AN AUDIT OF GERIATRIC STROKE REHABILITATION SERVICES AT A POST-ACUTE HOSPITAL (BOOTH MEMORIAL) IN URBAN CAPE TOWN, SOUTH AFRICA

TASLEEM RAS

Submitted to the Faculty of Health Sciences, University of Cape Town, in partial fulfilment of the requirements for the degree of Master of Family Medicine

February 2009

DECLARATION

I, Tasleem Ras, declare that this thesis is my own work in its entirety. All sources of information have been disclosed in full in the reference section. This thesis has not been submitted at any other institution. It is being submitted to the Faculty of Health Sciences at the University of Cape Town in partial fulfilment of the requirements for the degree of Master of Family Medicine.

Signed: Tasleem Ras_____

SA ID no.: 7508085127087

Date: _____

ACKNOWLEDGEMENTS

- Drs. Abdul Aziz Isaacs and Beverley Schweitzer for their guidance and advice
- The Management Board of Booth Memorial Hospital for their kind permission for doing this study
- The staff at Booth Hospital, whose work provided the impetus for this study
- The patients at Booth Memorial Hospital, who agreed to be part of a process of improving care to those who will follow them
- My parents, for their sacrifices and vision
- My wife, for her patience and tolerance

ABBREVIATIONS

BMH – Booth Memorial Hospital

CVD – Cardiovascular Disease

IHD – Ischaemic Heart Disease

MDT – Multi-discplinary team

FIM – Functional Independence Measurement

QoL – Quality of life

CONTENTS

STUDY QUESTION:

What is the quality of the stroke rehabilitation services being offered to Geriatric patients at Booth Memorial Hospital?

1. INTRODUCTION

Booth Memorial Hospital (BMH), situated at the foot of Table Mountain in urban Cape Town, South Africa, is an NGO-run hospital in a Public- Private Partnership with the Western Cape Department of Health. The essential service being offered is sub-acute health care, with state hospitals referring patients needing terminal, rehabilitation or convalescent care for a variety of illnesses.

Post-acute stroke rehabilitation forms an integral part of the general service being offered by BMH. This dovetails with the state-run rehabilitation hospital in the sense that younger patients able to undergo intense rehabilitation are sent to the state-run hospital, while BMH generally cares for those patients who may not be able to withstand the rigours of an intense rehabilitation program. In our setting, this means that most of the patients seen at BMH for post-stroke rehabilitation are elderly.

The elderly patient who has suffered a stroke is vulnerable in many respects. The most obvious vulnerability refers to the physical, emotional and psychological derangements that follow strokes in this age group. In addition, due to rampant poverty prevalent in the community we serve, social and economic factors place this group of patients at an even greater disadvantage. It is an imperative for social survival and an acceptable quality of life that this group of patients retain as much of their independence and empowerment after the stroke as is possible. The current situation of overflowing old-age homes, increasing prevalence of elder abuse and neglect, and the deficiency of community structures to care for

the elderly compel health care providers to ensure that a post-stroke rehabilitation service operates with maximal efficiency, given the paucity of resources endemic in our health system.

The above factors provided an impetus for this study. A need arose to assess the quality of the stroke rehabilitation services at BMH, as the starting point to what is hoped will be a continuous Quality Improvement Cycle. An additional factor compelling the examination of the quality of service being offered is that the Geriatric population is underserved in the present health system, competing for scarce resources with other vulnerable groups such as children, Cancer patients, and people living with HIV/AIDS. By focussing on a service that is almost exclusively aimed at the elderly, we hope to be able to advocate for greater resource allocation to this age group, given that receiving good health care is essential to the quality of life of the ageing population.

This assessment of the current services looked at the Structure, Process of care and Clinical Outcomes of stroke rehabilitation services being given to patients over the age of 65 years. The findings were evaluated against internationally accepted norms of post-acute stroke care, and are presented in this study.

2. LITERATURE REVIEW

2.1 Stroke epidemiology

Despite many years of research and innovation in the field of stroke prevention and acute treatment, cerebrovascular disease (CVD) and stroke remains an important cause of mortality internationally. The World Health Organisation's *Global Burden of Disease report, 2004*, lists stroke as one of the commonest causes of death in all ages [(1)]. In the broader population, it is second only to Ischaemic Heart Disease (IHD) in this respect, accounting for 9.7% of all deaths. The WHO report divides its data according to the economic status of countries with the three categories of *low income*, *middle income*, and *high income* countries producing differing findings. With regards CVD, the low income group lists it as the fifth leading cause of all age mortality at 5.6%. By contrast in middle income and high income countries, CVD achieves first and second place respectively.

Local statistics describing mortality trends in the Western Cape, South Africa, also present some interesting findings. Analysing records of death certificates in the Western Cape 2001-2006, Groenewald et al [(2)] describe causes of mortality in the Western Cape Metropole. Stroke is listed as the seventh common cause of mortality (3.7% of all deaths) in this period, with homicide (six times the global average) and HIV/AIDS being the two leading causes of death in this province.

2.2 Organised stroke care

Managing strokes in an organised, dedicated setting has been proven to have superior outcomes in terms of patient independence than when clinical management is part of a general medical service. A Cochrane review [(3)] has shown that when a standardised model is followed in the organisation of stroke services, better outcomes in terms of mortality and

morbidity are achieved. The units described by this review comprised comprehensive stroke management, from acute stroke care in the emergency setting, to post-acute rehabilitation and community re-integration. Important findings of the Cochrane review were that staff:patient ratios, staff training, and a dedicated rehabilitation ward are necessary for improved outcomes.

Stroke units were established across the world, including South Africa, with early efforts described by Patel in Cape Town, 2000 [4]. In this original clinical trial, Patel compared outcomes of stroke treatment between groups of patients who were subjected to differing levels of organised stroke care at Groote Schuur Hospital. Although the investigators were not able to demonstrate a significant improvement in outcomes in those patients treated in a dedicated stroke ward, there were other factors that the author discusses in detail that affected the findings.

2.3 Stroke management guidelines

Comprehensive Clinical Guidelines for the management of stroke patients based on best evidence have been disseminated internationally (Australia, UK, and North America) [5, 6, 7]. These guidelines form the basis of stroke care in the developed world, ensuring that current evidence is used as a basis for therapeutic services. A detailed prescription of stroke care is provided, including in-depth guidelines to therapists involved in speech, occupational and physical rehabilitation. The Australian guidelines even go so far as to examine best practice when dealing with specific issues and obstacles that are encountered within the rehabilitation process by individual members of the rehabilitation team. An important consideration is that the authors of these documents are drawn from a wide range of disciplines involved in the full range of stroke care, allowing for comprehensive input from different perspectives. Broad consensus exists as to what constitutes best practice across these published guidelines,

with the main differences relating to length of stay in hospital, and the timing of movement along the "unbroken chain of care" that is the ideal in stroke management.

The South African version of Stroke management guidelines, 2000 [8], provides comprehensive guidance on the immediate management of stroke patients in an acute setting, and makes several recommendations for improving the level of acute care. The need for comprehensive rehabilitation services is also addressed, and the rehabilitation process is described in broad outline. However, more detailed processes of post-acute care are not clarified, and it is left to individual institutions to develop their own protocols. Of importance to this study is a recommendation that further research is needed in assessing the quality of rehabilitation services. An obvious departure from the international guidelines lies in the availability of resources, both technical and human, with this document acknowledging this particular challenge in the developing world.

2.4 Auditing stroke practice

Adherence to existing guidelines allows stroke care to be standardised along best practice principles, allows institutions to compare outcomes, and improves functional recovery in stroke. This has been shown by Duncan et al [9] who performed an audit of stroke services at the University of Kansas Medical Centre in 2002. The main contribution of this study was to identify those areas of stroke care that are vital to the provision of a good quality of service, thereby describing a methodology of assessing stroke care. In post-acute care, 11 dimensions of care are identified that describe both the depth and scope of the services being offered. These 11 areas of care are centred on the involvement of a multi-disciplinary team, accurate assessments and ongoing monitoring, and early involvement of the family in the treatment process. The UK Stroke Audit Package [10] provides a similar methodology for assessing stroke rehabilitation services, with the only addition being that during discharge planning,

specific contact must be sought with the community-based services to ensure continuity of care.

