CHAPTER 5

5. DISCUSSION

5.1. INTRODUCTION
This chapter will provide a discussion about the level of functional independence at discharge and post discharge and about factors that influence functional independence after stroke. Factors that have a significant influence on functional independence will be discussed first. These factors are age, marital status, bowel continence (will be discussed with urinary incontinence, which does not have an influence on functional independence), duration of hospital stay, caregiver availability, and participating in community and household activities. This will be followed by a discussion of factors which do not have a significant influence of functional independence, which are: gender, education level, duration of stroke, side of stroke, post discharge rehabilitation, shoulder pain, leg pain, financial role, monthly income, depression and other illnesses,. Limitations, implications and recommendations of this study will be covered at the end of this chapter.

5.2. The level of functional independence at discharge and post discharge
Ninety three percent of the patients were functionally independent post discharge, compared to 47% on discharge from the hospital. These findings are in line with what is generally established by other studies. Stroke patients are discharged from the hospital with a low functional status, and thus are functionally dependent on discharge (Green et al., 2005). Stroke patients generally have a short length of hospital stay (Hale & Eales, 1998). This results in patients being discharged home before they are functionally independent. However if these patients receive post discharge rehabilitation, they are more likely to regain their functional independence (Greenberg et al. 2004).
Patients in this study were attending a stroke group, where they do exercises on a regular basis, hence the general improvement in functional independence post stroke.

5.3. Factors that have an influence on functional independence:

5.3.1. Age
The highest age group in this study was 45 – 54 years. The study established that younger patients have the highest likelihood of improved functional independence than an older group on discharge from hospital. This can be attributed to the fact that when younger patients have a stroke, they are relatively strong and able to relearn new skills faster than older patients. Patients (89%) within the age group of 18 – 34 scored ≥ 12 on the BI when being discharged from the hospital. A logistic regression for functional independence vs. age on discharge from the hospital also established that age does have an influence on functional independence (p = 0.003) This finding is in line with that of Pohjasvaara et al (1997), who established that an older age group deteriorated significantly more in activities of daily living than a younger age group. However the functional independence post discharge was found to be independent of the patient's age, as 93% of the patients scored ≥ 12 on the BI. This finding is not in line with what is generally found in the literature. According to Nakayama et al. (1994), Pohjasvaara et al. (1997) and Kelly-Hales et al. (2003), age has an influence on functional independence even in the long term. The reason for finding no significant difference in age and functional independence in this study can be due to the fact that the oldest patient in this study was 75 years, and the oldest age group in other studies which found age to have an influence on functional independence in the short and long term was more than 85 years. Another study by Jorgensen et al. (1999), which established that younger stroke patients have better functional outcome, was done on patients up to discharge.

The conclusion that is drawn from these findings is that age does have an influence on functional independence during the initial stages of rehabilitation,
but does not seem to have an influence on functional outcome in the long term for stroke patients younger than 75 years of age.

5.3.2. Marital status
There were more single than married patients in this study (44% singles and 38% married). The results show that patients who are married recovered faster than those who are single $p = 0.05$. These findings are in line with those of Boden-Albala et al. (2005) who established that services provided by a marriage network include cooking, bathing, dressing and shopping; and that these can improve the quality of life of the patient. Jorgensen et al (1999) also established that the existence of a spouse at home increased the relative chance of functional outcome. However Kauhanen et al. (2000) established that being married carries a risk for low quality of life, and that unmarried patients cope well with their impairments. Schepers et al. (2005) also established that living with a spouse could be a negative predictor of social activity. According to Schepers et al (2005), women do the majority of household work, leading to higher scores on functional independence post stroke, if they live with a partner and lower scores for men living with a partner. In this study group, patient's roles in household activities are more likely to be traditional (i.e. women generally do more of the household activities than men in this study population).

Based on this study's findings that being married improves the chances of recovery of function, and on the study that established that a traditional model of household chores made it possible for married women to recover functional independence (Schepers et al., 2005), it can be concluded that being married improves the chances of functional recovery after stroke in this population.
5.3.3. Bladder and bowel continence
The majority of patients were continent: bowel 62% and bladder 58%, and the p-values for the relationship with functional independence were: bladder (p = 0.53) and bowel (p = 0.003). Bowel incontinence is identified as a factor that limits functional outcome, whereas urinary incontinence is found not to have an influence. Brittain et al. (2000) found that daily continence is difficult to manage after discharge from the hospital, and thus affects the patient's quality of life. But the same study by Brittain et al. (2000) established that urinary incontinence increased significantly in patients who are more than 80 years of age. The majority of patients in this study were less than 55 years of age, and this can be a possible explanation why most patients in this study were continent and did not have functional limitations as a result of urinary incontinence. Barer (1989) also established that stroke patients who become continent have better functional outcome.

