THE ACUTE CLINICAL PRESENTATION OF OLDER PATIENTS ADMITTED TO THE MEDICAL WARDS OF CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

Dr. Makgotso P. Mohapi

A research report submitted to the faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Medicine in the branch of Internal Medicine.

Johannesburg, 2017

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL) APPROVAL

Permission to conduct this study was obtained from the Human Research Ethics Committee (Medical), University of the Witwatersrand, Clearance certificate number M140446

DECLARATION

I, Makgotso Patience Mohapi declare that this research report is my own work. It is being submitted for the degree of Master of Medicine, Internal Medicine at the University of the Witwatersrand, Johannesburg. It has not been submitted before in any degree or examination at this or any University.

…….

Makgotso Patience Mohapi

The……day of August 2017

DEDICATION

In memory of my cousin

Solomzi Sydney Ndlozi

24 July 1986- 12 October 2014

ABSTRACT

In South Africa, very little is known regarding the spectrum of clinical illnesses for which older patients are admitted to hospital. Within this group who are admitted, even less is known of the burden of HIV disease. This study investigated the clinical indications for acute medical admission in adults over the age of 50 years at Chris Hani Baragwanath Academic Hospital. The study also determined the prevalence of HIV infection of those with HIV, their access and adherence to treatment.

Methods: This was a prospective, observational study of patients over 50 years of age who were acutely admitted to the medical wards of Chris Hani Baragwanath Academic Hospital (CHBAH) between August 2014 to March 2015.

Results: A total of 200 participants 50 years and older were enrolled, 34% HIV-positive, 37% HIV-negative and 29% whose HIV status was unknown. The HIV-positive group was younger ($p < 0.0001$), had poorer access to pension funds ($p<0.0001$) and higher burdens of acute infectious illness when compared to their HIV-negative counterparts ($p<0.0068$). HIV-negative patients had higher rates of acute cardiovascular and haematological conditions ($p<0.0001$) and higher rates of chronic non-communicable disease ($p<0.0004$), predominantly diabetes mellitus ($p<0.0095$) and hypertension ($p<0.0024$).

Conclusion: In older patients hospitalised for acute illness, both infectious and non-communicable disease play a significant role however, in those with HIV, the infectious burden of disease is more prominent while non-communicable chronic disease predominated in those without HIV.

ACKNOWLEDGEMENTS

My thanks go to the following people:

My supervisor, June Fabian, for your endless patience throughout the process of this research report. Thank you for the invaluable support and guidance during this process.

To the staff and patients of Chris Hani Baragwanath Academic hospital wards for allowing me the time and place to conduct my research.

Petra Gaylard, for her assistance with my data analysis.

Most importantly, to my parents Thapelo and Matseleng Mohapi, for always standing firm in prayer on my behalf, for your unwavering love, support and encouragement. I stand tall always because I know you stand with me.

Last but not least to Gani Mhlanga for always listening and for the endless encouragement throughout this research process.

TABLE OF CONTENTS

LIST OF TABLES

ABBREVIATIONS

AIDS	Acquired immune deficiency syndrome
ART	Anti-retroviral therapy
BMI	Body mass index
CAD	Coronary artery disease
CD	Communicable diseases
CHBAH	Chris Hani Baragwanath Academic Hospital
CKD	Chronic kidney disease
COPD	Chronic obstructive pulmonary disease
GIT	Gastro-intestinal tract
HIC	High income countries
HIV	Human immunodeficiency virus
HIVVL	HIV viral load
ICU	Intensive care unit
KZN	Kwa-Zulu Natal
LMIC	Low-to-middle income countries
NCD	Non-communicable diseases
PJP	Pneumocystis jiroveci pneumonia
SA	South Africa
SE	Socioeconomic
SEI	Socioeconomic index
SSA	sub-Saharan Africa
UNAIDS	Joint United Nations Programme on HIV and AIDS
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO STUDY

1.1 Introduction

South Africa (SA) is in the midst of a profound health and demographic transition that is characterized by the increasingly recognized phenomenon of population aging with longer life expectancies, greater rates of survival of older patients, the ongoing burden of communicable disease (CD) and the increasing burden of non-communicable diseases (NCD) (Mayosi, 2009, Joubert and Bradshaw, 2006). This is taking place despite the adverse effects of human immunodeficiency virus (HIV) and the acquired immune deficiency syndrome (AIDS) on morbidity and mortality. HIV infection, once considered an untreatable fatal illness, is now a treatable chronic disease. The advent of antiretroviral therapy (ART) and expanded access to treatment has made a significant contribution to survival. Consequently, patient compliance on treatment results in increased longevity with average life expectancies that are only slightly lower than that of the communities in which they are living(Celesia et al., 2013, Mayosi, 2009, Joubert and Bradshaw, 2006). The latest World Health Organization (WHO) and Joint United Nations programme on HIV and AIDS (UNAIDS) data has shown that there are approximately 5 million people living with HIV in SA and of the 3 million who require ART, 2.2 million are currently accessing treatment (WHO, 2013).

