The Association between Depression and Functional Recovery

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Abstract

This pilot observation study looked at the prevalence of depressive symptoms within the geriatric population in an acute inpatient rehabilitation unit and examined the relationship between geriatric patients’ psychological state and their functional outcome. Thirty eligible patients were enrolled with the following measures applied: Functional Independence Measure (FIM), Mini-Mental State Examination (MMSE) and Geriatric Depression Scale (GDS). Depressive symptoms were present in 43% of the studied group on admission. There were significant improvements in both GDS and motor FIM scores indicating a significant interaction between mood and physical functioning. This suggests that it is necessary to address both physical and psychological functioning in a general rehabilitation programme.

Keywords: Depression; Geriatric rehabilitation; Functional outcome; Functional independence measure; Geriatric depression scale

Introduction

Major depression has been reported in 1-4% of the general elderly population with twice as many women as men affected [1]. The general prevalence and incidence of major depression double after age 70 years [1], with several studies suggesting that the prevalence of depression in the geriatric rehabilitation population is around 30% [2].

The presentation of depression in the elderly can be very variable and physical symptoms are often confounded by chronic medical illnesses and medication use [3]. The outcomes of many medical disorders may also be negatively affected by depressive symptoms [3]. It must be noted also, that social stressors such as low economic status, social isolation, bereavement and relocation contribute to adjustment issues with depressed mood [1]. All of these factors potentially affect the geriatric patients undergoing inpatient rehabilitation, as they are usually convalescing from serious illness and are often facing an uncertain future about their ability to regain their previous level of function.

Three studies examined the relationship between depression and functional recovery in rehabilitation patients; all of which used the Geriatric Depression Scale as a mood screening tool. Diamond et al. [4] found that only depression at discharge was related to functioning at discharge but was unrelated to functional change, i.e. patients classified as depressed at discharge had lower Functional Independence Measure (FIM) scores at both admission and discharge and did not appear to be related to change in FIM during rehabilitation.

Lieberman et al. [2] found that depression correlated significantly with functional state on admission and like the former study, also did not correlate with functional change during admission.

The third and largest study by Cully et al. [5], found that depression was significantly related to functional recovery, with the presence of depressive symptoms being negatively associated with functional ability at discharge.

Another large study by Callahan et al. [6] showed that a collaborative care management approach for geriatric depression was successful in reducing depression and highlighted an association with improved physical functioning. The authors suggested that this could be a cost-effective means of interrupting the inevitable decline in physical and cognitive function in the depressed elderly, by maintaining their independence in the community for a much longer period of time.

Given the available evidence suggesting the presence of a strong relationship between depressive symptoms and patients’ physical function, the purpose of this exploratory pilot study was to determine:

- The prevalence of symptoms suggestive of depression among the geriatric population in our unit during the course of rehabilitation
- The possible reasons for these symptoms
- Whether there was a relationship between patients’ psychological state and their functional outcome and the strength of this association
- What the relationship between psychological state and function was
- The usefulness of the Geriatric Depression Scale in an inpatient rehabilitation setting

Methods

Setting

The Gold Coast Health and Hospital Service is a major health service that provides health care from the state border of New South Wales to the Coomera region in Queensland, Australia. It consists of two main hospital campuses, the Gold Coast University Hospital and...
the Robina Hospital [7]. At the time of the study, the smaller Robina campus had over 160 beds in medical, rehabilitation and surgical wards and provided a limited range of outpatient services [7]. In terms of population and socio-economic data, the estimated resident population was about 5,76,918 and rapidly expanding as of 30th June 2016, with people aged over 60 years old making up about 21.9% of the Gold Coast population [8]. The Gold Coast area is also regularly visited by large numbers of local and international tourists [8].

Study design

This was a small pilot observational study, carried out in the rehabilitation unit of the Robina Hospital.

Participants: Forty-one patients in total were considered for enrolment during a two-month period from April to May 2008. The sample size was small due to the relatively short duration of the study, and eventually thirty patients were enrolled.