Bowel incontinence can be considered as a factor that influences functional independence negatively and is supported by studies by Brittain et al. (2000), Barer (1989), and Lam et al (1992). Although these other studies focused mainly on urinary incontinence; they all established that incontinence has an effect on functional outcome.

5.3.4. Duration of hospital stay
Duration of hospital stay was found to have an influence on functional independence post stroke. Patients who stayed two to six weeks in hospital were less functional (p = 0.65) than those who stayed one day to two weeks (odds ratio = 1) and those who stayed six to twelve weeks (p = 0.06). It is possible that those who stayed one day to two weeks did not have severe loss of functional ability or had more intense rehabilitation within a short period, and hence the early discharge and better relative functional ability, and those who stayed six to twelve weeks were likely to have had more rehabilitation prior to discharge, and hence better functional ability. It can thus be concluded that patients who stay longer in a hospital are more likely to have functional independence.
5.3.5. Caregiver availability

The majority of patients in this study had a caregiver (85%). Having a caregiver and the time caregiver was available was found to have an influence on functional independence ($p = 0.02 \& 0.04$) respectively. Patients who do not have a caregiver have better functional recovery than those with a caregiver. Eighty percent of patients who did not have a caregiver had functional independence compared to 41% who had caregivers. This finding is similar to that of Stineman et al. (1997) who established that living alone before having a stroke is associated with the likelihood of improved functional independence post stroke. This is attributed to the fact that patients who live alone are more likely to achieve more functional outcome because they know that they are unlikely to receive assistance after discharge from the hospital/rehabilitation unit. Some caregivers react by overprotecting and over caring for patients (Anderson et al. 1995), and thus patients who have such caregivers are unlikely to achieve much functional independence because of lack of opportunity to practice.

Almost half of the patients (47%) in this study scored more than 12 on the BI at discharge from the hospital, and thus were already considered functionally independent before caregiver involvement. Most patients who had caregivers (59%) in this study had caregivers and still did not achieve functional independence. It can thus be safely assumed that the caregivers of these patients were either not giving them an opportunity to practice, or did not know what they needed to do for/with the patient. The influence of time of availability of caregiver on functional independence shows that 80% of patients without caregivers were functionally independent compared to less than 65% in the other categories (i.e. day/ day and night/ night). This further confirms that not having a caregiver improves the chances of functional independence. Most of the patients had untrained caregivers (78%). Although there was no relationship between having a trained/untrained caregiver vs. functional independence, this might be attributed to the fact that the sample size of those with trained caregivers was very small (seven percent).
In conclusion, having a caregiver does have a negative influence on functional independence, but cannot be considered to have an influence on functional independence without taking into consideration other factors like the knowledge and role of the caregiver.

5.3.6. Household activities and community participation
Most of the patients participated in community activities (68%). There is a relationship between participating in community activities and functional independence (p = 0.02). Patients who participate in community activities either already have functional independence, or they have a caregiver who can help them integrate into the community (Schmidt et al. 1986). It is not surprising that most of the patients in this study participated in community activities because most of them had caregivers (85%) and thus could get help with transfers and moving from one facility to another. Glass et al. 1993 established that stroke patients, who have good social support, tend to have better functional outcome. This is in line with the findings of this study.

Participation in household activities has been found to influence functional independence (p = 0.01). This is in line with the findings by Schepers et al. (2005), who established that women do the majority of household work, leading to higher scores on functional independence post stroke. Sixty percent of the patients in this study were women, and women in this study population participate in household activities.

5.4. Factors that do not have an influence on functional independence:

5.4.1. Gender
There were more female patients (60%), than male patients. This is in line with the findings by Kelly-Hales et al. (2003) who also established that more women experience initial stroke. Gender was found to have no significant influence on functional independence (p = 0.99). The study by Kelly-Hales et al. (2003) also supports this by saying that older age at stroke onset, not gender is associated with greater disability. However Nakayama et al. (1994)
established that although the severity of neurological deficits can be the same for both genders, women were found to have more functional problems. Kelly-Hales et al. (2003) established that stroke occurs approximately five years later in women than in men. Thus, women get a stroke at an older age than men, and this can be an explanation of why they were found to have more functional problems by Nakayama et al. (1994). This is in line with the discussion in 5.3.1. which indicates that the likelihood of recovery of function is less in older patients.