As a result, the HIV pandemic now requires a shift in focus that addresses the impact of HIV and other clinical disease on older patients, both the effects on those burdened with caring for HIV infected family members and those infected themselves. This has generated new concerns regarding the roles that older patients play within society in general, the challenges and changes resulting from increasing disease burden and HIV infection

(Lekalakala, 2011). In resource limited settings such as those experienced in sub-Saharan Africa (SSA) and SA, the effects of this health and demographic transition, in specific relation to older patients living with HIV, are important transitions to address.

1.2 Population ageing in sub-Saharan Africa (SSA)

Population ageing is characterised by declining levels of fertility and mortality. These two factors are the major contributors to the surge in the numbers of older patients over the age of 60 years in low-to-middle income (LMIC) countries (Joubert and Bradshaw, 2006). This transition, initially experienced by high income countries (HIC) has since plateaued. In the 2001 population census for SA, seven percent of citizens were 60 years and older, similar to other LMIC and this is projected to increase to ten percent in the next 20 years (Joubert and Bradshaw, 2006).

In SSA, the decline in fertility reflects a reduction in the numbers of infants born to women, while improvement in, and increased access to healthcare has resulted in increased longevity. In SA total fertility rates have declined from 6.1 live births per woman in the 1950's to current national levels of 2.5 live births per woman (Joubert and Bradshaw, 2006). Although this number is higher than that seen in HIC, it is far lower than comparable birth rates from neighbouring SSA countries, for instance, 7.1 and 4.9 live births per woman in Angola and Mozambique respectively(Joubert and Bradshaw, 2006).

Secondly the decline in infant mortality since the 1990's as a result of progressive and increased treatment of infectious diseases has resulted in the increased survival of children into adulthood. This coupled with the decline in adult mortalities under the age of 60 prior to 1990 has resulted in longer adult life spans and surges in the numbers seen in the elderly

population. This reflects the improvement in healthcare access and resources in South Africa, including improved immunization programmes and infrastructures (Joubert and Bradshaw, 2006).

These data highlight the need for implementation of health strategies that will mitigate future demands placed on society in relation to the elderly. Even though HIV has not halted the process of population aging, new complexities pertaining to comorbidities and a higher burden of disease have arisen in older patients who are co-infected with HIV. In those patients who are aging without HIV the social impacts of this disease may leave them economically vulnerable and burdened with caring for extended family. HIV therefore has an impact on all aging individuals regardless of their HIV status.

1.3 Effects of immunosenescence in the elderly

Immunosenescence is a natural age-related process of decline that takes place in the human immune system. This ageing, in the absence of HIV, is associated with a significant decrease in immune function that results in a poor response to immunization and an increased risk of morbidity and mortality from pathogen exposure in comparison to the younger patient (Rickabaugh and Jamieson, 2010). Immunosenescence is characterised by a natural decline in production and decreased output of naive CD4 T cells as a result of age-related thymic involution, a decline in the function of circulating T cells, reduced memory T cell and cytotoxic CD8 cell populations, all of which increase the risk of new infections (Nguyen and Holodniy, 2008a, Fagnoni, 2000).

In HIV infection, thymic function and production of T cells is also thought to be inhibited by HIV itself. Immunosenescence is compounded by the deleterious effects of the virus on

the immune system which increases susceptibility to infection, bringing about further physiological as well as immunological decline. Older HIV-positive patients are also prone to faster disease progression and reduced T cell reconstitution despite successful viral suppression with ART (Rickabaugh and Jamieson 2010). The loss of cytotoxic CD8 cells, which play an important role in the containment of HIV replication, in combination with loss of CD4 cells, may explain the accelerated progression of HIV infection in older adults (Nguyen and Holodniy, 2008b)

1.4 Frailty in the elderly

Aside from immunosenescence, a physiological decline may occur in the elderly that results in reduced reserve in all organ systems increasing morbidity and mortality. This physiological decline manifests clinically as frailty. This decline in physiological and functional reserves subsequently results in a decreased ability to adapt to extrinsic as well as intrinsic stressors (Pathai et al, 2013). The frailty syndrome, which is mainly described in the geriatric population is characterized by the findings of at least three of the following clinical manifestations: exhaustion, slowed walking speed, low levels of activity, weakness, and weight loss (Effros et al., 2008). These factors lead to cognitive as well a physical decline, ultimately resulting in falls, increased frequencies of hospitalization as well as increased mortality (Pathai et al, 2013). The pathophysiological mechanism of frailty is not certain, however it is postulated to be as a result of an increase in the number of free radicals, mitochondrial dysfunction, and cytokines that may activate inflammatory pathways with age (Effros et al., 2008). HIV itself is an inflammatory state that activates similar inflammatory pathways and therefore results in accelerated ageing in those who are

infected (Effros et al., 2008). There are however, no defined characteristics of HIV-related frailty.