The enrolled patients:
- were at least 65 years old
- had a Mini-Mental State Examination (MMSE) score of 18 and above
- met the diagnostic criteria for admission into the rehabilitation unit

Patients were excluded, in the event of:
- Significant cognitive impairment, as measured by an MMSE score of 17 or less [2]
- being less than 65 years old [2]
- An inpatient transfer from the rehabilitation unit to the care of an acute team, without readmission into rehabilitation thereafter [2]
- A refusal to participate in the study [1]
- An inability to speak English [1]
- An inability to complete the GDS and MMSE because of severe dysphasia, visual or hearing deficits [1]
- Incomplete data collection [2]

Complete data was available for thirty patients, with eleven patients excluded for the above reasons. Six (20%) were males and twenty-four (80%) were females. The average age of the patients studied was 79.9 years (Standard deviation. 8.00; range 65-95 years). Twenty-nine patients were Caucasian and one patient was of Middle Eastern descent. Diagnoses of patients included orthopaedic reasons [9-14], cerebro-vascular accidents [6], general medical causes [3], and other neurological causes [3], amputations [2], respiratory causes [1] and vascular causes (Figure 1) [1].

![Figure 1: Number of patients by diagnostic group. (Neuro: Neurological; Resp: Respiratory; Gen Med: General medical; CVA: Cerebrovascular Accidents).](image)

Twenty-three (77%) patients were discharged home; five (17%) were discharged to a low care residential facility (hostel) and two (6%) were discharged to a high care residential facility (nursing home). The two patients who were discharged to a high care facility were both over ninety years of age (Figure 2).
Measures

The Geriatric Depression Scale (GDS) was developed as a screening tool for the geriatric population [9]. Its items are based on characteristics of depression in the elderly [10]. The original scale consisted of 30 questions which required only a “yes/no” answer. None of these questions relate to somatic symptoms, so as to avoid confounding somatic symptoms with physical disturbances common in old age, usually because of chronic medical illness or medication side effects [9]. This 30-item scale has been validated against other assessment instruments of depression, such as the Beck Depression Inventory and the Hamilton Depression Rating Scale [6]. The validity of the GDS has been evaluated mostly in elderly living independently in the community. However, there have been a few small studies regarding its use in the hospitalised elderly population, which suggested that the depressed state improves towards the end of hospitalisation with the degree of improvement associated with a corresponding improvement in the functional state [2].

The GDS has, however, been found to be unreliable in people with moderate to severe cognitive impairment; it has not been adequately studied in people less than 65 years of age [8].

The short form of GDS (GDS-SF) with a 15-item questionnaire was utilised in this study. A score of more than 5 points is suggestive of depression and a score of more than 10 points is almost always indicative of depression [11]. The GDS-SF has generally demonstrated strong psychometric properties, including reliable internal consistency in urban geriatric rehabilitation patients [11,12].

The GDS was created primarily as a screening tool for depression. If a patient was found to have a strong indicator for depression, a referral for further detailed clinical psychiatric assessment was made. However, this was not the main focus of the current study.

The Functional Independence Measure (FIM) is the most widely used functional assessment instrument in medical rehabilitation [13]. It measures eighteen items in six categories inclusive of: self-care, sphincter control, mobility, locomotion, communication and social cognition [13]. Each item is scored on a 7-point ordinal scale; 1 indicates total dependence and 7 indicates complete independence; higher scores are indicative of better functioning [13]. The total score ranges from 18 to 126. The six categories are broadly divided into two main groups, with the categories of activities of daily living and mobility being classified as “motor” and the categories of communication and social cognition being classified as “cognitive”. The maximum subtotal score for the “motor” group is 91 and the maximum subtotal score for the “cognitive” group is 35 [13].

The Mini-Mental State Examination (MMSE) is the most widely used and studied screening measure of cognitive impairment [14]. It is scored out of 30 and has the advantages of being brief and easy to administer. Its disadvantages are that it is insensitive to frontal lobe disorders and is of limited usefulness in detecting focal deficits and mild cognitive impairment [14]. Other factors such as age, education and socio-economic status also may affect the final score [14]. The normative values of the MMSE are more useful in terms of specificity, rather than sensitivity [14].

Procedure

In this study, functional gains were determined by examining changes in admission and discharge FIM scores. These were completed...
by members of the rehabilitation team (physiotherapists, occupational therapists and nursing staff).

Admission MMSE scores, which were used to screen for cognitive impairment within the study group, were administered by either the ward medical officer or occupational therapists once the patients were transferred to the rehabilitation unit.

The Geriatric Depression Scale was administered twice to each patient (once within three days of admission and once within three days pre-discharge) and was done by either a trained nursing staff member or the ward medical officer.

**Ethics**

Verbal consent was obtained from each patient before the GDS questionnaire was administered. The study was approved by the Quality Assurance committee of the hospital and was deemed to be exempt from full ethical review.

### Statistical analysis

Data were analysed using the computer programme SPSS [12]. The type of analysis performed was an analysis of variance (ANOVA).