The conclusion that is drawn from these findings is that gender does not have an influence on functional outcome, except in instances where age at stroke onset is not the same for both male and female patient. Thus age seems to contribute more than gender in predicting functional outcome.

5.4.2. Education level
The highest number of patients (79%) in this study had an education level less than grade 11. This may be attributed to the fact that the study was done in state facilities, and most people who have a high education level tend to go to private facilities as they can afford the private medical care charges. The results of this study show that education level does not have an influence on functional independence. On the contrary a study by Hale et al. (1999) found that the two patients, who understood their medical condition in their study, were the ones whose general education level seemed to be better. Stewart et al. (2000) established that patients with better knowledge had a better quality of life. Based on these studies one would expect the patients in this study to have poor functional outcome, but that is not the case. This can be due to the fact that despite the low education level, all of these patients were receiving rehabilitation pos discharge which has been found to improve functional independence in other studies (Greenberg et al., 2004; Mayo et al., 2000). However a study by Paulocci et al. (1999) established that patients with a higher education level are vulnerable to post stroke depression. Post stroke depression leads to lower functional scores (Paulocci et al. 1999; Schwartz et al. 1993; Van de Weg et al. 1999). Recovery of function in this study population can be attributed to other factors than education level. Thus,
education level cannot be considered to be an independent predictor of functional independence post stroke.

It can be concluded that the level of education cannot always be considered as a predictor of functional outcome, because those with a combination of higher education and depression may have the same level of function as those with lower education. This study's findings also indicate that education level cannot be considered as one of the factors that predict functional independence.

### 5.4.3. Duration of stroke (Time since stroke onset)

Stroke duration was found to have no influence on functional independence in this study ($p = 0.58$). Of the patients who scored more than 12 on the BI, 90% were those who had a stroke for less than six months, and 96% were those who had a stroke for more than twelve months. These results are not in line with the findings of Aprile et al (2006), who established that patients with a long duration of stroke are better at walking. Aprile et al.’s study however does not give a specific duration of stroke of the patients in their study: the study just states that it is post acute and chronic. This study included people who had a stroke for more than six weeks, and the longest duration was 12 months. However most (93%) of the patients in this study scored more than 12 on BI post discharge compared to the 47% on discharge from the hospital. This implies that patient’s functional independence improved with increased duration post stroke. It can thus be concluded that duration of stroke is not an independent predictor of functional independence.

### 5.4.4. Side of stroke

Of the stroke patients in this study, 66% had weakness on the right side of the body. The side of stroke was found to have no influence on functional independence ($p = 0.12$). Rexroth et al (2005) also found that patients with right and left CVA had similar abilities when performing activities of daily living. Bernspang and Fisher (1995) also established that patients with right and left CVA have hemispheric differences in motor impairments, but do not differ significantly in domestic activities of daily living. The subtype of stroke
could not be established in this study, as most of the patients were from referral hospitals that do not routinely do investigations to establish the stroke subtype. Thus this study's conclusion can only be made about side of stroke and not stroke subtype.

It can thus be concluded that side of stroke cannot be considered as a factor that influences functional independence post stroke. However hand dominance should be taken into consideration, because loss of function on the dominant hand side will affect the patient's functional independence more than loss of function on the non dominant hand side.

5.4.5. Post discharge rehabilitation
There is no relationship between post discharge rehabilitation and functional independence (p = 0.74). This is not in line with the findings of Greenberg et al. (2004), who established that stroke patients who had general functional deterioration, decreased hand function and difficulty walking had 58% of their problems resolved through community rehabilitation services. Mayo et al. (2000) also found that post discharge rehabilitation; especially home-based rehabilitation resulted in more functional recovery. However when comparing the results of the baseline BI scores with those of BI score during the time of data collection, they show an improvement from 47% to 93% of patients who achieved functional independence. This can be used as an indication that post discharge rehabilitation may have an influence on functional independence; because 93% of the patients in this study received post discharge rehabilitation and 93% ultimately achieved functional independence.

5.4.6. Shoulder and leg pain
There were more patients (68%) with shoulder pain than those without, and shoulder pain was found to have no significant influence on functional independence (p = 0.74 & 0.90). Fifty two percent of patients had leg pain, and there was also no significant relationship between leg pain and functional independence. These findings are not in line with what was found in other studies. Jonsson et al. (2005) and Jakobsson et al. (2003) found that pain
results in more functional limitations. Jakobsson's study was done among older people, and the mean age for Jonsson's study was 72 years. Thus their findings will be expected to differ with those of this study, as the highest number of people in this study was within the age group of 45-54 years. Older patients tend to have other degenerative diseases of the joints that may aggravate their pain, and thus affect their function more than younger patients.

