therapies the most commonly used (49%).

"Traditional" CBT integrates aspects from behaviour therapy and the Cognitive Model (Beck, 1964). Cognitive therapy focuses on identifying negative thoughts, attitudes and beliefs and challenging these with the replacement of more positive and realistic thinking patterns (Beck, A.,1995). The premise behind CBT is that the situation itself

does not cause the emotional and behavioural consequences for a person, but rather it is the person's interpretation of those events that contribute to the emotional, physical and behavioural response (Beck, A., 1964; Ellis, 1962 in Beck, J., 1995).

Homework exercises have been identified as an important component of change in CBT interventions with older people (Lincoln et al., 2012). Homework is often used to reinforce concepts between sessions, such as goal setting and activity scheduling, with mood and activity levels monitored on a regular basis. Psycho-education is another component of CBT and provides participants with information and education about their condition, the content of which may differ at certain points in their rehabilitation. Provision of information to stroke survivors and their carers has been associated with an improvement in mood (Smith et al., 2008 in Barton, 2012). CBT may also involve teaching skills to participants, such as time management, social skills training and problem solving skills in an attempt to improve participants' ability to deal with everyday problems or crisis situations (Hackett & Anderson, 2005b)

Lincoln, Flannaghan, Sutcliffe and Rother (1997), in an uncontrolled pilot study using an AB experimental design, assessed the effectiveness of CBT on post stroke depression in 19 stroke survivors using the Beck Depression Inventory (BDI) and the HADS as measures. Stroke survivors were reviewed over an initial 4 week baseline period before receiving an average of 8.4 sessions of CBT over three months (with the number of sessions ranging from 3-15 at the discretion of the therapist). CBT strategies included cognitive restructuring and activity scheduling, and results indicated a statistically significant decrease in depressive symptoms from pre to post intervention with

"consistent benefit" noted in four patients, "some benefit" in six patients and "no benefit" in 9 patients. Stroke survivors with recurrent stroke and illness or those with cognitive impairment were noted to benefit less from treatment. Methodological limitations apparent in this study included a lack of a control group and follow-up, the inexperience of the therapist delivering the program and an inadequate number of treatment sessions.

A later RCT by Lincoln et al. (2003) evaluated CBT in the treatment of a sample of depressed stroke survivors recruited at 1 month, 3 month and 6 months post stroke who were randomly assigned to three different groups. The manualised CBT intervention had a focus on education, activity scheduling, and modification of negative thoughts and beliefs. An average of ten one-hour intervention sessions were delivered across a three month period to the 39 participants in the intervention group, while other participants were allocated to an attention placebo group (43 participants who received the same number of visits with a focus on general discussion without any therapeutic care) and 41 participants in a standard care control group. No significant differences were found between groups after intervention, with all groups demonstrating an improvement in mood.

Potential difficulties with this study were the variability in number of sessions received by participants in the CBT intervention group, ranging from 0 – 15 (also observed in their pilot study, Lincoln et al., 1997) and the lack of evaluation of the quality of therapy provided. Additionally, recruiting participants at different time points may be problematic, with Lincoln et al. (2012) suggesting that CBT may be better suited to the

post-acute phase rather than in the acute phase, as participants recruited at a later time post stroke showed greater improvement.

In another study using an AB experimental design, Rasquin et al. (2009) assessed 5 depressed stroke survivors attending an outpatient rehabilitation clinic in the Netherlands after 8 weekly, one hour session of CBT intervention involving recognition and challenging negative thoughts, relaxation and scheduling of pleasurable activities. Homework exercises were completed between sessions with twice weekly contact by a psychologist to assist with homework compliance. Improved mood was reported by four of the participants after the intervention, while three months later, a reduction of depressive symptoms was noted by three participants. All participants reported that the strategies provided by the intervention helped them "handle mood problems" (p. 218).

Problem Solving Therapy

Problem solving therapies are a form of cognitive behavioural intervention which focuses on helping clients identify problems of concern and working through a structured approach to solve these problems. A RCT comparing problem solving therapy with volunteer visits and treatment as usual, demonstrated that a median of 5 fortnightly sessions of problem solving training was beneficial in reducing general psychological distress (as measured on the General Health Questionnaire, which incorporated a measure of depression) as delivered to stroke survivors by a community mental health nurse (House, 2000 in Lincoln et al., 2012).

A RCT by Robinson et al. (2008) found that fewer cases of depression developed over a 12 month period when non-depressed stroke survivors at three months post stroke were either treated with Escitalopram or problem solving therapy, with both treatments being superior to placebo medication alone. However, problem solving therapy was not superior to placebo when using an intention to treat methodological analysis, with an estimated 9.1 stroke survivors needing to be treated to prevent 1 case of depression.

Towle, Lincoln and Mayfield (1989) assessed the impact of social work intervention (using a problem solving approach in addition to providing advice on services, benefits and counselling) on self-reported depression in 44 stroke survivors who were more than 12 months post stroke. Participants received visits up to twice weekly for a period of 16 weeks with results unable to demonstrate any effect of treatment in comparison to a control group. Treatment outcomes were difficult to assess due to the variability in content and number of intervention sessions received by participants (ranging from 2 – 11 sessions).

Other studies have failed to demonstrate a benefit from problem-solving therapy. Dennis, O'Rourke, Slattery, Staniforth and Warlow (1997) in a RCT using a problem solving intervention over a 6 month period which included counselling, stroke related advice and goal setting, delivered by stroke family care workers in a sample of 210 stroke survivors based on need, found no treatment benefit over a control group of 207 stroke survivors receiving standard care. The authors suggested that rather than improving stroke survivors' coping skills, the social worker merely provided support.

Group Therapy

CBT can be delivered in a group or individual based format, however the majority of empirical evidence has been based on individually delivered CBT. Described benefits of group therapy are the sharing of experiences and an increase in social networks (Yalom, 2005 in Huntley et al., 2012) while also allowing stroke survivors to see others in a similar situation, providing reassurance that they are not "alone" in the experience of stroke.

Huntley et al. (2012) conducted a systematic review and meta-analysis of the efficacy of group-based psychological therapies for the treatment of depression in primary care and the community. Group CBT was superior to usual care alone for individuals who are clinically depressed. While individually delivered CBT was more effective than group CBT in the short term following treatment, the difference was no longer apparent after 3 months.

A group CBT intervention for stroke survivors' spouses was compared to two different control groups, one receiving supportive information while the other received standard care (Wilz & Barskova, 2007). Spouses in the CBT intervention group received 15 structured sessions of manual based CBT intervention, which was offered twice a month for 1.5hours duration over a period of 8 months. The content of the CBT intervention focused on expression of emotions and "social sharing" (p. 2511), psycho-education, cognitive restructuring, problem solving and relaxation techniques. Outcomes were

measured pre and post intervention and again at 6 month follow-up, using self-report depression, anxiety and quality of life questionnaires (Beck Anxiety Inventory; BDI, WHOQOL). Results indicated an improvement in carers' quality of life post intervention and at 6 month follow-up, however improvement in depression was only evident at 6 month follow-up.