### Results

On admission, thirteen (43%) patients were classified by the GDS as having symptoms suggestive of depression. On discharge, this number had dropped to five (17%). The number of patients who were unlikely to have depression as scored by the GDS had increased from 17 to 25. None of the patients scored more than 10 points on the GDS (which would have indicated depression) on either admission or discharge (Figure 3).

![Figure 3: Number of patients on the GDS indicating likelihood of depressive symptoms.](image)

Twenty-two (73%) patients demonstrated an improvement in GDS scores; three (10%) patients did not show any change; five (17%) patients showed deterioration in score. The biggest deterioration occurred in one of the patients discharged to a high care residential facility.

Table 1 shows the average admission and discharge FIM scores obtained for each patient along with the motor and cognitive breakdown scores. The average GDS scores for admission and discharge are also shown. The range of scores obtained for both measures are included in the same table for reference.

<table>
<thead>
<tr>
<th></th>
<th>Admin FIM score</th>
<th>DC FIM</th>
<th>Diff</th>
<th>Motor FIM (admin)</th>
<th>Diff</th>
<th>Motor FIM (DC)</th>
<th>Diff</th>
<th>Cognitive FIM (admin)</th>
<th>Diff</th>
<th>Cognitive FIM (DC)</th>
<th>Diff</th>
<th>GDS (admin)</th>
<th>Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>average</td>
<td>97.7</td>
<td>108.0</td>
<td>10.4</td>
<td>67.5</td>
<td>9.4</td>
<td>76.9</td>
<td>9.4</td>
<td>30.3</td>
<td>0.9</td>
<td>31.2</td>
<td>0.9</td>
<td>4.8</td>
<td>0.8</td>
</tr>
<tr>
<td>std dev</td>
<td>16.4</td>
<td>16.0</td>
<td>8.9</td>
<td>13.4</td>
<td>8.6</td>
<td>13.5</td>
<td>8.6</td>
<td>4.4</td>
<td>1.4</td>
<td>3.8</td>
<td>1.4</td>
<td>2.9</td>
<td>1.0</td>
</tr>
<tr>
<td>min</td>
<td>43.0</td>
<td>44.0</td>
<td>23.0</td>
<td>20.0</td>
<td>20.0</td>
<td>22.0</td>
<td>22.0</td>
<td>1.0</td>
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<tr>
<td>max</td>
<td>120.0</td>
<td>124.0</td>
<td>89.0</td>
<td>35.0</td>
<td>35.0</td>
<td>35.0</td>
<td>35.0</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>
Table 1: Differences between admission and discharge parameters (Admin: Admission; DC: Discharge; Diff: Difference; FIM: Functional Independence Measure; GDS: Geriatric Depression Scale; Std Dev: Standard Deviation).

<table>
<thead>
<tr>
<th>GDS (DC)</th>
<th>3.0</th>
<th>2.4</th>
<th>0.0</th>
<th>9.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diff</td>
<td>1.8</td>
<td>2.9</td>
<td></td>
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</table>

There was a significant improvement in total FIM scores between admission and discharge (p<0.01). Both motor and cognitive components demonstrated improvements, with the motor FIM scores improving to a larger degree than cognitive FIM scores (p<0.01); only the degree of improvement in motor FIM scores was significant.

There was also a significant improvement in GDS scores between admission and discharge (p<0.01). There was a significant interaction between the changes in motor FIM scores and GDS scores (Figure 4). There was a significant main effect for motor functioning F(1,29)=733.4 (p<0.01). There was also a significant main effect for mood F(1,29)=23.52 (p<0.01). There was a significant interaction between motor functioning and mood F(1,29)=42.45 (p<0.01).

Discussion
The purposes of this study were to determine the prevalence of depressive symptoms among the geriatric population in the rehabilitation unit and to determine the relationship between psychological state and functional outcome. The FIM, MMSE and GDS were applied to each eligible patient and the relationships between the FIM and GDS scores evaluated.

The findings in this study showed that a large number of patients (43%) within the studied rehabilitation population had symptoms suggestive of depression on admission. Some of the reasons that patients mentioned to account for their GDS answers included:

- A preference for remaining at home rather than going out because they felt older and “wished to conserve energy”
- A reluctance to impose upon carers and family members
- Financial pressures
- Fears of encountering unknown situations
- A preference for living a “quieter” lifestyle
- Having a more introverted personality
- Experience of a general decline in health

After a period of participation in the unit’s inpatient rehabilitation program, these mood symptoms generally improved, alongside a notable improvement in functional status. It was not possible from this study to determine the exact causal relationship between mood symptoms and functional improvement. However, given that significant improvements did occur in both GDS and FIM scores between admission and discharge, particularly in the motor FIM component, it is highly possible that a positive mood did lead to a better functional outcome. The converse is also likely.