The presence of pain does not influence function according to this study, but this cannot be considered as conclusive because the severity of pain was not considered. It might happen that patients with severe pain experience more of a limitation in their functional ability than those with mild and moderate pain.

5.4.7. Financial role and family income
Most patients (62%) were breadwinners before stroke onset, however the financial role before stroke was found to have no influence on functional independence (p = 0.97). These findings are not in line with what is found in the literature. According to Stineman et al. (1997), the likelihood of achieving functional independence is lower in patients who were unemployed before the stroke. Hale et al. (1999) also established that most patients are not able to use the existing public transport system, and thus have to spend more money for privately hired transport, which is expensive and thus limits the number of times they can come for rehabilitation as outpatients, thus affecting functional outcome.

Financial role has no influence on the functional independence of this study population. This can be attributed to the fact that financial role may not be an independent predictor of functional outcome and that all patients in this study were attending/receiving post discharge rehabilitation services, despite their low income. The rehabilitation services received were at their local clinics that have a stroke group service, and thus they did not have to spend a lot of money to get rehabilitation services.
The current financial role was also found to have no influence on functional outcome \( (p = 0.87) \). However it was interesting to observe that 16% of the patients were contributing to family income before stroke and this changed to 29% after stroke (current financial role). Thus even though some of the patients were no longer breadwinners, most of them did not become dependents, instead were still able to contribute towards family income because of the disability grant. Thus if the financial role is considered to have an influence on functional independence, this would mean that most patients would still have some degree of independence as they still have a contributory financial role. This income was made possible by the state disability grants and businesses that they had.

Family income was also found not to have an influence on functional independence. However a study by Eales et al. (2004), found that patients who had an annual income more than R50 000 were more likely to accept self-responsibility for their recovery than those who earned less than R50 000. In this study only 18% of the patients earned more than R2000 per month, and thus this group had more low-income earners. Having more of the low-income earners in a group makes it difficult to make conclusions, as high-income earners were not well represented in this sample. Family income may not be an independent predictor of functional independence in this study population as besides being low-income earners, all patients in this study had access to rehabilitation services post discharge.

**5.4.8. Depression**

Most patients (78%) in this study had emotional support and 59% of the patients were depressed. However the results of this study show that there is no relationship between depression, having a person to give emotional support and functional independence. The number of patients who were depressed in this study is far more than that established by Gainotti et al. (2001), who found it to be 30%. Poor socioeconomic status is known to increase depression and thus depression of patients in this study be attributed to the poor socioeconomic status as most of the patients in this study (82%)
had less than R2000 monthly income. Although most patients in this study were depressed, it does not influence their functional independence and this can be due to the fact that most of them participate in household and community activities, indicating that they are not feeling isolated and have not lost their self worth. This is in line with Hale et al.'s 1999 findings that the loss of usefulness and worth within the family unit and the need to go back to work are more depressing to patients than the lack of independence in activities of daily living.

Although most studies found that depression negatively affects functional independence (Paolucci et al., 1999; Schwartz et al., 1993; Van de Weg et al., 1999; Hermann et al., 1998), they did not mention the influence of participating in community activities on depression. Thus depression cannot be considered in isolation as a factor that influences functional independence without taking into consideration other activities that the patient is involved in, which may help give the patient a feeling of self worth.

5.4.9. Other illnesses/diseases

Illnesses included in this study were diabetes, hypertension, arthritis and other. Other illnesses which were found in other studies were epilepsy, cardiac diseases, HIV, hypoglycaemia, asthma and pneumonia. When the presence of these illnesses was compared with functional independence of the patient, there was no significant relationship (p > 0.78) for all illnesses included in this study. The literature on the influence of other illnesses on functional independence indicate that the presence of hypertension and diabetes is associated with the likelihood of having a stroke, but does not affect the patient's functional outcome (Pinsky et al., 1985; Kelly-Hayes et al., 2003).

Guccionne et al. (1994) established that knee osteoarthritis and heart diseases contribute to physical disability. There was only one patient with arthritis in this study, thus the influence of this disease cannot be identified. The effect of other diseases could not be measured as individual diseases. They were measured as one category and all of them were found to have no
influence on functional independence. Thus a conclusion cannot be made about the influence of each disease in the “other” category. Jorgensen et al. (1999) also established that diabetes, hypertension, ischaemic heart disease, and other disabling diseases do not predict functional outcome.