In studies investigating HIV and frailty, HIV-positive patients were more likely to have frailty than those without HIV, women were more affected than men and the prevalence of premature frailty in HIV was 5 - 20% (Pathai et al., 2013). Factors associated with an increased risk of frailty in HIV were lower socioeconomic status, a lower body mass index (BMI), a lower CD4 count (from less than 500) however there was no association with duration of ART or the CD4 count at diagnosis (Pathai et al., 2013, Rickabaugh and Jamieson, 2010).

In summary, a number of factors influence the severity of HIV infection in older patients including normal age-related immunosenescence, (exacerbated by HIV), a greater degree of frailty, poor immune reconstitution despite ART and an increase in the prevalence of NCD and CD comorbid disease.

1.5 HIV in an ageing population

HIV infection in the older population is on the increase. UNAIDS estimates that 3.6 million people aged 50 years and older are living with HIV worldwide and ten percent of these live in LMIC with the majority (74%) in SSA (UNAIDS, 2013a).

In South Africa in 2010 the prevalence of HIV infection in older adults was estimated to be 9% and this was likely to increase to 17% by the year 2040 (Negin et al., 2012). These figures may be an underestimate as most prevalence data are extrapolated from women of reproductive age accessing antenatal care at their respective clinics (UNAIDS, 2013b). This method for collecting prevalence statistics contributes to a paucity of prevalence data

on HIV in older people (Negin and Cumming, 2010). Currently there is no data on prevalence rates of HIV in hospitalised patients.

1.6 Clinical characteristics and manifestations of HIV in older patients

Currently there are two groups of clinical interest within the older HIV-positive population. One includes those who from a younger age are diagnosed with HIV, are started on ART and survive beyond the age of 50 years. The second includes those with newly diagnosed HIV at age 50 years or older, who require HIV-related care at an older age.

1.6.1 Clinical characteristics of older HIV-positive patients on long term ART

Older HIV-positive patients aging on ART treatment have a different clinical presentation compared to those newly diagnosed after age of 50 (Cahill and Valadéz, 2013). They present with fewer HIV-related CD but have a higher burdens of non HIV related NCD (Cahill and Valadéz, 2013).

It is not yet known whether long term ART incurs significant drug related comorbidities, so that HIV itself may no longer be the primary disease but, instead, a host of other complex comorbidities have arisen that may be related to the long term inflammatory milieu of HIV infection in the presence of ART (Cahill and Valadéz, 2013). These include coronary artery disease, dyslipidaemia, some HIV/non-HIV associated cancers, metabolic syndrome, diabetes, osteopaenia/osteoporosis, liver and renal disease and dementia (Negin et al., 2012). The Strategies for Management of Antiretroviral Therapy (SMART) trial suggested that morbidity and mortality may be influenced by ART through effects on drug-

related toxicity (including lipoatrophy, renal dysfunction and neuropathies), inflammation, interactions with other chronic infections, such as hepatitis B and C, and other chronic NCDs associated with older age including osteoporosis and cardiovascular disease (OAR, 2012). These studies suggest that HIV and/or its treatment affect and influence the process of ageing and/or the development of illnesses typically associated with advanced age.

Other concerns included the increased rates of cancer. In comparison with the general population, patients with HIV experienced a significantly higher incidence of cancers, both haematological and solid tumours. In particular, on long term ART there appeared to be an increase in the development of non-HIV-related cancers with a decline in HIV-associated cancers such as Kaposi's sarcoma and non-Hodgkin's lymphoma(Chiao et al., 1999).