Examining the structure, process and outcomes of a health service has been shown to be an effective way to evaluate stroke rehabilitation services by Hoenig et al[11]. This study, a two year prospective study involving 11 rehabilitation centres and 288 patients, examined the relationship between structure and process of the stroke rehabilitation services in Durham, USA, and looked at whether each of these aspects were independently responsible for good clinical outcomes, or whether they were co-dependent on each other. The findings were that process of care was an independent determinant of outcomes (P<0,001), structure on its own had a statistically significant effect on outcomes (P<0,05), and a combination of the two yielded a significant association with good outcomes. The authors conclude that strengthening the individual components would most likely result in an improvement in the overall quality of service. Lind[12] had attempted to synthesise the results of seven studies that looked at the effectiveness of stroke rehabilitation, but this review had weaknesses related to its methodology and the quality of the studies it was evaluating. Nonetheless, it was important in that the need for quality research in stroke rehabilitation was identified, this being an important element in the compilation of a body of evidence that would mould best clinical practice.

The structure of stroke rehabilitation services has three distinct areas, according to Hoenig [11]. These are the systemic organisation, staff training and technological sophistication. The national stroke guidelines as cited above also provide details on how stroke rehabilitation services should be organised. Langhorn and Pollock[13] have described effective stroke care in more detail. In this detailed assessment of 11 stroke units across the world that have shown consistently good clinical outcomes, the authors identify several aspects of stroke unit structure that are important to the success of the service. In summary, the size of the stroke

unit, the staffing mix in terms of disciplines and seniority, specific staff training and a clear set of beliefs that was shared in the unit were identified as key components of a strong unit. This is a particularly useful study in that it standardises staffing components and describes quite specifically the staff to patient ratio for each discipline involved in the rehabilitation process. The authors also present a set of skills needed for the training of health care workers in this setting across the various disciplines involved in this level of care.

As mentioned earlier, the process of care seems to be central to effective stroke rehabilitation. Several studies have looked at various aspects of evaluating the process of care. McNaughton et al[14] failed to show a distinct improvement when three New Zealand hospitals followed the UK guidelines in implementing stroke care. In fact, the hospital with the highest adherence levels to the guidelines showed the worst outcomes. The single most important limitation, as identified by the author, is the lack of a stroke unit in any of the hospitals reviewed. The patients in the study were therefore part of a general ward that did not cater specifically for rehabilitation. The Cochrane review is emphatic in that the need for a specific rehabilitation ward is central to the delivery of effective rehabilitative care. Stuart et al[15] compared the process of care with relation to timing of discharge between large rehabilitation centres in the US and Switzerland. Their findings were that patients were more likely to be discharged from a rehabilitation unit earlier in the US. This affected the outcomes negatively, as the Swiss patients, receiving in-patient rehabilitation for 40 days longer, had significantly improved levels of functioning at discharge than their US counterparts.

A further component of assessing the process of care is the specific medical management of patients who have suffered strokes, both with regard to their ongoing chronic conditions and as regards the known complications of stroke. Langhorne et al[16] describe the incidence of medical complications after stroke in Scotland, and report that pain, confusion, infections and falls are the commonest complications following stroke. Other less common, but equally

important problems encountered were pressure sores, depression and anxiety, deep vein thrombosis, and recurrent stroke. In addition to reinforcing current knowledge, the authors followed patients up for 30 months after the stroke, highlighting the need for ongoing active monitoring after discharge from the rehabilitation centre. Shah[16] provides a detailed overview of rehabilitation of the older person, and discusses the particular challenges faced when treating this age group. She reviews stroke-related and age-related disabilities and describe how the two processes interact with each other. Wells et al[17] make an important contribution to this area when they define geriatric subtopics in the rehabilitation framework. This specifically relates to frailty, comprehensive geriatric assessment, nutrition, emotional and cognitive function. This knowledge allows the practitioner to develop an overall strategy when addressing the rehabilitation needs and goals of individual patients.

2.5 Stroke outcomes measurement

Outcomes measurement in stroke rehabilitation is a well studied phenomenon in the international literature. Many different scales are used to quantify disability in the stroke population. Schepers et al[18] examine several scales by linking them to the International Classification of Functioning, Disability and Health (ICF). The authors link 15 well known clinical scales to the ICF in an attempt to ascertain how well they describe functional disability. The Functional Independence Measurement (FIM), Barthel Index and Chedoke McMaster Stroke Assessment Scale all performed well in this study. When assessing the use of outcomes measures in rehabilitation settings in Europe, Toreenbeck et al[19] found that the Barthel Index was the commonest scale in use, followed by the FIM and the Frenchay Activities Index. Van der Putten et al[20] have provided further evidence in support of the FIM as a valid evaluation tool. Their comparative study indicated that the FIM and Barthel Index performed equally across a range of clinical diagnoses. Dodds et al[21] measured the validity of the FIM tool when used in a variety of diagnoses in 11,102 patients, with stroke (52%),

orthopaedic (10%) and brain injuries (10%) being the commonest. Their findings were that the FIM had high internal consistency, and adequate discriminatory capabilities between patients of varying age, co-morbidity and impairment severity. The FIM has been used in different populations (Thailand[22], Italy and USA[23] and Sweden[24]) and found to be a practical, reliable and valid tool to use by most of the investigators, with the exception of Streppel and van Harten[25], who conducted a pilot study in the Netherlands using 48 stroke patients, and found that the actual improvement in their patients was not reflected in the FIM score after treatment. Attributing this to a "ceiling effect" of the FIM tool, they advise that it is not useful in the Dutch population.

2.6 The South African rehabilitation perspective

Original research in stroke rehabilitation and management in South Africa is scarce. Patel[4] did a controlled trial of stroke rehabilitation at Groote Schuur Hospital, as cited earlier. The realisation that stroke is a major problem and that organised stroke care is an important component of our health system has been recognised by several authors. In 2004, Bridget Farham[26] lamented the lack of stroke surveillance systems in South Africa and Africa. She quotes Hoffman (SAMJ, 2000) who found that the incidence of stroke in young South Africans was increasing. Myles Connor[27], in SA Psych Review raises the issue of stroke care in general, and questions which speciality is responsible for overall stroke rehabilitation. He asserts that stroke management as a speciality (strokology) is a pipedream in South Africa, as the workload in private and public practice does not allow physicians or neurologists to treat strokes exclusively. Staub[28], writing in the CME in 2006, provides a general overview of stroke rehabilitation according to current best practice. Sandra Pretorius[29] describes the nutritional aspects of caring for a stroke rehabilitation, and underlines the centrality of adequate nutrition as a treatment strategy in stroke rehabilitation. Despite the acknowledgment that treating stroke patients effectively is vital, there seems to be

consensus that our health care system is not geared to delivering the kind of stroke treatment described in the international literature, purely due to a lack of resources. The emphasis therefore seems to be focussed on primary and secondary prevention.

The local epidemiological research dealing with stroke and its ramifications offers new perspectives on the implications and burden this disease places on our resources. South Africa's first Burden of Disease study[30], reported in 2000 by the Medical Research Council, threw light on what was previously unchartered waters. This study gave a detailed analysis on the main causes of morbidity and mortality in the country, highlighting the areas that needed more effort. Predictably, HIV/AIDS and violence were major contributors in this regard, but non-communicable diseases were a major cause of mortality in males and females under the age of 45 years. In 2000, Cardiovascular Disease was the second commonest cause of mortality in males and females in South Africa. The same Working Group provides important information of the individual contribution of the common "diseases of lifestyle" to the overall burden of disease. They report on the roles that Cholesterol[31], Diabetes Mellitus[32], Hypertension[33], and obesity[34] play in adding to the burden of disease.