Although the results of this study show that the presence of other illnesses does not have an influence on functional independence, it is evident from the literature presented, that other illnesses like HIV infection, cardiac diseases and arthritis may influence the ability of the patient to become functionally independent.

5.5. Conclusion

Most stroke patients are less functional on discharge from the hospital but later become functionally independent with continued outpatient rehabilitation. Age has an influence on functional independence on discharge from the hospital, but does not have an influence on functional independence post discharge for patients above the age of 75. Being married improves the chances of being functionally independent. Bowel incontinence decreases the chances of being functionally independent. Stroke patients who stay longer in hospital are more likely to be functionally independent. Having a caregiver reduces the chances of being functionally independent, but cannot be considered to be a factor that influences functional independence without taking into consideration other factors like the knowledge and the role of the caregiver. Participating in household and community activities increases the likelihood of improved functional independence. Gender, education level, duration of stroke, side of stroke, post discharge rehabilitation, shoulder and leg pain, financial role and family income, depression and the presence of other illnesses do not have an influence on functional independence in this study population.
5.6. Limitations, implications and recommendations of this study

5.6.1. LIMITATIONS
5.6.1.1. Inability to identify the patient's stroke sub-type:
It would have been better if the researchers were able to identify the stroke sub type as this could give us more information about the functional limitations that are specific to certain stroke subtypes. Although some researchers have established that stroke subtype does not influence functional independence, it would have been beneficial to establish if that would be the case in this stroke population.

5.6.1.2. Inability to get the same number of patients with and without functional independence:
A sample of convenience was utilised, and thus patients were included in the study irrespective of their functional limitations. The aim was to identify factors that could have an influence on their ability/inability to have functional independence.

5.6.1.3. Depression scale not used
The tools used in the study were the Barthel Index and a self-designed questionnaire. Having an additional depression scale would have added to the already lengthy interview, and thus taken up a lot of the patient and/or caregiver’s time. However having a separate depression scale could have enabled the researcher to better link depression and functional independence according to depression severity.

5.6.2. IMPLICATIONS
The results of this study show that having a caregiver does have an influence on functional independence. It is thus important to check if the patient has a caregiver and the role of that caregiver in the patient’s life. Being married was also found to have an influence on functional independence. It is thus important to establish the marital status of the patient and to establish the role of the spouse in their life. A spouse may or may not necessarily be the caregiver (38% of the patients were married, but 20% of
them had a spouse as a caregiver). Thus it is important to establish who the caregiver is, and the role of both the spouse and the caregiver.

Participating in household and community activities was found to increase the chance of improved functional independence. It is thus necessary to encourage patients and to teach the caregivers to allow/encourage patients to participate in these activities (household and community).

5.6.3. RECOMMENDATIONS

a) Clinical recommendations
Physiotherapists, who provide rehabilitation services for stroke patients should establish if a patient has a caregiver from the time of admission. This will enable the physiotherapist to involve the caregiver, and give them information about the patient’s condition and the role they (caregiver) are supposed to play in order to improve the patient’s functional independence post discharge. Caregivers should be informed about the importance of patient’s participation in household and community activities, as these were shown to have a positive effect on functional independence.

The marital status of the patient should be established. There is also a need to establish if the spouse is the caregiver, as there are instances where it is not the case. In cases where the spouse is the caregiver, their role should be established, to ensure that they do not promote functional dependence.

Older stroke patients (up to 75 years of age) should be given an opportunity to receive rehabilitation services, as it was established in this study that patients younger than 75 years of age had functional independence in the long term.
b) Recommendations for further research

This study could be extended to a prospective study. A prospective study would enable the researchers to have the stroke subtype, by making special requests for the research patients to be diagnosed according to stroke subtype. The rehabilitation services that the patients receive can be accurately monitored, so that results can also indicate if the rehabilitation services received had an influence on functional outcome. The functional independence of the patient on discharge can also be accurately captured without relying on the patient's memory.

Patients who stayed in hospital for less than two weeks and more than six weeks, had better functional independence than those who stayed between two and six weeks. It may be valuable to do a study to check what kind of patients get discharged before two weeks and after six weeks, and the amount of rehabilitation they receive during this period.

There are factors which were found to have an influence on functional independence by the literature reviewed, but not found to have an influence in this study population as shown in the discussion section. It is thus recommended that a similar study be conducted in another South African population to establish if the same factors would be found to influence functional independence as the once identified in this study population.