A significant interaction between the functional outcome of patients in the rehabilitation unit and their psychological state would suggest a need for the following in future studies:

- A study with larger population numbers to further confirm and strengthen the findings
- More specific observational studies to determine the differences between patients suffering from different medical/surgical conditions and the gender groups
• Evaluation of the benefits of targeted psychological intervention towards patients screened as possible sufferers of depressive symptoms
• An interventional study to study the effects of regular supportive counselling, cognitive behavioural therapy or appropriate medication in the general rehabilitation population identified as experiencing depressive symptoms
• A similar study which could be conducted amongst patients in the acute wards

Administration of the various scale questionnaires would preferentially be limited to a core research team, in order to limit the influence of staff opinions on patients' answers, given the subjective nature of the GDS questions. During the study, several nursing staff members expressed reluctance in administering GDS questionnaires as they felt that some of the questions were potentially upsetting. The study could also perhaps have been made more meaningful by focussing solely upon those patients whose scores were suspicious for depressive symptoms. These patients could be compared directly with those patients whose scores did not suggest depression.

At the time of the study, a typical inpatient rehabilitation program in the unit consisted of assessment and therapy from the physical and occupational therapists, overseen by the medical team. Dietetics, speech therapy, social work, psychological and neuropsychological supports were available on an as-needed basis. The unit did not offer the services of a diversional therapist. There was no formal education program for the benefit of the patients and their families. Aside from scheduled therapy time, which was usually limited to a daily maximum of 2 to 3 h per patient, there was little guided activity to keep patients occupied. While some patients showed the initiative and motivation to continue with constructive activities such as walking, reading, or puzzle-solving, it had been noted that a large number of patients did not do so; the reasons for the latter were not immediately clear.

This study suggests that psychological state is an important contributor to physical function or vice versa. It is therefore necessary to address both physical and psychological functioning in a general rehabilitation programme. If psychological well-being can be found to have a positive correlation with functional outcome, a case could be made for rehabilitation units to be more proactive in encouraging a positive mental outlook in patients. This could be in the form of:

• Formal and informal education sessions for patients and their families during the week covering common geriatric issues such as osteoporosis, incontinence, sexuality, dementia, information about supported residential accommodation and end-of-life issues
• Greater involvement of the patients' families and support network during their rehabilitation
• Greater involvement of community social groups such as those from major religious denominations or charitable organisations
• Diversional activities outside of planned therapy hours, which could involve volunteers offering support in the form of craftwork, computer skills, educational games, music therapy, pet therapy, news discussion groups and group excursions
• Routine psychological support such as group sharing sessions and scheduled regular interview time with social workers and psychologists
• Better liaison with the hospital consultation-liaison mental health service to facilitate earlier and more effective assessment and management of potentially depressed patients

• A routine follow-up phone conversation one week following discharge from the unit
• Staff members can also be trained to be more vigilant for the signs and symptoms of mood disturbance, so that earlier treatment may be sought

With regards to the utility of the GDS as a screening tool in an acute rehabilitation setting, it was noted that patients frequently were unable to give definite "yes/no" answers, with many attempting to qualify their answers with further explanations about variable personal circumstances. This created difficulties during administration of the scale questionnaire as the GDS scale does not accommodate descriptive answers. However, obtaining qualified answers allowed additional insight into a patient's perception about his impairment and functioning. An increased understanding of the patient's priorities, hopes, goals, personal outlook and coping mechanisms could ultimately lead to better rapport between the treating team and the patient. A clinical evaluation by a trained mental health professional at this point would also be important from a management perspective.

The major limitations of this study included:

• Its small sample size, which meant that a Type 1 error could not be confidently excluded
• The short duration of the study period
• The un-blinded observational nature of the study
• The fact that a variable number of staff applied the test measures, which made it difficult to standardise the way in which the tests were conducted
• The use of the GDS as a mood screening tool in hospitalised patients as it was originally developed for use in the community setting [14,15]; perhaps a more comprehensive tool such as the Beck Depression Inventory with good psychometric properties might have yielded more specific information.

Conclusion

Depression in the geriatric population is common and the prevalence is higher still in the hospitalised elderly. This study showed that there was an improvement in both mood and physical status following a rehabilitation programme. This highlights the importance of focussing on both psychological and physical status in order to optimise the geriatric patient's functional ability.

References