The South African Stroke Prevention Initiative[35], while examining the extent of secondary stroke prevention in a rural South African community, found that only 8% of patients who had suffered hypertensive strokes were taking anti-hypertensive treatment. While all the reasons for these damning findings were not immediately obvious, access to health care, local beliefs, and general ignorance were identified as key factors. In 2005 Connor et al[36], described the incidence of known cardiovascular risk factors in a general practice population (n=9731). They found that in patients older than 30 years, there existed significant opportunity for General Practitioners to intervene early by treating known risk factors for Cardiovascular Disease. In addition, they found that risk profiles differed across racial

groups, an important consideration when the GP is doing an individual risk profile on a particular patient when time and resources are limited.

The South African data indicates that stroke is a neglected condition, as Farham asserts, that its incidence is high, that its long term management in poor, and that much still needs to be done in establishing local norms in the comprehensive post-acute management of stroke victims.

3. AIMS and OBJECTIVES

3.1 AIM

This study aims to assess the quality of the stroke rehabilitation services at Booth Memorial Hospital.

3.2 OBJECTIVES

1. Examining the structure of the stroke services at the hospital with respect to human resources, equipment, medication and other physical structures needed in the rehabilitation context.

2. Studying aspects of the process of care and comparing this to best practice as defined in medical literature.

3. Measuring clinical outcomes of stroke care using an accepted measuring instrument which will be compared to similar outcomes measurements in other rehabilitation institutions.

4. Identifying areas of weakness in the service, and developing a strategy to improve on these aspects, as part of a quality improvement process.

4. METHODS

This was a descriptive study, describing care to a cohort of patients.

4.1 Definitions:

Stroke rehabilitation: the therapeutic process aimed at improving the patient's level of functioning with respect to mobility, activities of daily living (ADL), and communication, while monitoring for common complications of stroke and secondary prevention

Structure: refers to the organisation of stroke services, with respect to premises, equipment, staff, and communication infrastructure, internally and with other health-care institutions

Process: the process that is followed when dealing with a patient who has suffered a stroke, from referral through to discharge and follow-up arrangements

Outcomes: The measured clinical outcome of the process of stroke therapy, in this instance as defined by the Functional Independence Measurement (FIM)

Functional Independence Measurement (FIM): an 18-item, 7-level clinical scale for measuring the functional ability of individual patients over a range of verbal, motor and cognitive activities.

Quality improvement: a process of assessing quality of care aspects in an organisation, and introducing improvements in practice aimed at better service delivery

4.2 Study Population and Sampling

The population being studied comprised of stroke patients over the age of 65 years who were admitted to Booth Memorial Hospital for post-acute stroke care. The study sample was collected over a period of six months (01 January 2008 – 30 June 2008) from patients in the study population who were admitted to the BMH for routine post-acute stroke care.

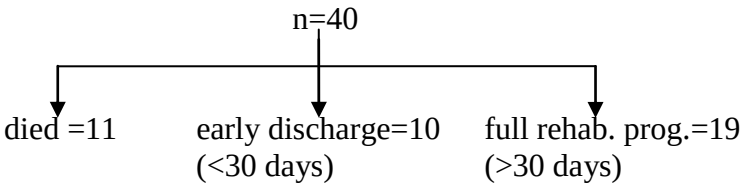
Inclusion criteria: age >65 years; acute stroke in the last 3 months; signed consent for inclusion in study.

Exclusion criteria: refusal to sign a consent form.

We were able to recruit the desired number of patients (n=40). This sample size was calculated prior to the commencement of the study to provide statistical power of greater than 90%. The first forty patients admitted who matched the criteria during this time period were included in a non-random manner. No patients refused to give consent; hence no patients were excluded from the study.

As can be expected in this age group, 11 (27.5%) subjects died while admitted to the hospital. Of the remaining patients, 10 (25%) were discharged before thirty days had passed, indicating that the rehabilitation process had been significantly shortened. Figure 1 summarises the flow of patients through BMH during the study period. The usual period of admission is approximately six weeks (42 days), as per service agreement between the Local Authority and the Hospital. The average length of hospital stay (aLOS) for the entire sample was 27.8 days.

Figure 1. Patient flow during study duration



Males represented 40% of the sample (16). 45% (18) of patients suffered a right hemispheric stroke, 32.5% had a left hemispheric lesion, 5% had bilateral strokes, 1 patient (2.5%) had a lacunar infarct, and 6 patients (15%) had no documented site of lesion.

Hypertension was by far the commonest known risk factor (50%), diabetics made up 17.5% of the sample and hyperlipidaemia was only documented in 7.5% of patients. Six patients (15%) had suffered from strokes previously.

4.3 Measurement

The audit tool (appendix 1) that was used had been developed elsewhere[9,10], and was adapted to our needs.

4.3.1 Structure

When assessing the structure of our service, we looked at the following and compared it to internationally accepted best practice, as defined in the literature:

1. Staff: patient ratio
2. Staff training in stroke management
3. Availability of a dedicated rehabilitation ward
4. Multidisciplinary team (MDT) availability

5. Availability of written protocols for each member of the MDT: Doctor, Nurses, Physiotherapist, Occupational therapist, Speech Therapist, Social Worker

4.3.2 Process

With reference to assessing the process of care in our service, we used the clinical notes to assess 12 key elements of post-acute stroke care. To be assessed as having been done, this had to be documented in the clinical notes, and if no written record was found, it was deemed to have been omitted. We calculated how often these elements were included in our routine care, and quantified it as a percentage of the total sample. The 12 elements of care being measured were:

1. Involvement of MDT
2. Baseline clinical assessment
3. Goal setting by MDT and patient
4. Treatment planning
5. Monitoring progress
6. Managing complications
7. Managing impairments
8. Family involvement in process of rehabilitation
9. Secondary prevention
10. Education: family and patient
11. Discharge planning
12. Written referral for community follow up

4.3.3 Outcomes measurement

The third leg of our study was to assess clinical outcomes of the rehabilitation service. We did this by measuring the stroke-related disability of the patients at admission, and again at discharge. Improvement in the level of ability would indicate a favourable outcome, while worsening of disability would indicate a negative outcome. The tool we used (appendix 2) is a commonly used clinical measuring tool called the Functional Independence Measurement (FIM). This is an 18-point, 7-level scale measuring the patient's motor, verbal and cognitive ability across a range of activities of daily living. Maximum FIM score, representing full and independent functioning in the above areas, is 126, while a minimum FIM score, indicating complete dependence in all spheres of activity, is 18. In an attempt to limit bias and to improve reliability, a nurse who was not part of the rehabilitation team, and not trained in stroke rehabilitation, was trained to use the FIM tool. A pilot sample was selected to assess and improve her consistency prior to the commencement of the study. In addition, the completed FIM assessments were subjected to random review by the Nursing Services Manager, who was familiar with the FIM.

The FIM was administered to patients within three days of their admission to the ward, and again on discharge. If the patient died, the FIM at death would be compiled based on the patient's clinical notes.

5. RESULTS

The assessment of the structure of our services yielded the following results:

5.1 Structure

Table1. Organisation of services

PARAMETER	STANDARD	BOOTH
Dedicated rehab/stroke ward	Yes	Yes
No. of patients / ward	13-15	25
Availability of MDT	Yes	Yes
Written protocols	Yes	Yes

Table 1 indicates the availability of certain key structural elements of post-acute stroke care. The Cochrane review found that rehabilitation in a dedicated stroke ward and in a general rehabilitation ward had similar outcomes. BMH has a general rehabilitation ward that includes orthopaedic, post-operative and neurology patients, in addition to stroke patients.