The cost-effectiveness of group CBT, (with estimates suggesting group therapy costs are half that of individual therapy) and being able to treat more people using the same resource (Huntley et al., 2012; Vos, Corry, Haby, Carter & Andrews, 2005) makes it attractive for services with limited resources, such as Australian stroke services which have limited access to clinical psychologists. The National Stroke Foundation Acute Clinical Audit (2009) indicated that only 3% of stroke patients with mood impairment were assessed by a psychologist. A recent audit by the Australian National Stroke Foundation (2012) stated:

> "One of the areas in need of the most change is providing better access to psychological and mood assessments, and support. Depression and mood disorders are a significant problem for stroke survivors with undiagnosed and untreated depression, which is recognised as a major barrier to successful rehabilitation. Only 38% of hospitals reported access to psychologists and only 50% of patients audited had mood assessments." (p. 5).

They state further: "It is recommended that systems are established or enhanced to ensure the psychological and emotional support needs of all stroke survivors are

considered during rehabilitation (including further assessment and treatment by psychologists) and is offered to those who require it" (p. 6).

Group Therapy Interventions for Post Stroke Depression

There is a paucity of research on group interventions for the treatment of depression in stroke survivors. A twelve week course of group CBT was used in a study by Kemp, Corgiat and Gill (1992) to treat depression in 41 older nondisabled and disabled participants (an unspecified number of whom had suffered a stroke). Both groups reported an improvement in depression levels from baseline; however, this improvement was only continued in the nondisabled group at six and twelve months follow-up. Longer intervention sessions and booster sessions were recommended for the disabled participants.

Gurr (2009) implemented a psychological wellbeing group for stroke survivors in an acute stroke rehabilitation service in the UK. The study was not intended as a research project, rather the aims of the group were to "support adjustments to the health changes following stroke, optimise emotional and cognitive functioning and enhance opportunities for social interaction and sense of belonging to the group" (p. 12). The intervention was conducted in an 'open group' format, with new patients (admitted to the unit) being eligible to join the group, with an average of 3-6 patients within any one session. The group met once a week for an hour and a half with the first hour following a CBT group therapy model, while stroke survivors were taught and practiced relaxation

in the last half hour of the group. Psychological distress at the start of groups was reported as a mean HADS-A score of 8.7 and a mean HADS-D score of 7.3, although variability of distress was noted between group members (anxiety ranging from scores of 1-20 and depression scores ranging from 4-14 on the HADS). Assessment of 20 stroke survivors who completed the self-rated anxiety, depression and relaxation measures indicated a significant reduction in anxiety and depression scores post intervention and an improvement in self-rated relaxation ability.

Intervention Recommendations for Post Stroke Depression

National guidelines recommend the use of cognitive behaviour therapy (CBT) for the treatment of post stroke depression (NSF, 2010). However, the literature regarding efficacy for CBT for post stroke depression is limited and further studies are required. Recommendations from the Hackett et al. (2008) review suggested that future psychotherapy trials should adhere to the use of a "pre-specified framework for therapy" (p. 10) and the use of a manualised program. The use of manualised treatments and reliable and valid outcome measures for assessment (for replication of studies), has also been recommended by Chambless & Hollon (1998 in Kneebone et al. 2000) in order to ascertain whether a psychological treatment is empirically supported.

Laidlaw (2008) contends that "CBT should work, given that it is a present oriented, skills-enhancing, problem solving therapy" (p. 238), although currently there is a lack of empirical evidence for its support in treating post stroke depression. In a review of the literature on post stroke depression, Broomfield et al. (2011) suggest that the efficacy of CBT in the treatment of post stroke depression may be improved through the use of

augmentation; using motivational interviewing, grief resolution, and adaptation for cognitive deficits and being tailored to specific needs of the individual stroke survivor.

A trial protocol of an individually tailored, augmented CBT intervention for post stroke depression in a sample of 106 stroke survivors with outcomes assessed at baseline, post intervention and at 6 and 12 month follow up (on the HADS), has recently been published (Kootker, Fasotti, Rasquin, van Heugten and Geurts, 2012). The design is a multi-centre RCT with the experimental intervention based on 10 – 12 sessions of CBT, (following principles of "recognising, registering, and altering negative thoughts and cognitions" p. 54) augmented by 3 – 4 sessions of direct in-vivo activation (offered concurrently by occupational therapists) so that mood and emotional symptoms are improved. Patients in the control group receive a computerised cognitive training intervention.

Evidence for psychological treatment for anxiety in stroke survivors is sparser still. A Cochrane review (Campbell-Burton et al. 2011) found insufficient evidence to guide treatment for anxiety after stroke, although pharmacotherapy may effectively reduce anxiety in stroke survivors experiencing co-morbid anxiety and depression. No information was available on treatment for anxiety alone in stroke survivors.

Brainstorm Intervention for Post Stroke Depression

In 2007, the Hunter Stroke Service in Newcastle, Australia, requested a group intervention focusing on reducing depression in stroke survivors. An existing CBT

program developed by the Liaison Psychiatry Service at John Hunter Hospital (*BraveHeart*, Hambridge, Turner & Baker, 2009; Turner, Hambridge, Baker, Bowman & McElduff, 2013) was adapted for stroke survivors. The cognitive and behavioural content of the *Brainstorm* program focuses upon improving mood by increasing motivation and socialisation and in developing more adaptive cognitions. These are considered "key factors" impacting upon recovery from stroke (Hackett, Yapa et al. 2005).

The *Brainstorm* treatment manual utilised large font, double-spaced lines, and tick-box options for older and more physically disabled stroke survivors; and were checked by a speech pathologist with stroke expertise. Caregivers were also included in the program. Brainstorm groups have been conducted for six years (2007 – 2013). Group participants have been invited to complete assessments of mood and quality of life before and after the program with the aim of evaluating the effectiveness of the treatment program. The current research involves a detailed analysis of the existing Brainstorm data. The study will give an initial indication as to the effectiveness of group CBT with this clinical population and guide clinical practice and future research.

Group cognitive behavioural therapy for stroke survivors with depression and their carers

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Abstract

Objective: To evaluate the effectiveness of a group cognitive behavioural therapy program (*Brainstorm*) for stroke survivors with depression and their carers.

Method: This study utilised a repeated measures design with no control group. Participants were 48 community dwelling stroke survivors and 34 carers who attended groups from 2007 to 2013. This closed group intervention consisted of up to 10 sessions covering basic CBT techniques including psycho-education, mood and activity monitoring, activity planning, thought challenging and problem solving. Participants were assessed at baseline, post-treatment and 1 month and 6 months post intervention. Primary outcomes were depression scores for stroke survivors (Beck Depression Inventory-II; Hospital Anxiety and Depression Scale depression subscale). Exploratory analyses included changes in anxiety, quality of life and the impact on participation and autonomy for stroke survivors, and the assessment of depression, anxiety and carer burden for carers. Statistical analysis used a mixed models approach for repeated measures data.

Results: The post-treatment assessment was completed by 77% of stroke survivors; 46% and 27% of the baseline sample completed 1 month and 6 month follow-up assessments respectively. Stroke survivors' depression scores decreased from baseline to post-treatment ($p < .001$), this was maintained at 1 month ($p < .001$) but not 6 month follow-up. Anxiety scores decreased for stroke survivors between baseline and 1 month follow-up ($p = .012$). Their quality of life, and participation and autonomy scores did not change over time. Carer burden (perceived time spent on and difficulty of caring tasks), depression and anxiety scores at 1 month and 6 month follow-up, for carers, were all reduced when compared with baseline.