The internationally accepted amount of beds for running an effective rehabilitation unit is 13-15 patients. At the BMH, the rehabilitation ward accommodates 25 patients. Bed occupancy at any given time during the study was between 80% and 96% giving a total of between 20-24 patients. In addition, the members of the MDT provide their services to other patients in the 106-bed hospital as well. Only the nurses, being allocated to particular wards, provide an exclusive service to the rehabilitation patients.

The availability of a fully staffed MDT consisting of a doctor, nursing team (professional nurse, staff nurse, nursing aids), physiotherapist, occupational therapist, speech therapist and social worker, is in keeping with existing norms.

In addition, BMH has written protocols in place that are updated annually according to available evidence in the literature. The protocols cover the medical assessment, monitoring, treatment and emotional aspects of caring for stroke patients. They do not specifically instruct as to how much therapy patients must receive, or the intensity of therapeutic sessions. While these protocols are mainly directed at the nursing process, they describe broad areas of stroke management, including rehabilitation.

Table2. Staff ratios and training

STAFF MEMBER	RATIO (staff: patient) – Langhorne et al.	RATIO – BOOTH	SPECIALISED STROKE TRAINING
Doctor	1:25	1:213	No
Nurses: professional	1:15	1:25	No
Nurses: staff	1:7.5	1:25	No
Physio	1:10	1:35	Yes

Occ. Therapy	1:10	1:24	Yes
Speech therapy	1:30	1:44	Yes
Social worker	1:30	1:60	No

Table 2 describes the ratio of staff to patients, the ideal as described by Langhorne et al[13], compared to the BMH ratios, and whether or not the relevant health care professional has had specialised stroke straining.. When measuring the staff to patient ratios, we had to take into consideration that staff members were not providing a service exclusively to stroke patients, but had to divide their time between other rehabilitation and general patients. In addition, only the nursing staff and the physiotherapist are full time employees. We calculated the BMH ratios by using the actual amount of patients treated by the individual therapist, and dividing it by the fraction of full working day spent at the hospital using the formula:

$$\textbf{Amount of patients per full working day} = \frac{\textbf{actual amount of patients}}{\textbf{No. of hrs worked per day} \times {}^{1}/_{8}}$$

Full working day = 8 hrs

Eg. Occupational therapist: $15 / (5 \times {}^{1}/_{8}) = 24$. The BMH norm is 1 OT : 24 patients

The doctor to patient ratio (1:213) is a reflection of the fact that the doctor works at the hospital in a part-time capacity (3 hours/day). Time spent at the hospital is divided between patients requiring palliative care, general medical care, and rehabilitation. This is appropriate in the context of sub-acute care, where the core service is delivered by a nursing team.

The nursing staff compliment is also significantly less than the recommended norm (1:25 for professional nurses vs. the recommended 1:15), with registered nurses at BMH caring for

three times the amount of patients their counterparts in the developed world are caring for (1:7.5 vs. 1:25). Nurses work a standard 12 hour shift, with a full complement of staff available at night as well.

Similarly, this wide dissemination of needs is reflected in the number of patients that the other therapists have to assess and treat. The above figures indicate that therapists at BMH are carrying approximately 2-3 times the workload that is the recommended norm.

The norm for physiotherapists in the developed world is that one physiotherapist treats an average of 10 patients at a time (1:10). For the duration of the study, the physiotherapist at BMH treated an average of 35 patients (1:35) at any given time. The physiotherapist works a full eight hours, and has two untrained assistants who work directly under his supervision.

The occupational therapist works for five hours daily, five days of the week. The average number of patients on her treatment list during this time was 15. This worked out to a ratio of 1:24 had she been in full time employ, the ideal ratio being 1:10. This represents a significantly increased workload as compared to international norms. The OT has an untrained assistant who needs direct supervision.

The speech therapist works three hours a day, for three days of the week. An average of 10 patients was treated for speech or swallowing related impairments at any time during the study. The calculated ratio for the ST was 1:44, while the internationally accepted norm is 1:30.

The social worker, who works five hours a day for four days a week, had a calculated ratio of 1:60, as compared to the norm of 1:30.

Staff training is seen by many to be central to provision of a good quality service. While the physiotherapist, occupational and speech therapists have undergone training in stroke

management as part of their standard training, neither the doctor nor the nurses - the core elements of the rehabilitation team - have undergone formal training in the field.

5.2 Process

Table3. Process of care

PARAMETER	PERFORMANCE
Involvement of MDT	72.5% (29)
Baseline assessment	100% (40)
Goal setting (MDT)	57.5% (23)
Treatment planning (MDT)	67.5% (27)
Progress monitoring	100% (40)
Managing impairments	100% (40)
Complication management	100% (40)
Secondary prevention	82.5% (33)
Family involvement	35% (14)
Education – pat. and family	67.5% (23)
Discharge planning	47.5% (19)
Referral for follow-up	72.5% (29)

Figure 2

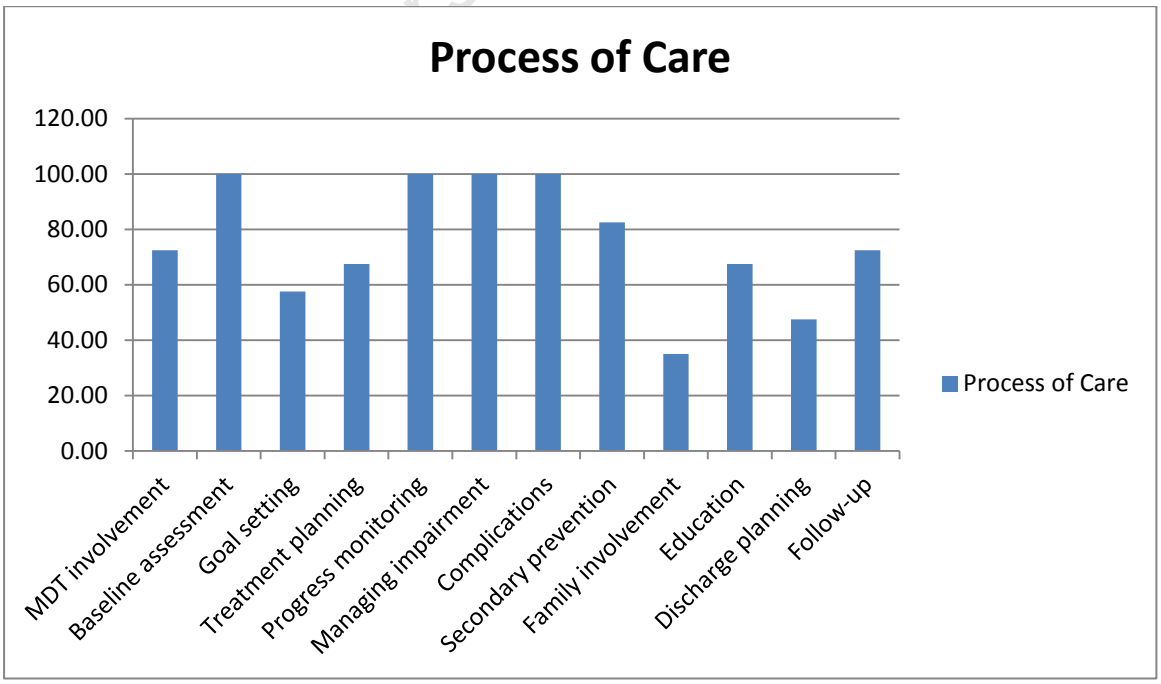


Table 3and Figure 2 describe the process of care incorporating the 12 aspects of post-acute care identified by Rudd et al[9] and Duncan et al[10]. We used the clinical notes to determine if the above aspects were incorporated in the holistic management of patients at BMH. For an aspect of care to be deemed performed, it had to be documented in the clinical notes. This was expressed as a percentage of the total sample (n=40), and as an absolute value (in parentheses). We had decided that 75% adherence to the internationally accepted norm would be an indication of an adequate quality of care. The figure of 75% was decided upon by the MDT as this was deemed a realistic target in terms of the availability of resources and time.

BMH performed well in the areas relating to the medical management of stroke patients, with all subjects in the study being assessed thoroughly on admission, active monitoring for complications was being done and specific interventions for stroke-related impairments. In addition, all of the 29 patients (72.5%) who lived had documented referrals to hospitals, community-based health facilities, home-based care, or nursing homes.

Not all patients were assessed and treated by the MDT (72% - 29/40). The involvement of the MDT was at the discretion of the doctor, who would only refer those patients deemed fit for rehabilitation, or who needed further disability assessment. The MDT assessed and treated fewer patients than our self-defined target of 75%.

Goal setting being an important part of the rehabilitation process was not always documented in the notes. Only 57% of the total sample (23/40) had their rehabilitation goals documented. These represent mutually agreed goals set in conjunction by the therapists and patients. However, when looked at from the perspective that only 29 of the total of 40 patients were referred to the MDT, then 79% of the patients (23/29) had treatment goals documented, meeting the self-defined target of 75%.

Of the 29 patients referred to the MDT for assessment or treatment, 27 had treatment plans recorded in their notes. While this represented only 67% of the total sample, it indicates that for 93% of patients in the subgroup (n=29) referred to the MDT, co-ordination and planning of treatment was documented.

BMH performed poorly when it came to involving the family. 67% of patients or their families had some kind of educational input from a member of the MDT regarding stroke. In the absence of a formal educational program, this was usually in the form of informal interaction with nursing staff or rehabilitation therapists. Out of the total of 40 patients, only 14 families (35%) were incorporated actively into the treatment process by means of joining the therapeutic session or meeting with the MDT or its individual members.

Formal discharge planning was documented in 47% (19/40) of cases. This involved the recording in the notes of the discharge destination as well as the type of care the patient would need after discharge.

5.3 Outcomes

The data analysis was performed using the Wilcoxon signed rank test, a non-parametric test, to determine the statistical difference between patient's condition pre- and post-intervention. Our hypothesis was that the rehabilitation intervention would have a significant impact on the functional ability of patients as measured by the FIM (our outcome measure).

As described earlier (fig. 1), a total of forty patient records were evaluated (n=40). Of these forty, 11 died. A further 10 patients were discharged prematurely (before 30 days). The analysis was performed on an intention to treat basis. The total number of patients subject to the full rehabilitation process was 21, representing 52.5% of the total sample.

The mean FIM score on admission (pre-intervention) was 31.87 +/- 11.59. The mean FIM score on discharge (post-intervention) was 45.46 +/- 17.44. When comparing pre- and post scores for statistical significance, the p-value was 0.000012.

In addition, the mean change in FIM score after rehabilitation was 15.24 +/- 13.0, a positive change representing clinical improvement.

Table 3. Outcome measurement

FIM score	Mean (n=40)	Maximum	Minimum	Std. Deviation
Admission	31.87	107	18	23.18
Discharge	45.46	126	18	34.87
Change	15.24	101	0	26.06

An analysis of the subgroup (21/40) who endured for the duration of the rehabilitation process (>30 days) was not done as this would not have been in keeping with the intention to treat analysis required for the validity of this study.

6. DISCUSSION

Following similar models of assessing quality of care elsewhere, we have attempted to quantify the quality of our service by auditing the structure and process of care at BMH, and measuring the clinical outcome in this group of patients.

Our results indicate that the organisation of services at BMH follows the recommendations of the accepted international guidelines. The presence of a rehabilitation ward, central to the delivery of any stroke rehabilitation service[3], provides a basis for the service. Although the hospital does not have the technology that more advanced stroke units have, the "low tech" approach is in keeping with a post-acute setting, where low intensity rehabilitation is administered. The hospital has well documented protocols and policies in place dealing with stroke rehabilitation and the medical issues associated with this. These protocols mainly define nursing responsibilities, but as the nursing staff's duties are broad in scope, the protocols cover most areas of stroke rehabilitation. The size (amount of patients) of the rehabilitation ward is also substantially larger than the stroke units reviewed by Langhorne[13]. This is directly related to the fact that Langhorne's research, and indeed most of the research looking at stroke units have focussed on the delivery of care in an acute stroke setting, where the rehabilitation service is not separate from the acute service. As such, the acuity levels (amount of nursing intensity), is much higher in these units than in a purely post-acute setting, where patients are medically stable. At BMH, the post-acute model is the one being implemented. Unfortunately, the international literature expands very little on the delivery of stroke rehabilitation service in this setting, and the local literature not at all. This is probably a reflection of the relative immaturity of stroke services, in that the organised stroke unit in the acute setting is a relatively new concept in medicine, and the delivery of services downstream from this setting is in a process of evolution in South Africa. However, recent epidemiological findings[1,2] will force us to address this problem more seriously, especially in an African context, where the incidence of hypertension is grossly underreported, and where problems still exist in delivering healthcare to large sections of the population.

The staffing at BMH follows accepted guidelines in its interdisciplinary mix. Where a major departure from these guidelines is found is in the ratio of staff to patients. This is attributable to the availability of resources, and the level of acuity that BMH caters for. The ratio of one doctor to over two hundred patients (1:213) seems exorbitant when taken at face value. When one looks at the reality behind this statistic, the nature of post-acute care is revealed. This being a nurse-driven service guided by evidence-based protocols, the doctor is not required to be available in a full-time capacity. Unlike the acute stroke unit where the patient is medically unstable and needs acute intervention that only a doctor can take responsibility for, in a post-acute setting patients are medically stable and medical intervention is limited to monitoring the stability of the medical condition and being vigilant for stroke-related complications, a service easily deliverable by a competent nursing team directed by a doctor. It was beyond the logistic scope of this study to quantify the incidences of medical complications arising from stroke that are encountered at BMH, but this could have shed light on the quality of service that the nurse/doctor team is providing.

Following on the above is the ratio of nurses to patients. The accepted norm is that a professional nurse (1:15) is aided by two staff grade nurses (1:7.5), and a varying amount of nurse aids, in caring for an average of fifteen patients. The BMH norm is that one professional nurse, assisted by one staff nurse, assisted by nursing aids, is the best case scenario. This gives us the nurse to patient ratio of 1:25, two to three times the international norm. In addition, very often during the course of the study, a professional nurse was not available to oversee the ward directly, and supervision was done by a nurse from a different ward or the hospital matron, leaving a staff nurse to manage the daily ward activities. The argument of acuity levels (lower in this setting) in regard to the nursing staff is balanced by the increased responsibilities that senior nurses accept at the post-acute level.

Similarly, the therapeutic team members in their individual capacities exceed the number of patients their counterparts are treating elsewhere in the world. The physiotherapist at BMH cares for triple the amount of patients his colleagues see in the developed world. The physiotherapy service is directed at stroke, orthopaedic, and generally ill patients needing mobilising or bed-based physiotherapy. Time spent per patient was not measured in this study, and would have provided a measure of the intensity of the therapy given to individual patients. However, from the ratios one can conclude that patients are not receiving the duration of rehabilitation that they may need purely due to a lack of human resources in the multidisciplinary team. Generally, the intensity of the specific therapeutic sessions would depend on the well-being of the patient at that time, and this cohort being from the older population with many subjects having co-morbidities, one could assume that the intensity of the sessions is less than with younger patients with greater reserves for physical activity.

A significant deviation from the accepted norm is found in the lack of formal training in stroke rehabilitation among the nurses and the doctor, seen as an essential aspect of stroke services. This is offset by two factors. Firstly, the doctor is a generalist with a special interest in stroke rehabilitation and evidence-based practice, and in the absence of a formal training program in South Africa no options exist for further studies in this field apart from specialising in neurology or internal medicine. The senior nurses have many years experience in geriatrics and general rehabilitation, although this may not always equate with evidence based practice. Formal training programmes in stroke management are available for nurses, but none of the current staff have this accreditation. On the other hand, the physiotherapist, occupational and speech therapist all have formal training in stroke rehabilitation. In addition, the speech and occupational therapists had worked at large academic institutions in stroke rehabilitation before working at BMH. In this instance, the value of an MDT is demonstrated in that expertise and experience is shared in a common bid at delivering good service.