Conclusions: The *Brainstorm* group intervention for depression in stroke survivors appears to be effective in the short term. Session attendance rates were high and participant feedback positive.

Keywords

Cognitive behaviour therapy, depression, group therapy, stroke, anxiety, carers

A stroke occurs when there is a disruption of the blood supply to the brain, often due to a burst blood vessel (haemorrhagic stroke) or a blood clot (ischaemic stroke, National Stroke Foundation, NSF, 2010). While stroke mortality in Australia has declined due to better prevention, treatment and awareness of risks, 6% of all deaths in Australia in 2009 were attributable to stroke (Australian Institute of Health and Welfare, AIHW, 2012). Approximately one-third of stroke survivors experience depression in the year following stroke (Hackett et al., 2005b). In stroke survivors, depression may impede rehabilitation, reduce socialisation and increase mortality risk (Hackett and Anderson, 2005a; Ellis et al., 2010).

Depression in stroke survivors has also been associated with increased caregiver emotional distress (Cameron et al., 2011). The management of stroke survivors' behaviours and provision of emotional support has been associated with negative caregiver outcomes, such as reduced social functioning, well-being and physical health (Bakas et al., 2004).

Reliable, empirical evidence to guide clinical management of post-stroke depression is limited (Hackett et al., 2008). A Cochrane review of the efficacy of pharmacotherapy and psychotherapy for treating depression after stroke provided tentative support for the use of antidepressant medication; however caution was advised due to side effects and unknown risks associated with these medications (Hackett et al., 2008). Assessment of the potential benefit of psychotherapeutic interventions for the treatment of depression after stroke has been difficult due to the small number of studies conducted and their methodological limitations. Hackett et al. (2008) suggested that future psychotherapy

trials should adhere to the use of a "pre-specified framework for therapy" (p.10) and the use of a manualised program.

Cognitive Behaviour Therapy (CBT) is a relatively brief, structured psychotherapy considered particularly effective in the treatment of mild to moderate depression in the general population (Ellis et al., 2004; Roth and Fonagy, 2005) and with depressed older adults (Laidlaw, 2008). While individually delivered CBT has been shown to reduce depressive symptoms in stroke survivors (Lincoln et al., 1997; Rasquin et al., 2009), a randomised controlled trial (RCT) failed to demonstrate superiority over an attention placebo or standard care (Lincoln and Flannaghan, 2003).

Group CBT is estimated to cost half that of individually administered therapy and is able to treat more people using the same resources (Vos et al., 2005). This makes group CBT attractive for services with limited resources, such as Australian stroke services that may have minimal access to clinical psychologists (NSF, 2009).

A group CBT program, *Brainstorm* was developed through the Liaison Psychiatry department at John Hunter Hospital, Newcastle, Australia for outpatient stroke survivors experiencing symptoms of depression. This program was adapted from an existing group CBT program for cardiac rehabilitation outpatients (Hambridge et al., 2009; Turner et al., 2013). The cognitive and behavioural component of the *Brainstorm*program focused upon improving mood by increasing motivation and socialisation and in developing more adaptive cognitions, considered key factors in

impacting upon recovery from stroke (Hackett et al., 2005b). Treatment manual format was suitable for older and more physically disabled stroke survivors. Caregivers were included in the program in order to benefit from CBT strategies personally and to assist stroke survivors in their recall and use outside of the group.

The aim of the present study was to evaluate the effectiveness of the *Brainstorm* group CBT program (conducted between 2007 and 2013) for stroke survivors experiencing symptoms of depression and their carers. The current research involved a detailed analysis of the existing *Brainstorm* data.

The primary hypothesis was that stroke survivors' depression scores would be lower than baseline levels following the group CBT intervention (indicating improved mood). The secondary hypothesis was that this reduction in stroke survivors' depression scores would be maintained at 1 month and 6 month follow-up. It was expected that stroke survivors would demonstrate an overall reduction in symptoms of anxiety and improvements in quality of life, participation and autonomy. It was expected that carers would demonstrate reductions in depression, anxiety and carer burden.

Methods

Design and setting

The research design was a quantitative study utilising a repeated measures design. As data was collected as part of a service evaluation of a clinical program, no control group

was used. The *Brainstorm* CBT program was conducted with eight groups between March 2007 and June 2013 in the Hunter New England region of NSW, Australia.

Participants and procedures

The program was open to stroke survivors who were aged ≥18 years with depressive symptoms, intact receptive communication, able to read, communicate verbally and complete 'tick' boxes on questionnaires independently. Exclusion criteria included major cognitive impairment or dementia; or non-English speaking, which were applied through the use of clinical judgement, both by referrers (as to suitability to be in a group program) and by the group facilitators. No screening tests were routinely used.

Participants either self-referred or were referred by a health professional. Sources of recruitment included government and non-government inpatient and outpatient services for people who had experienced a stroke. Group facilitators assessed the suitability of potential group members. All interested and eligible patients were offered treatment. Stroke survivors were asked to attend the group with a selected carer/support person ("carer") however, stroke survivors could attend alone.

Baseline assessment occurred at the initial group session while the post-treatment assessment was completed at the final *Brainstorm* session. Participants were also mailed questionnaires (with stamped, self-addressed return envelopes) to complete at one month and six months after program completion. Data for the current study includes baseline, post-treatment and 1-month assessment data for all participants, and

6-month assessment data for groups 1-7 (group 8 data for the 6 month follow-up is not due until December 2013). Participants were also given the opportunity to provide both verbal and anonymous written feedback during the final session.

As the outcome measures were given as part of a service evaluation project, written consent was not sought. Participants who opted to complete the measures did so with full knowledge that the results would be used to evaluate the program. Completion of the measures was therefore deemed sufficient to indicate consent. Analysis of the outcome data and publication and dissemination of resultswere approved by the Hunter New England Human Research Ethics Committee and University of Newcastle Human Research Ethics Committee (see Appendix A).

Intervention

Brainstorm is a closed group CBT program consisting of between 7-10 sessions of 2-3 hours duration. Earlier groups received 7 or 8 weekly sessions. The program was extended by two extra sessions for groups 6-8 (6 weekly sessions, followed by two fortnightly sessions, and then two sessions held a month apart) as an initial look at the data suggested a loss of gains (with regard to improvement in depressive symptoms) at six months. Groups were facilitated by clinicians from Hunter New England Health; either two clinical psychologists or a clinical psychologist and a social worker or occupational therapist(see Appendix B)

Brainstorm uses a manualised 'tool kit' approach; likening CBT strategies to maintenance tasks (see Appendix C). Each session included a program overview; revision of homework from the past session; new information and new homework tasks; and a session summary. CBT techniques included: psycho-education, mood monitoring, activity monitoring and planning, thought monitoring and challenging. Problem solving skills included brainstorming, structured problem solving, prioritising and motivating tools. Participants were encouraged to use these skills to deal with depression, anxiety and sleeping problems. The Brainstorm group also allowed for separate group time for carers. This provided carers with a confidential arena to discuss difficulties in providing support for stroke survivors and allowed CBT strategies to be discussed that targeted carer specific concerns.

Participants received workbooks that included session information, additional reading and homework tasks. Treatment manuals utilised large font, double-spaced lines, and tick-box options for older and more physically disabled stroke survivors; and were checked by a speech pathologist with stroke expertise. Participants received feedback on their scores on the depression and anxiety measures (Beck Depression Inventory-II, BDI-II and Hospital Anxiety and Depression Scale, HADS) at the initial and final sessions.

Measures

At baseline, post-treatment, 1-month and 6-month follow-up, stroke survivors were invited to complete the BDI-II, HADS anxiety and depression subscales (HADSA, HADSD), Assessment of Quality of Life (AQOL) and Impact on Participation and

Autonomy (IPA). Carers were invited to complete the BDI-II, HADSA, HADSD and the Oberst Caregiving Burden Scale (OCBS). HADS is a commonly used measure of depression in stroke, and the BDI-II was included as a more sensitive measure of depression in stroke survivors.

Depression and anxiety.

The 21 item BDI-II (Beck et al., 1996) is a widely used measure of self-reported depression in adults and adolescents and has good psychometric properties in primary care medical patients (Arnau et al., 2001). Participants select one of 4 statements for each item, scored 0-3 (total score range 0-63). Recommended severity categories are: *Minimal* (0-13); *Mild* (14-19); *Moderate* (20-28); and *Severe* (29-63) (Beck et al., 1996).

The 14 item HADS (Zigmond and Snaith, 1983), designed for use with medical outpatients, consists of a 7-item anxiety subscale (HADSA) and a 7-item depression subscale (HADSD). Participants select one of 4 statements for each item, scored on a four point scale from 0-3 (total subscale scorerange 0-21), with higher scores indicating increased severity of symptoms. Recommended severity categories are: *Minimal* (0-7); *Mild* (8-10); *Moderate* (11-13); and *Severe* (14-21). The reliability and validity of the HADS are well established (Bjelland et al., 2002).

Quality of Life.

The 15 item AQoL version B (Hawthorne et al., 1999) has five subscales covering independent living; social relationships; physical senses; psychological well-being and illness. The 3 items in each scale are scored from 0-3 (total subscale score range 0-9, where 0 is good and 9 is considered the worst possible QoL). The AQoL is considered a reliable and valid instrument for assessing QoL after stroke (Sturm et al., 2002).

Participation and Autonomy.

The 32 item IPA (Cardol et al., 2001) assesses limitations in the autonomy and participation of adults with chronic illnesses across five domains: autonomy indoors; family role; autonomy outdoors; social life and relationship; and work and education. Items assess perceived participation in specific situations, with responses graded on a five point scale ranging from 0 (*very good*) to 4 (*very poor*), and, for each domain, how problematic any limitations are, graded on a three point scale (0, *no problem*; 1, *minor problems*; 2, *severe problem*). Domain scores are calculated by summing item scores (scored 0-4), with higher scores indicative of more restriction in participation or more problems experienced in that domain. The IPA has demonstrated reliability and validity (Sibley et al., 2006).

Caregiver Burden.

The 15 item Oberst Caregiving Burden Scale (OCBS, Bakas et al., 2004) assesses the time requirement and difficulty of tasks provided by caregivers of stroke survivors. Each item requires caregivers to rate the time involved in a specific task (ranging from *none* to *a great amount*, scored 1-5); and the difficulty of performing the task (ranging

from *not difficult* to *extremely difficult*, scored 1-5). Individual items are summed to provide total sub-scores for time and difficulty (ranging from 15-75) with higher scores indicating greater time spent or difficulty with tasks. Item and subscales have been shown to have good psychometric properties (Bakas et al., 2006).

Participant feedback.

Participants were requested to provide anonymous written feedback about the *Brainstorm* group during their final session. Participants responded to 10 questions in the format of a 5-point Likert scale (adapted and expanded from Edelman et al., 2003). Responses ranged from 1 (*not at all*); 2 (*a bit*); 3 (*moderately*); 4 (*quite a lot*) to 5 (*very much*) on questions such as their enjoyment of the program, how helpful they found being in a group with people in a similar situation, and how well they thought the facilitators led the group.

Analysis

Data was analysed with IBM SPSS Statistics for Windows (version 20.0; SPSS, Chicago, IL, USA). Significance reported a priori as $\alpha = .05$. Data that was deemed missing at random was dealt with according to questionnaire-specific guidelines (Aben et al., 2002; Hawthorne et al., 2000; Kersten, 2007; Bakas et al., 2006). Missing data was imputed, where permissible, by averaging individual participants' scores within a subscale. See Appendix D for data recovery details.

Linear mixed models were created for all outcomes (BDI-II, HADSA, HADSD, AQOL subscales, IPA subscales, Carer Burden Time and Difficulty subscales) to determine any changes from baseline to post-treatment (the end of the final treatment session), and again at 1 month and 6 month follow-up. A mixed models approach to analysing repeated measures data was used as it analyses on an intention to treat basis and there was incomplete data from participants over the four time points and varying assessment time intervals. This ensured all participants were included in the analysis and allowed inherent adjustments for baseline scores. Another advantage of using a mixed models approach is that the optimal covariance matrix is selected, resulting "in more appropriate estimates of the effect of treatment and their standard errors" (Brown and Prescott, 2006: p. 3). Model choice was based on comparison of three nested covariance patterns (Compound Symmetry; Toeplitz and Unstructured/General) and selection of the covariance matrix with the best fit was indicated by the lowest Akaike's Information Criteria (AIC) and Schwartz's Bayesian Criterion (BIC) values.

Results

Participant Characteristics

A total of 82 participants; 48 stroke survivors (59%) and 34 carers (41%) started the program and 37 out of 48 stroke survivors (77%) and 24 out of 34 carers (71%) completed the post-treatment assessments at the final session. The primary outcome measures (BDI-II, HADS) were completed by 36 participants at 1 month, comprised of 22 stroke survivors (46%) and 14 carers (41%). The 6-month follow-up assessments were completed by 13 stroke survivors (27%) and 8 carers (24%) from the first 7 groups.

Participants were offered between 7–10 sessions over a 7–18 week period. Of the 82 participants starting *Brainstorm*, 10 participants (12%) attended the first session only. Median attendance for all stroke survivors was 88% of offered sessions, with 17 (35%) stroke survivors attending all sessions offered and 12 (25%) stroke survivors missing one session.

The mean age for stroke survivors was 66 years and 65% (31/48) were male. Mean carers' age was 63 years with 21% (7/34) male. Seventy-one percent (32/45) of stroke survivors had experienced 1 stroke. The median time since their last stroke was 15 months and the majority (60%) of stroke survivors had experienced their last stroke more than one year prior to attending the *Brainstorm* group.

TABLE 1 ABOUT HERE

For stroke survivors, there was a significant positive correlation between baseline scores on the BDI-II and baseline scores on HADSA (r=.86, n=46, p<.001, one tailed) and HADSD (r=.78, n=46, p<.001, one tailed). There was a significant positive correlation between HADSA and HADSD baseline scores(r=.66, n=46, p<.001, one tailed).

Mixed Models Analysis for Stroke Survivors

No significant effects (on the BDI-II, HADSA or HADSD) were found for age, gender, number of strokes, time since stroke or percentage of sessions attended. The group attended by stroke survivors was significant and included in further analysis for outcomes on the BDI-II and HADSA; group 4 had significantly higher scores, while group 7 had significantly lower scores.

TABLE 2 ABOUT HERE

Depression.