The process of care was assessed following guidelines that are internationally accepted.

In general, BMH showed good adherence to the processes that define good quality care. In particular, the admission procedure, where patients were assessed medically by the doctor and the nursing team, was well documented, with all patients in the cohort receiving a comprehensive assessment. This included an assessment of the disability and impairment. Additionally, it was well documented whether the ongoing condition of the patient was being monitored, complications diagnosed and treated, and disabilities and impairments managed.

Although the figures indicate that not all patients were reviewed by the MDT, this was at the discretion of the doctor. If a patient was too ill for meaningful therapy, the referral was deferred to a later date, or not done at all. The 72% of patients seen by the MDT are a reflection of those patients who were fit for rehabilitation or who needed further assessment by the MDT in terms of making prognoses. The fact that not all the patients were seen by the MDT impacted on the overall statistics when reviewing the performance of the MDT. In general, when patients were referred to the MDT, the process of care was well documented. Specifically, the MDT performed well when co-ordinating a treatment plan for an individual patient and monitoring the patient's progress for the duration of the hospital stay. What was not well documented was the setting of individual patient goals in specific areas of rehabilitation. This may have been done verbally with a patient, but did not give other members of the MDT access to decisions taken in their absence. In the particular case of BMH, due to the fact that most of the team members are part-time employees with varying working hours, having clearly documented goals are an important tool in co-ordinating care.

BMH performed poorly in the psychosocial dimensions of care in this cohort of patients. Firstly, in the absence of a formal educational and counselling programme for patients and families, it is left to individual members of the MDT to provide information, counselling and

training in an ad hoc manner. The target of 75% adherence to accepted norms was not reached in this regard, when only 67% of patients/families were subjected to some form of counselling. This audit did not specify the type of counselling or what represents a "counselling" session.

Family involvement in the rehabilitation process was measured at 35%, not even reaching half of the self-defined target (75%). This group represents those families that were called in for family conferences with the doctor and social worker, or who joined the therapists in rehabilitation sessions. The main reason for this low figure was that family members were invited to a family conference only when it was anticipated that the patient would be significantly impaired in a specific aspect of self-care, was bedridden, or if the family themselves requested a meeting with the doctor or social worker. Secondly, caregivers were not always available for participation in the sessions due to work or social constraints.

Early discharge planning was only documented in 47% of clinical notes. This may be due in part to the admission process at the hospital, where family members are required to specify a discharge destination on the application form. Pro-active discharge planning was only done in those patients who it was anticipated would have a problematic discharge. The social worker was only asked to intervene in these "problem cases" who had no discharge plan specified on admission, whose discharge plan was deemed unrealistic according to the MDT, were cognitively impaired, or who were not able to articulate to their families what their needs were. In certain instances, adverse social circumstances mandated the social worker's intervention, resulting in placement of the patient in a nursing home or suitable facility. This dimension of the service highlighted the high prevalence of social neglect and abuse that the elderly and particularly the sick elderly are subject to. On a positive note, the absence of active discharge planning indicates that the majority of patients had support structures that were able to provide the kind of care they required.

All the patients who were discharged (72.5% of the total sample, the remaining 27.5% died during admission) from BMH had a definite plan of action outlined in terms of referral to other hospitals, community-based health centres or home-based care. This was documented in the notes, and a copy of the referral letter was also filed in the folder. The remaining 27.5% that had no referral to a health facility were those that died while in hospital.

Interestingly, our findings in terms of adhering to guidelines in the process of care seem to mimic that of Duncan et al[9] who found that adherence to different dimensions of care in post-acute setting reviewed in the United States was good in relation to the medical management, involvement of the MDT, co-ordination of care, but poor in relation to family involvement, education and discharge planning. This focus on the clinical condition of the patient to the detriment of psychosocial aspects of care impacts negatively on the overall quality of care provided by the institution.

As all our data was collected from patient records in a retrospective manner, the poor performance in certain aspects of care raises some issues. Our assumption is that when activities are not documented in the notes, they were not done and this omission represents non-compliance with best practice. Poor record keeping would then cause problems in the sense that an activity may have been done, but no documented evidence exists as proof, leading to a conclusion of non-compliance. Also, the social worker generally kept separate notes from the clinical folder, and these notes were not included in this study. This could also impact negatively on the measures of family involvement and discharge planning.

We used a validated and reliable tool, the FIM, to measure our outcomes. The results indicate a statistically significant improvement in FIM scores post-intervention ($p<0.0001$). Our sample, taken from the patients admitted to BMH during a specified time-period, comprised 40 patients. We had calculated that with a mean increase of 35% in the FIM score at

discharge, we would need a sample size of 40 to give us statistical power of >90%. Our mean increase at discharge was 47.8% from the baseline FIM on admission. Thus, although this study used a relatively small sample, our findings have statistical relevance.

The baseline FIM (measured within three days of admission) has a large standard deviation, indicating wide variability in these FIM scores. What this means in clinical terms is that there existed large differences between individual patients' functional ability as quantified by the FIM score on admission. This is similar to findings elsewhere[22], where a wide range of functional variability was found on admission to the stroke unit. Had we been able to use a much larger sample more representative of the general stroke population, we would have been able to apply multivariate regression analysis in a bid to define causative and predictive factors more clearly. This was beyond the scope of this study. Ween et al[37], for example, were able to conclude that younger age and higher FIM score on admission (>80), were positive predictive factors for good recovery from stroke.

While the definition of statistical significance has almost universal acceptance, the issue of clinical significance is more contentious. In this instance, the absolute improvement in FIM score, expressed as the difference between the admission and discharge scores would indicate whether the intervention resulted in a clinically useful change in the patient. Our mean FIM improvement was 15.24. In Holland, Streppel and colleagues[25] had used an absolute improvement of 13 to indicate clinical usefulness. In the US, Duncan et al[9] found a mean FIM improvement of 21 to be an acceptable score, although they do not set a minimum score for clinical usefulness. Our results place us somewhere between these two well designed studies, allowing us to conclude that our findings were clinically significant as well.

This study had some limitations, relating both to methodology and logistics. Methodologically, the sampling technique was non-random, with patients being selected in a

consecutive manner within the specified time frame. A total of 97 stroke patients were admitted to the hospital in this time frame and it can be argued that the sampling technique we used was not representative of the total patient population. This could have led to skewing of the data, affecting the reliability of the study. The counter-argument to this lies within the events that unfolded during the course of the study. A total of 19 patients (almost half the study population) were not fully exposed to the intervention (11 died, 10 early discharge), yet the results still reached statistical significance. An analysis of the subgroup that completed the rehabilitation program showed that an even greater improvement in FIM score than the total sample, indicating that the intervention did not have a negative impact on those patients who had full exposure. This was not reported in this study in an attempt to maintain the integrity of our results. It is our contention that although these limitations need to be acknowledged, the results of the study still are a fair indication of the quality of service being offered at BMH.

The second methodological limitation relates to the FIM tool itself. While providing an accurate measure of verbal, motor and cognitive function, the FIM does not measure aspects relating to Quality of Life (QoL), an important component of aftercare to stroke patients. In those studies that have measured QoL, a separate tool specifically designed for this function has been used. Measuring QoL may have given us insight into the patients' subjective experience of having suffered from a stroke, and added a new dimension to the rehabilitation service.

In terms of the logistic limitation, the sample size was too small to allow more complex statistical analysis that would have led to accurate inferences about our patient population, predictive factors for clinical outcome, as well as causative factors. Being able to predict outcomes allows clinicians to advise families well in advance as to what preparations need to be made for living arrangements post-discharge, and is an area of intense research

internationally. It also adds to the body of knowledge regarding stroke management and prevention. In addition, if certain traits are identified within a particular population, public health initiatives can address these at the appropriate level. It becomes apparent that a large enough cohort of patients representative of a given population allows researchers to draw conclusion and make recommendations on a larger scale. This study did not seek to do this as the focus was only at an institutional level.