For the BDI-II, a linear mixed model analysis testing both time and group attended and their possible interaction as fixed effects found a significant effect for time only ($F(3,57.74)=9.63$, $p<.001$). Post-treatment depression scores were significantly lower than baseline scores ($p<.001$) with a further significant reduction in scores at 1 month follow-up ($p<.001$). The group attended by the stroke survivor was included in the BDI-II model with the effect trending towards significance ($p=.057$) though the interaction between group and time was non-significant.

TABLE 3 ABOUT HERE

There was a significant positive correlation between the average of BDI-II scores for stroke survivors at baseline and post-treatment and the difference between scores at

baseline and post-treatment (Spearman's rho=.33, n=37, p=.048, two tailed). This indicated that stroke survivors with more severe depression scores showed the greatest amount of change in scores from baseline to post-treatment (Bland and Altman, 1999).

Stroke survivor BDI-II scores were categorised into severity ratings. At baseline 59% of stroke survivors had scores within the moderate or severe categories, with 30% in these categories at post-treatment.

HADSD scores changed significantly over time ($F($3,73.50)=3.98, p=.011). Depression scores at post-treatment (p=.002) and 1 month follow-up (p=.041) were significantly lower than at baseline.

Anxiety, QOL and participation and autonomy.

For HADSA, a mixed model analysis testing both time and group attended found a significant effect for time ($F($3,56.67)=3.39, p=.024) and group ($F($7,41.99)=2.35, p=.041) but not for their interaction. Post-treatment scores trended towards being significantly lower than baseline scores (p=.068), while 1 month follow-up scores were significantly lower than baseline scores (p=.012).

No significant reduction in mean scores from baseline to post-treatment, and no significant differences over time were found on any AQOL subscale. Similarly, no significant effects were found for the IPA subscales. See Appendix E.

Mixed Model Analysis for Carers

The optimal model for assessment of change over time for carers' scores on the BDI-II, HADSD and HADSA used a compound symmetry covariance matrix. There was a significant effect for time on the BDI-II (p=.007) with follow-up scores at 1 month (p=.016) and 6 months (p=.002) being significantly lower than baseline. Scores at 6 months were also significantly lower than post-treatment scores (p=.017). A trend was seen for change over time for carers' scores on the HADSD (p=.064).

HADSA scores for carers changed significantly over time (p=.018) with follow-up scores at 1 month (p=.007) and 6 months follow-up (p=.016) being significantly lower than baseline.

For the mixed model analysis for carers on the OCBS Time subscale, the compound symmetry covariance matrix was used to reveal a significant effect for time (p=.017) with scores at 1 month (p=.023) and 6 month follow-up (p=.006) significantly lower than baseline. The 6 month follow-up scores were also significantly lower than post-treatment scores (p=.021). There was no significant difference between baseline and post-treatment scores.

A similar pattern was found on the OCBS Difficulty subscale with a significant effect for time (p=.001) with scores at 1 month (p=.003) and 6 month follow-up (p=.001)

both significantly lower than baseline. The 6 month follow-up scores were significantly lower than post-treatment scores (p=.011).

TABLE 4 ABOUT HERE

Stroke Survivor and Carer Comparison

Stroke survivor and carers' scores on BDI-II, HADSD and HADSA and were modelled together to examine their differences in scores. At baseline stroke survivors had significantly higher BDI-II, HADSD and HADSA scores than carers, with a mean difference of 10.49 (p<.001), 3.72 (p<.001), and 2.12 (p=.018) respectively.

Participant Feedback

Anonymous feedback was obtained from 53 participants (87%). Overall, satisfaction with the Brainstorm program was high. The item "How helpful was it being in a group with people in a similar situation" was rated either a 4 ("quite a lot") or a 5 ("very much") by 100% of participants. Questions asking about the enjoyment, helpfulness and leader quality of the program all had average ratings above four. The completion and ease of doing homework items had the lowest ratings. Suggestions for improvements mainly focused on geographical location of the program and a preference for less travel time and easier access to the building.

Discussion

The purpose of this study was to evaluate the effectiveness of a group CBT program (*Brainstorm*) for depression in stroke survivors and carers. Stroke survivors' depression scores at post-treatment were significantly lower than at baseline, supporting the primary hypothesis. This reduction in depression scores was maintained at one month follow-up, but not at six month follow-up, partially supporting the secondary hypothesis.

This study is one of very few evaluating group CBT for depression in stroke survivors. The findings were similar to those obtained by Gurr (2009), who assessed 16 stroke survivors after up to three sessions of CBT and relaxation in an open group format within an acute stroke rehabilitation unit, and found a decrease in depression scores for stroke survivors at post-treatment. Their finding of a greater reduction in anxiety scores than depression scores post-treatment was not replicated by the current study, possibly because the current group CBT intervention was not targeted toward anxiety reduction (Hambridge et al., 2009).

The improvement in stoke survivors' depression was maintained at 1 month follow-up, but not at 6 month follow-up. This pattern was also found by Drummond and Walker (1996) in their RCT of a program designed to increase stroke survivors' leisure activities, which found an improvement in psychological wellbeing at 3 months which did not persist at 6 months. The 6 month follow-up data in the current study came from a very small sample (n=13). Further research is required to confirm whether the benefits of *Brainstorm* persist beyond 6 months.

Stroke survivors' mean baseline scores on the BDI-II were categorised as 'moderate', which is within the severity range considered to potentially benefit from group CBT interventions (Ellis et al., 2004). Stroke survivors with more severe depression showed the greatest degree of change in scores from baseline to post-treatment. Stroke survivors with baseline depression scores within the minimal range may still benefit over the longer term from their participation in the *Brainstorm* program, given the dynamic nature of the natural course of post-stroke depression (Ayerbe et al., 2013). The provision of CBT strategies may assist stroke survivors to identify and manage depression occurring in the future.

Stroke survivors were encouraged to attend *Brainstorm* with a carer (typically their partner). There was no significant difference between age of stroke survivors and carers. However, there was a significant difference in gender, with a greater number of male stroke survivors and a greater number of female carers. This may be partly due to a higher number of male stroke survivors within the Hunter New England Health area (Hunter New England Health Stroke Service Plan, 2008) or perhaps a function of female carers being more willing to accompany their male stroke survivor partners to a depression treatment group.

Demographic characteristics such as age, gender, number of strokes suffered, time since stroke and percentage of sessions attended were not significantly associated with depression or anxiety scores over time in stroke survivors. Although the group that the

stroke survivor attended was significantly associated, caution should be taken in interpretation due to small sample sizes.

The *Brainstorm* program appears to specifically target depression, with some improvement in anxiety but little effect on stroke survivors' QOL or participation and autonomy in day to day activities. Only minimal improvement in the AQOL and IPA subscales was seen from baseline to post-treatment, and this was not maintained at 1 month or 6 month follow-up. While QOL, participation and autonomy were not the target of the group CBT intervention, it was expected they would have benefited from stroke survivors' improved mood. Our finding was consistent with Lincoln et al.'s (1997) finding of no significant improvement in stroke survivors' functional outcomes following CBT.

While carers' mean scores on depression and anxiety measures at all four time points were within the minimal range and significantly lower than stroke survivors' scores at baseline, 38% of carers had clinically significant depression scores. Depression and anxiety significantly decreased at 1 month and 6 month follow-up compared with baseline. Furthermore, perceived carer burden (both the time required and the difficulty of tasks) followed the same pattern. This delayed change may occur for several reasons. Stroke survivors' symptoms may have stabilised over time resulting in a decrease in the time and difficulty of tasks required of carers. Carers may have developed increased self-confidence in providing care over time. Alternatively, the program may have provided carers with strategies to deal with their own mood, resulting in a flow-on effect of changing their perception of carer burden.

The benefits of group delivery of CBT in reducing depression in stroke survivors in the current study is consistent with that found for group CBT for depression in the community (Huntley et al., 2012). The *Brainstorm* participants' anonymous feedback indicated that delivery of the CBT program in a group format was appealing; particularly the ability to see others in a similar situation, development of mutual support and increased socialisation and session attendance was high.

There are several limitations of the current study. This study had a small sample size and no control group. The assessments were completed as part of a service evaluation, rather than specifically designed as a research project. Therefore some stroke survivors with minimal depressive symptoms were included, and there was no evaluation of prior history of depression or formal diagnostic assessment of depression. Further, documentation of current use of antidepressant medication was not available, nor was there a measure of stroke severity or assessment of treatment integrity. Finally, as follow-up questionnaires were posted (due to limited service resources), the rate of return and sample size for the follow-ups were reduced.

Recruitment rates into the Brainstorm program were low and may reflect referral barriers even when a service is offered, suggesting a role for routine depression screening within outpatient clinics. Uptake barriers also need to be acknowledged and addressed, such as difficulty for stroke survivors in physically attending the group due

to mobility, transport or access to the building issues. Additionally, some stroke survivors will prefer other modalities or types of treatment to a group therapy program.

A future RCT would allow comparison with a control group. Stroke survivor outcomes were the primary focus of the current study; however results suggest that carers also benefitted. Future research could extend the analysis of carer outcomes and look at matching stroke survivors with their carer to evaluate any relationship between outcome measures between matched pairs. Future research studies could also examine the role of a group CBT program such as Brainstorm, in the prevention of post stroke depression, as well as in the sub-acute period.

The current study suggests that *Brainstorm*, a group CBT intervention for the treatment of depression, has successfully been adapted to suit a stroke survivor population. Following *Brainstorm*, community dwelling stroke survivors demonstrated significant improvement in depression at post-treatment and 1 month follow-up, with high attendance rates and positive participant feedback. The inclusion of carers attending with stroke survivors was beneficial, with a reduction in carer burden, depression and anxiety for carers in the longer term.

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Declaration of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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Tables

Table 1.

Demographic details for stroke survivors and carers at baseline

Demographics	Stroke Survivors (n=48)	Carers (n=34)	Significance p
Age *M* (SD)	66.04 (11.58)	62.81 (14.99)	.288
Male Female	31 17	7 27	<.001*
Number of strokes (% of stroke survivors) (n=45)	1 = 32 (71%) 2 = 11 (25%) 3 = 2 (4%)	N/A	
Time since stroke			
Median (months)	15	N/A	

Significance level *p<.05

Table 2.

Baseline mean scores and standard error scores for stroke survivors for BDI-II and HADSA according to group they attended

	Group1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Number of stroke survivors in group	6	5	6	4	5	6	7	9
BDI-II								
Mean(SE)	17.10(3.84)	17.86(4.26)	22.24(3.91)	30.41(4.77)*	23.33(4.71)	19.74(3.10)	11.09(3.60)*	13.47(3.33)
HADSA								
Mean(SE)	8.44(1.51)	6.23(1.65)	8.84(1.51)	11.43(1.84)*	10.44(1.84)	9.35(1.53)	4.61(1.39)*	6.20(1.28)

*Significance level $p<.05$

Table 3.

Estimated marginal means for stroke survivors for BDI-II, HADSD and HADSA at assessmenttime points

		Follow-Up			
Measure	Baseline (n=46)	Post-Treatment (n=37)	1 Month (n=22)	6 Month (n=13)	p
BDI-II					
Mean (SE)	23.66 (1.55)	17.34 (1.65)*	16.13(2.11)*	20.83 (2.62)	Time $F(3,57.74)= 9.63$ ($p<.001$)* Group $F(7,42.53)= 2.16$ ($p=.057$)
BDI-II Severity %					
Minimal(0-13)	24%	35%	64%	46%	
Mild (14-19)	17%	35%	5%	15%	
Moderate (20-28)	35%	14%	27%	0%	
Severe (29-63)	24%	16%	5%	39%	
HADSD					
Mean (SE)	8.54 (0.63)	6.85 (0.67)*	7.23 (0.76)*	7.12 (0.91)	Time $F(3,73.50) = 3.98$ ($p=.011$)*
HADSA					
Mean (SE)	9.28 (0.61)	8.18 (0.65)	7.22 (0.84)*	8.37 (1.08)	Time $F(3,56.67)=3.39$ ($p=.024$)* Group $F(7,41.99)=2.35$ ($p=.041$)*

Table 4.

Estimated marginal means for carers for OCBS Time and Difficulty subscales, BDI-II, HADSD and HADSA at assessment time points

			Follow-Up		Significance
Measure	Baseline	Post-Treatment	1 Month	6 Month	*p*
	(*n*= 29)	(*n*=21)	(*n*=12)	(*n*=8)	
OCBS Time					
Mean (SE)	43.82 (2.29)	42.35 (2.49)	36.96 (3.02)*	33.82 (3.54)*	*F(*3,37.99) = 3.82 (*p*=.017)*
OCBS Difficulty					
Mean (SE)	30.01 (1.93)	27.34 (2.08)	22.84 (2.52)*	20.17 (2.82)*	*F(*3,38.72) = 6.31 (*p*=.001)*
BDI-II	(*n*=34)	(*n*=24)	(*n*=14)	(*n*=8)	
Mean (SE)	11.62 (1.33)	9.85 (1.53)	6.94(1.89)*	3.98 (2.31)*	*F(*3,45.39)= 4.56 (*p*=.007)*
HADSD					
Mean (SE)	4.65 (0.59)	4.20 (0.65)	3.44 (0.75)	2.59 (0.89)	*F(*3,47.12) = 2.58 (*p*=.064)
HADSA					
Mean (SE)	7.12 (0.61)	6.41 (0.69)	4.79 (0.84)*	4.52 (1.05)*	*F(*3,48.67)=3.71 (*p*=.018)*

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Appendix A: Ethics Approval

Ethics Approval

This research project received Human Research Ethics Approval from the University of Newcastle's Human Research Ethics Committee [H-2013-0166] and from Hunter New England Research Ethics Committee [13/05/15/5.06].

Thank you for your **Variation** submission to the Human Research Ethics Committee (HREC) seeking approval in relation to a variation to the above protocol.

Variation to include data from the 8th Brainstorm Group conducted through Consultation Liaison Psychiatry, John Hunter Hospital.

Your submission was considered under **Expedited Review of External Approval** review by the Chair/Deputy Chair.

I am pleased to advise that the decision on your submission is **External HREC Approval Noted** effective **03-Jul-2013**.

The full Committee will be asked to ratify this decision at its next scheduled meeting. A formal *Certificate of Approval* will be available upon request.