The second logistic limitation relates to the length of study. Most studies elsewhere measured FIM scores on admission, at discharge and at 6 months post-discharge. This allows the researcher to assess whether the improvements seen while in hospital are maintained outside the therapeutic environment. In addition, it allows the treating clinician to maintain contact with the patient as they move along the continuum of care. In our setting, following up such patients need not be a logistically complex task, as our documentation includes direct contact details for the patients, discharge destination, and details of the community health centre where follow-up is anticipated.

A third limitation was that the social worker's notes were not included in the study. Had this been done, it may have shown that families were involved in the process more than was reflected in the clinical notes. In addition, inclusion of information obtained by the nursing staff in routine exit interviews would have enriched the data by documenting further interaction between staff and families.

7. RECOMMENDATIONS

The following recommendations were discussed with the MDT as well as the management of the hospital, and was presented in written form at the Annual General Meeting of the Hospital Board in 2009.

1. Specific stroke management training for professional and staff nurses working in the rehabilitation ward.

2. In the absence of a training program for the doctor, he should spend clinical time in a formal stroke unit where specialist supervision is available, or attend academic meetings where stroke management is discussed.

3. Funding should be sought to improve the current staff to patient ratios particularly the physiotherapist and occupational therapist.

4. Families should be involved in the rehabilitation process and discharge planning from an early stage in the hospital admission. This involvement should be documented in the clinical notes.

5. The MDT should set and clearly document rehabilitation goals for each patient. Record keeping of all decisions must be clear and concise.

6. A future quality of life study would be a valuable addition to this study in assessing the patients' subjective experience while admitted to the hospital.

7. An effort should be made to maintain contact with patients beyond discharge in a bid to assess the long term impact of the rehabilitation service on functional ability and quality of life.

8. CONCLUSION

This was a small study that was focussed on a particular institution. Despite certain limitations as discussed earlier, we believe that the results are a valid and reliable indication of the services being rendered at the BMH. As such, while there are areas that can be improved upon, it is hoped that future practice will address these issues as recommended

above with the aim of improving the quality of the service. Our final conclusion is that the Booth Memorial Hospital is providing a good level of care to geriatric stroke patients, while operating under severe financial and logistic constraints.

9. REFERENCES

1. World Health Organisation. Global Burden of Disease Report, 2004, part 2. www.who.int/entity/healthinfo/global_burden_disease/GBD_report_2004update_part2.pdf
2. Groenewald P, Bradshaw D, Daniels J, Matzopoulos R, Bourne D, Blease D, Zinyaktira N, Naledi NT. Cause of death and premature mortality in Cape Town, 2001-2006. Cape Town: South African Medical Research Council, 2008.
3. Stroke Trialists' Collaboration. Organised inpatient (stroke unit) care after stroke. BMJ 1997; 314:1151-1159
4. Patel NK. Organised Care of Acute stroke at Groote Schuur Hospital – a controlled trial. Unpublished thesis – UCT, 2000.
5. Australian Government Health and Medical Research Council. Clinical Guidelines for Stroke Rehabilitation and Recovery. National Stroke Foundation, 2005. (www.strokefoundation.com.au)
6. Scottish Intercollegiate Guidelines Network. Assessment of patients with stroke. I. Assessment, Investigation, Immediate Management and Secondary Prevention. Edinburgh: Scottish Intercollegiate Guidelines Network (SIGN), 1997.
7. Gresham GE, Duncan PW, Stason WB, et al. Post stroke rehabilitation: Clinical Practice Guideline, no. 16. US Dept of Health and Human Services. Public Health Services, Agency for Health Care Policy and Research. AHCPR publication no. 95-0662, May 1995.
8. SAMA-NASA Stroke Working Group. SA Stroke Therapy - Full Guidelines. SAMJ. 2000 Mar; 90(3):280-300
9. Duncan PW, Horner RD, Reker MR, et. al. Adherence to Post –acute Rehabilitation Guidelines is associated with Functional recovery in stroke. Stroke. 2002; 33:167-178

10. Rudd AG, Lowe D, Irwin P, et al. on behalf of the Intercollegiate Stroke Working Party. Quality in Health Care. 2001; 10:140-151
11. Hoenig H, Duncan PW, Horner RD, et al. Structure, process and outcome in stroke rehabilitation. Med Care. 2002 Nov; 40(11):1036-1047
12. Lind K. A synthesis of studies on stroke rehabilitation. J Chronic Diseases. 1982 Feb; 35(2):133-149
13. Langhorne P, Pollock A. What are the components of effective stroke unit care? Age and Ageing. 2002; 31:365-371
14. McNaughton H, McPherson K, Taylor W. Relationship between process and outcome in Stroke Care. Stroke. 2003; 34:713-717
15. Langhorne P, Stott DJ, Robertson L, et al. Medical Complications after Stroke. Stroke. 2000; 31:1223
16. Shah MV. Rehabilitation of the older Adult with Stroke. Clinics in Geriatric medicine. 2006; 22(2):469-489
17. Wells JL, Seabrook JA, Stolee P, et al. State of the art in geriatric rehabilitation. Part I; a review of frailty and comprehensive geriatric assessment. Arch Phys Med Rehab. 2003; 84(6):890-897
18. Schepers VP, Ketelaar M, van dew Port IG, et al. Comparing contents of functional outcome measures in stroke rehabilitation using the International Classification of Functioning, Disability and Health. Disabil. Rehab. 2007; 29(3):221-230
19. Toreenbeck M, Caulfield B, Garret M, Van Harten W. Current use of outcome measures for stroke and low back pain rehabilitation in five European countries: first results of the ACROSS project. Int. J of Rehabilitation Research. 2001; 24(2):95-101
20. Vander Putten JJMF, Hobart JC, Freeman JA, et al. Measuring change in disability after inpatient rehabilitation: comparison of the responsiveness of the Barthel Index

and the Functional Independence Measure. J Neur Neurosurg and Psychiatry. 1999; 66:480-484

21. Dodds TA, Martin DP, Stolov WC, Deyo RA. A validation of the functional independence measurement and its performance among rehabilitation patients. Arch phys Med Rehabilitation. 1993; 74(5):531-536
22. Suputtitada A, Aksaranugraha S, Granger CV, et al. Results of Stroke rehabilitation in Thailand. Disab Rehab. 2003; 25(19):1140-1145
23. Tesio L, Granger CV, Perucca L, et al. The FIM instrument in the United States and Italy: a comparative study. Am J Physical Rehabilitation. 2002; 81(3):168-176
24. Grimby G, Gudjonsson G, Rodhe M, et al. The functional independence measure in Sweden: experience for outcome measurement in rehabilitation medicine. Scand J Rehab Med. 1996; 28(2):51-62
25. Streppel KR, Van Harten WH. The Functional Independence Measure in a Dutch rehabilitating stroke population; a pilot study to assess progress. Int. J Rehab Research. 2002; 25(2):87-91
26. Farham B. Stroke: a neglected chronic illness. CME. 2004; 22(6):340
27. Connor M. Stroke Management in SA – who is responsible? SA Psychiatriv Rev. 2005; 8:125-126
28. Staub H. Stroke Rehab. CME. 2006; 24(9): 494
29. Pretorius S, Van Zyl L, Dolloway K. Nutritional therapy in stroke management: prevention and rehabilitation. CME. 2008; 26(3):164-166
30. Bradshaw D, Groenewald P, Laubscher R, et al. Initial burden of Disease for South Africa, 2000. Cape Town: South African Medical Research Council, 2003.