Professor Allyson Holbrook

Chair, Human Research Ethics Committee

HUMAN RESEARCH ETHICS COMMITTEE

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Notification of Expedited Approval

To Chief Investigator or Project Supervisor:	**Doctor Sean Halpin**
Cc Co-investigators / Research Students:	**Ms Susan Ward** **Dr Alyna Turner**
Re Protocol:	**Group Cognitive Behaviour Therapy for Depression in Stroke Survivors and their Carers**
Date:	**05-Jul-2013**
Reference No:	**H-2013-0166**

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Appendix B: Brainstorm Group Information

Group	Stroke Survivors	Carers	Total	No of sessions	Timing	Year	Facilitator
1	6	6	12	8	6 sessions 1/wk 2 sessions fortnightly	2007	2 Clinical Psychologists
2	5	2	7	8	6 sessions 1/wk 2 fortnightly	2008 Mar	ClinPsych Social Worker
3	6	4	10	7	6 sessions 1/wk 1 fortnightly	2008 Oct	Clin Psych Social Worker
4	4	3	7	8	6 sessions 1/wk 2 fortnightly	2009 June	Clin Psych Occupational Therapist
5	5	4	9	8	6 sessions 1/wk 2 fortnightly	2009 Sept	Clin Psych OT
6	6	5	11	10	6 sessions 1/wk 2 fortnightly 2 monthly	2010	Clin Psych OT
7	7	6	13	10	6 sessions 1/wk	2012	Clin Psych

					2 fortnightly **2 monthly**		**Registered Psych** **OT**
8	**9**	**4**	**13**	**10**	**6 sessions 1/wk** **2 fortnightly** **2 monthly**	**2013**	**Clin Psych** **OT**
TOTAL	**48**	**34**	**82**				

Notes:

1. Group size was determined pragmatically, and groups were run when there was a sufficient size (minimum of 3 – 4 stroke survivors and a maximum of 7 – 8 stroke survivors). The length was determined after consideration of the Braveheart sessions (from which Brainstorm was derived), as it was felt that stroke survivors were more disabled than cardiac patients and therefore earlier groups consisted of eight sessions, while later groups were extended to ten sessions in an attempt to maintain gains from the program.

2. An initial look at the data suggested a loss of gains (with regard to improvement in depressive symptoms) at six months so the program was extended from eight to ten sessions. The seven week group was due to Christmas falling during the timing for the eighth session, meaning one less session for that particular group. Otherwise the program was refined based on facilitator experience and participant feedback.

Appendix C: *Brainstorm* Session Content (10 session program)

Session Number	Session Title	Content
1	Introduction. So tell me what is this all about?	• Group introductions • Symptom screening and feedback (BDI-II, HADS) • Introduction to mood monitoring
2	Figuring out the problem: working out what makes you feel bad.	• The impact of stroke • Stroke and mood • Psychoeducation (depression/anxiety) • Goal setting
3	If it aint broke, don't fix it: working out what makes you feel good.	• Link between activity and mood • Brainstorming – problem solving • Activity planning
4	If it is broke... Part 1 Pros and cons for change.	• Problem solving • Links between thoughts, feelings and actions.
5	If it is broke... Part 2: Overcoming barriers to change	• Barriers to change Overcoming barriers • Thought challenging
6	Helping change happen: Resources and supports	• Further problem solving with a focus on increasing motivation. • Managing conflict • Finding resources and supports

7 - 9	Dealing with the squeaky bits: Common fears and problems Discussion of topics of interest from group participants	• Sleeping problems • Dealing with emotional lability • Dealing with anxiety and panic • Information for carers
10	DIY or professional needed: Where to from here? BDI-II: Beck Depression Inventory HADS: Hospital Anxiety and Depression Scale.	• Review of goal setting and achievements. • Review of main messages and tools. • Symptom re-screening and feedback (BDI-II, HADS). • Options for further assistance. • Discussion and feedback.

Measure	Before Cleaning	After Cleaning	Improvement	% Improvement
BDI-II Pre	78	80	2/78	2.56%
BDI-II 1 Mth	34	35	1/34	2.94%
BDI-II 6 Mth	20	21	1/20	5.00%
HADS Pre	79	80	1/79	1.27%
HADS 1 Mth	35	36	1/35	2.86%
AQOL Total Pre	41	45	4/41	9.76%
AQOL Total Post	28	31	3/28	10.71%
AQOL Total 1 Mth	18	19	1/18	5.55%
AQOL Illness Pre	43	45	2/43	4.65%
AQOL Illness Post	29	31	2/29	6.90%
AQOL Indep Living Pre	44	45	1/44	2.27%
AQOL Indep Living Post	30	31	1/30	3.33%
AQOL Social Pre	43	45	2/43	4.65%
AQOL Physical 1 Mth	19	20	1/19	5.00%
AQOL Psychological 1 Mth	19	20	1/19	5.00%
IPA Autonomy Indoor Pre	41	42	1/41	2.44%
IPA Family Role Post	26	30	4/26	15.38%
IPA Autonomy Outdoor Pre	41	42	1/41	2.44%
IPA Autonomy Outdoor 6 Mth	11	12	1/11	9.09%
IPA Social Life Post	27	30	3/27	11.00%
IPA Work & Education Pre	7	13	6/7	85.71%
IPA Work & Education Post	7	14	7/7	100.00%
IPA Work & Education 1 Mth	6	9	3/6	50.00%
IPA Work & Education 6 Mth	3	4	1/3	33.00%
Carer Burden Time Pre	23	28	5/23	21.74%
Carer Burden Time Post	17	21	4/17	23.53%
Carer Burden Time 1 Mth	10	12	2/10	20.00%
Carer Burden Difficulty Pre	22	29	7/22	31.81%
Carer Burden Difficulty Post	17	21	4/21	19.05%

Appendix D: Data Cleaning Process and Recovery

BDI-II (Aben, Verhey, Lousberg, Loder & Honig, 2002)	75% of items must be completed. Cannot impute means; only 1 item missed from a scale with total based on the sum of the other 20 questions.
HADS(Aben et al. 2002)	70% of items must be completed. Imputed means are acceptable if only 1 item missed from a subscale.
AQOL(AQOL Technical Report, 2000)	70% of items must be completed. Imputed means are acceptable if only 1 item missed from a subscale.
IPA(Kersten, IPA Manual 2007)	75% of items must be completed.
Carer Burden (OCBS Questionnaire: www.medscape.com)	At least 50% of items must be completed to calculate total score. If less than 50% of items are missing for each subscale then imputing means is acceptable.

Appendix E: Estimated Marginal Means and Standard Errors for AQOL and IPA

Estimated marginal means and standard errors for AQOL and IPA subscales over time points for stroke survivors

Measure	Baseline Mean (SE)	Follow-up Post-Treatment Mean (SE)	1 Month Mean (SE)	6 Month Mean (SE)	Significance *p*
AQOL	(*n*=45)	(*n*=31)	(*n*=20)	(*n*=12)	
Illness	6.27 (.32)	6.25 (.35)	5.87 (.38)	6.14 (.43)	.531
Independent Living	4.07 (.42)	3.81 (.45)	3.90 (.49)	3.93 (.55)	.840
Social	3.24 (.32)	3.23 (.35)	3.52 (.39)	3.42 (.46)	.809
Physical	1.81 (.21)	1.57 (.23)	1.49 (.26)	1.95 (.29)	.207
Psychological Wellbeing	3.48 (.29)	2.87 (.31)	3.25 (.35)	3.28 (.40)	.090
IPA	(*n*=43)	(*n*=30)	(*n*=20)	(*n*=12)	*p*
Autonomy Indoor	5.45 (.88)	4.77 (.94)	3.63 (1.03)	5.50 (1.14)	.105
Family Role	11.19 (.99)	10.02 (1.10)	10.36(1.24)	10.97 (1.50)	.627
Autonomy Outdoors	8.97 (.82)	8.27 (.87)	8.58 (.93)	9.16 (1.02)	.486
Social	8.64 (.85)	8.47 (.92)	9.57 (1.02)	9.45 (1.18)	.496
Work and Education[a]	13.77(1.61) (*n*=13)	15.08(1.58) (*n*=14)	13.91(1.71) (*n*=9)	15.06(2.06) (*n*=4)	.634

AQOL, Assessment of Quality of Life Instrument (Version B); IPA, Impact on Participation and Autonomy Questionnaire

a. IPA Work and Education subscale had a much smaller sample size as questions related to paid or unpaid employment or training. The majority of stroke survivors were either retired or unable to work due to their stroke.

Appendix F: Journal Submission Details and Guidelines for Authors

It is the intention of the authors to submit 'Group cognitive behavioural therapy for stroke survivors with depression and their carers' for publication in the Australian and New Zealand Journal of Psychiatry.

Information has been taken ('cut and pasted') from the Sage Harvard Submission Guidelines.

Journal of the Australian and New Zealand Journal of Psychiatry

Impact Factor:3.293 | Ranking:24/120 in Psychiatry (SSCI) | 39/135 in Psychiatry (SCI)

Australian & New Zealand Journal of Psychiatry is the official Journal of The Royal Australian and New Zealand College of Psychiatrists (RANZCP).

The *Australian & New Zealand Journal of Psychiatry* is a monthly journal publishing original articles which describe research or report opinions of interest to psychiatrists. These contributions may be presented as original research, reviews, perspectives, commentaries and letters to the editor.

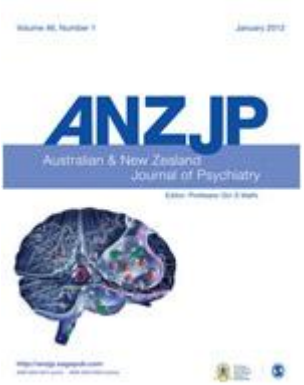
The *Australian & New Zealand Journal of Psychiatry* is the leading psychiatry journal of the Asia-Pacific region.

Information sourced from journal home page:

http://anp.sagepub.com/

Manuscript Submission Guidelines

Australian and New Zealand Journal and Psychiatry



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11. **Further information**

The *Australian and New Zealand Journal of Psychiatry* is the official journal of the Royal Australian and New Zealand College of Psychiatrists. It is published twelve times per year and accepts submissions presented as original research, reviews, perspectives and correspondence. The Editor welcomes editorials, debates, viewpoints and commentaries but requests that authors contact him in advance; see 'article types' below for further information.

The acceptance criteria for all papers are the quality and originality of the research and its significance to our readership. All articles submitted are first screened by the Editor for suitability, quality and originality. If suitable, articles are assigned to the Editor or an Associate Editor who coordinates the peer review process, which usually involves seeking reviews from at least two researchers expert in the field. The Editorial Board reserves the right to refuse any material for publication and advises that authors should retain copies of submitted manuscripts and correspondence as material cannot be returned. Final acceptance or rejection rests with the Editor and Editorial Board.

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The *Australian and New Zealand Journal of Psychiatry* operates a strictly anonymous peer review process in which the reviewer's name is withheld from the author. The reviewer may at their own discretion opt to reveal their name to the author in their review but our standard policy practice is for the identity to remain concealed. Each manuscript is reviewed by at least two reviewers. All manuscripts are reviewed as rapidly as possible, and an editorial decision is generally reached within (e.g.) 4-6 weeks of submission.

2. Article types

The ANZJP publishes seven types of manuscripts (*Editorial, Debate, Viewpoints, Review, Research, Commentary* and *Letter*) within three categories: (*Perspectives, Articles* and *Correspondence).* Please note that ANZJP does not publish Book Reviews.

Perspectives Perspectives include editorials, debate and viewpoint. The Editor encourages perspectives but requests that authors contact him in advance.

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Debate: These are brief provocative accounts that provide differing perspectives on a single shared issue or topic of discussion. Their focus may be similar to that of editorials and viewpoints but these are generally shorter pieces that make one or two salient points.

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Articles: Articles include Reviews and original Research papers.

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	MANUSCRIPTS						
Category:	**Perspectives**			**Articles**		**Correspondence**	
	Perspectives include editorials, debate and viewpoint. The Editor encourages perspectives but requests that authors contact him in advance.			Articles include reviews and original research papers.		Correspondence includes communications to the Journal in the form of commentaries and letters.	
Type:	**Editorial**	**Debate**	**Viewpoint**	**Review**	**Research**	**Commentary**	**Letter**
Descriptio	The Editor	These are	Viewpoint	These	These	This is	Corresponden

n:	normally commissions Editorials, however proposals are welcome and should be addressed directly to the Editor. Editorials should address contemporary topics of interest and provide thought-provoking discussion. The presentation of new hypotheses and novel ideas pertaining to psychiatry are welcome.	brief provocative accounts that provide differing perspectives on a single shared issue or topic of discussion. Their focus may be similar to that of editorials and viewpoints but these are generally shorter pieces that make one or two salient points.	perspectives are similar to editorials but allow the inclusion of personal perspectives and opinion. Viewpoints may choose to address contentious issues in psychiatry and may therefore contain controversial views.	papers provide a synthesis of a topic within psychiatry. They may have a clinical and/or research focus. In exceptional circumstances these papers may exceed the specified length but this should be negotiated with the Editor at the time of submission.	are papers that report original high quality research.	correspondence typically pertaining to a recent or concurrently published article within ANZJP. Usually comments and critiques will be passed on to the authors of the original article however, this will not determine the outcome of review and publication.	ce to the Editor is welcomed and encouraged on any aspect of psychiatry. Please note case reports *per se* are no longer published by the ANZJP but observations of single cases and case series can be reported in ANZJP as letters.
Word Count:	2500-4000	1000-1500	1500-2500	4000-7500	5000	500-1000	250-500
Max Refs:	25	15	20	100	50	10	5
Abstract Required:	No	No	No	Yes	Yes	No	No
Authorship:	Editor, Deputy Editors, Associate Editors, Invited Guest Editors	At invitation of Editor	At invitation of Editor	Anyone	Anyone	At invitation of Editor	Anyone

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While UK English is preferred, US English may be used as per the author's preference.

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Any acknowledgements should appear first at the end of your article prior to your Declaration of Conflicting Interests (if applicable), any notes and your References.

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9.2 Journal Style

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9.3 Reference Style

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For manuscripts requiring an abstract, the abstract must be approximately 300 words in length and structured under four headings: Objective, Method, Results and Conclusions.

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Method: design, setting, sample, interventions (if appropriate), chief outcome measures; for reviews give sources of data and criteria for their selection.
Results: main findings.
Conclusions: only those related to results, both positive and negative, highlighting limitations as appropriate, and clinical and research implications; for reviews give principal conclusions and clinical and research implications.

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