31. Norman R, Bradshaw D, Steyn K, Graziona T, and the SA Comparative Risk assessment Collaborating Group. Estimating the burden of disease attributable to high cholesterol in 2000. SAMJ. 2007;97(8):708-715
32. Bradshaw D, Norman R, Pieterse D, Levitt NS, and the SACRACG. Estimating the burden of disease attributable to Diabetes in 2000. SAMJ. 2007;97(7):700-707
33. Norman R, Graziona T, Laubscher R, Steyn K, Bradshaw D, and the SACRACG. Estimating the burden of disease attributable to high blood pressure in 2000. SAMJ. 2007;97(8):692-698
34. Joubert J, Norman R, Bradshaw D, Goedecke JH, Steyn NP, Puoane T, and SACRACG. Estimating the burden of disease attributable to excess body weight in 2000. SAMJ. 2007; 97(8):683-690
35. SASPI project team. Secondary prevention of Stroke – results from The South African Stroke Prevention Initiative study. Bulletin of the World Health Organisation. 2004;82(7):503-508
36. Myles C, Rheeder P, Bryer A, et al., on behalf of the SA Stroke Foundation. SAMJ. 2005;95(5):334-339
37. Ween JE, Alexander MP, D'Esposito M, Roberts M. Factors predictive of stroke outcome in a rehabilitation setting. Neurology. 1996;47(2):388-92

APPENDIX 1

AUDIT TOOL

Structure:

PARAMETERS	NORM	BOOTH	
No. of beds per unit	13-15		
Doctor:Patient	1:15		
Nurse:Patient (registered) Nurse:Patient (staff nurse)	1:15 1:7.5		
Physio	1:10		
Occ. Ther	1:15		
Speech ther	1:30		
Soc. worker	1:30		
Clinical psych.	Optional		

Process of care

PARAMETERS	IDEAL	BOOTH	%
Involvement of MDT			
Baseline assessment			
Goal setting (MDT)			
Treatment planning (MDT)			
Progress monitoring			
Managing impairments			
Complication management			
Secondary prevention			

Family involvement			
Education – pat. and family			
Discharge planning			
Referral for follow-up			

APPENDIX 2

Functional Independence Measurement (FIM):

The Functional independence Measurement was developed in the US by Uniform Data System for Medical Rehabilitation. It rates the cognitive, mobility and ADL functional ability of patients using an 18 item, 7 level scale.

1= total assistance (subject 0%)
2 = maximal assistance (subject = 25%)
1 + 2 = COMPLETE DEPENDANCE
3 = moderate assistance (subject = 50%)
4 = minimal assistance (subject = 75%)
5 = supervision

6 = modified independence (device)
7 = completely independant
6 + 7 = NO HELPER

PARAMETER	FIM1	FIM2	% Improve
Eating			
Grooming			
Bathing			
Dressing – upper			
Dressing – lower			
Toileting			
Bladder management			
Bowel management			
Transfer – bed, chair, w'chair			
Transfer – toilet			
Transfer – shower, bath			
Mobility – walking, w'chair			
Stairs			
Comprehension			
Expression			
Social interaction			
Problem solving			
Memory			
TOTAL	_____	____	_____

APPENDIX 3

CONSENT FORM

You are invited to participate in a study of the stroke rehabilitation services at the Booth Memorial Hospital**.**

We hope to learn how efficient the service is, and how we can improve on it.

You were selected as a possible participant in this study because you have suffered a stroke and may benefit from the therapy that we provide.

If you decide to participate, we will treat you as we treat all our other patients. We will measure how badly your stroke has affected you, and give you the necessary rehabilitation, and when it is time for you to be discharged, we will measure how much you have improved. The normal stay in hospital for stroke rehabilitation is six weeks. We hope that at the end of your stay, you would be able to do more things for yourself than what you are able to do now.

While you are admitted to the hospital, we would need the following from you:

1. Take your regular medication as prescribed by the hospital doctor.
2. Take part in activity sessions with the physiotherapist, occupational therapist, or speech therapist.
3. Attend your hospital appointments with the appropriate specialist.

The treatment offered by our hospital does not put you at risk of worsening your illness or causing new health problems. A small risk exists that patients may fall during certain activities where standing and walking is required. We have mechanisms in place to minimise this risk.

The benefits of rehabilitation after a stroke is that patients are taught to be more independent, the risk of having a second stroke is lower and patients experience less complications of stroke like chest infections and thrombosis.

The information we need for this study is related to how much you have improved during your stay with us, and we will collect this directly from the notes in your folder.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will not be disclosed to anybody not working in the hospital.

Your decision whether or not to participate will not affect your relationship with the hospital. If you decide to participate, you are free to discontinue participation at any time without prejudice.

If you have any questions, please contact Dr. Tasleem Ras:
021-4654846
Fax: 0214614106
E-mail: drras@telkomsa.net
Booth Memorial Hospital
c/o Prince and Orange Streets
Oranjezicht
Cape Town, 8001

You will be offered a copy of this form to keep.

You are making a decision whether or not to participate. Your signature indicates that you have read the information provided above and have decided to participate.

You may withdraw at any time without penalty or loss of benefits to which you may be entitled after signing this form should you choose to discontinue participation in this study.

Patient name: _____

Signature: _____ Date: _____

Signature of Legal Guardian: _____

Witness: _____ Date: _____
Dr. T. Ras: _____ Date:_____

SUMMARY

Background: Booth Memorial Hospital is a privately owned facility in partnership with the department of Health that offers sub-acute health care to state patients. Part of this service is the post-acute in-patient management of stroke patients. Most of these patients are older people, and those whose prognosis for recovery and rehabilitation is unfavourable. It became necessary for us to evaluate the quality of our post-acute stroke rehabilitation services to this vulnerable group of people, particularly in the context of massive social problems like poverty and unemployment, as a good quality service has been proven to improve level of functioning and independence after stroke.

Goals and objectives: The goal of this study was to measure the quality of the stroke services at Booth Hospital. This was achieved by auditing the organisation of stroke services, the process of care that is followed, and measuring the clinical outcomes following our intervention (stroke rehabilitation). In addition, the study made recommendations to improve the quality of the service.

Methodology: This was a simple observational, retrospective study, looking at a non-random sample of stroke patients admitted to the hospital over a period of six months, from 1 January to 30 June 2008. The organisational aspects of the audit compared the structure of stroke services at Booth hospital with the organisation of successful stroke rehabilitation units elsewhere in the world. Similarly, process of care was compared with the internationally accepted standards of best practice in stroke units. Clinical outcomes were measured on individual patients using a validated and reliable clinical measuring tool, the Functional Independence Measurement (FIM), that scored patients on their motor, verbal and cognitive ability. Each patient had a baseline FIM on admission, and another measurement was done at

discharge (post-intervention). A statistical analysis was used to determine if the difference between pre- and post-rehabilitation FIM was significant.

Results: The audit of the organisation (structure) of the stroke rehabilitation services showed that most of the international recommendations were being followed. Two serious deficiencies were found. The first related to the lack of stroke training for the medical team comprising the doctor and nurses, and the second related to the ratio of staff to patients. Booth staff members were treating two to three times more patients than their counterparts in rehabilitation centres in the developed world.

The process audit found good correlation between certain practices at Booth and the ideal as defined by current evidence. In assessing and treating medical issues related to stroke care in general, the staff at Booth scored more than the self-defined target of 75%. Only 72.5% were referred to the multidisciplinary team for assessment or treatment, with even less having documented treatment plans (67.5%) or defined goals (57%). Booth scored even more poorly when it came to the psychosocial aspects of care, particularly in relation to discharge planning, counselling and family involvement.

We determined that the intervention at Booth had a statistically significant improvement in the post- versus pre-intervention FIM score ($p<0.0001$). In addition, the mean FIM improvement of 15.24 points represented a clinically significant improvement.

Conclusions: We concluded that the stroke rehabilitation service at Booth Hospital is of a good quality, although the study highlights certain areas that need improvement. This study provides the hospital with a good opportunity to embark on a quality improvement process in the stroke services.