1.6.2 Clinical characteristics and outcomes of older patients with newly diagnosed HIV infection

In older, newly diagnosed HIV-positive patients, the clinical course is characterised predominantly by AIDS-associated illnesses (of which pneumocystis jiroveci pneumonia (PJP) and tuberculosis (TB) are the most common), lower CD4 counts and a marked decline in immune function when compared with younger individuals with HIV (Metallidis et al., 2013, Tadros et al., 2012). Older patients were also twice as likely to be diagnosed later in their course of illness with lower CD4 counts (Smith et al., 2010). Overall, this group is at increased risk for an accelerated clinical progression to AIDS and premature death (Chiao et al., 1999, Nguyen and Holodniy, 2008a). In SA these adverse outcomes may be compounded by lack of access to an appropriate income, housing and sanitation.(Lekalakala, 2011).

1.7 Hospitalisation of the elderly

Studies in HIC show that rates of hospitalisation in older patients (irrespective of HIV status) account for over 40% of their total admissions with cardiovascular disease as the leading cause for admission (Russo, 2006). Data from LMIC countries confirm that similarly, approximately 45% of admissions comprise patients over the age of 50 years, regardless of HIV status (Eze, 2013, Noor et al., 2015). Compared to HIC, where NCD's predominate as the primary cause for admission, studies from both LMIC and SSA have shown the most common causes for acute medical admission across all age groups was infectious and the main risk factors included older age, concurrent comorbidities, gender and issues of compliance (Eze, 2013, Noor et al., 2015). It is thought that LMIC will see a similar transition (as seen in HIC) over several years from acute CD to NCD (Noor et al., 2015). Indeed a few S.A studies have already demonstrated such a transition (Mayosi, 2009, Tollman, 2008).

In a study conducted in Bushbuckridge, the main causes of mortality and morbidity in elderly patients were predominantly due to rising rates of CD (namely HIV and TB), but NCD's were notably on the rise at the time, particularly in those older than 65 (Tollman, 2008). These patients had predominantly vascular disease, including stroke, ischaemic heart disease and hypertensive heart disease.

In older patients with HIV hospital admission rates have been shown to be higher than in younger patients, and they are more likely to demise during the course of admission (Smith et al., 2010). In a study from United states conducted over a seven year period the most common cause for admission was non-tuberculosis related pneumonia and in those aged 65 years and older, there were high rates of congestive cardiac disease and coronary heart

disease (Tadros et al., 2012). In LMIC, HIV infection is one of the main causes for hospitalisation in patients older than 55 years (Gavazzi, 2004b). In the few African studies that have investigated hospitalisation of older patients with HIV, most admissions were for infectious illnesses manifesting as wasting, fever, weight loss and diarrhoea (Gavazzi, 2004a). Moreover it was shown that tuberculosis (TB), pneumonia, malaria, leishmaniasis and diarrhoeal syndromes had an important impact on mortality. Studies in HIC showed PJP as the most common opportunistic infection in older patients with HIV and was the most common AIDS defining illness, followed by oesophageal candidiasis and disseminated Mycobacterium avium complex (Chiao et al., 1999). (Chiao et al., 1999).

Despite similarities noted in the prevalence of CD in older and younger patients, older patients had higher risks of adverse outcomes in terms of morbidity and mortality as a result of these CD (Chiao et al., 1999). This increased risk for morbidity is true despite the initiation of ART in those 50 years and older (Rickabaugh and Jamieson, 2010).

Currently it is unclear how older patients' living with or without HIV present to hospitals in South Africa, hence this study was undertaken.

1.8 Aim

The primary aim of this project was to investigate the acute clinical presentation of patients older than 50 years, irrespective of their HIV status, who were admitted to the medical admission ward at CHBAH. The secondary aim was to investigate those who were HIV-positive in order to determine whether there were any differences in this group, compared to their HIV-negative counterparts and to investigate HIV-related aspects of patient illness and factors that influence outcomes and access to ART.

1.9 Objectives

The objectives of the study were to (all apply to older adults defined as over the age of 50 years):

- Describe the sociodemographics of older patients admitted to CHBAH and to compare the demographic profiles of HIV-positive patients to those who are HIV-negative
- Describe the spectrum of acute clinical illnesses in older hospitalised patients admitted to medical wards whether infectious or non-infectious and compare those who are HIV-negative to those who are HIV-positive
- Describe the non-communicable comorbid illnesses in older patients and compare those who are HIV-positive to those who are HIV-negative
- Determine the prevalence of older HIV-positive patients in this study sample
- Compare the differences in clinical presentation of older patients with a diagnosis of HIV prior to admission to those who were newly diagnosed on this admission

CHAPTER TWO

METHODS

Permission to conduct this study was obtained from the Human Research Ethics Committee (Medical), University of the Witwatersrand, Clearance certificate number M140446 (appendix A). A letter of permission from the CEO of CHBAH was obtained (appendix B)

2.1 Study design and sample

This study was conducted as a prospective, observational study of male and female patients aged 50 years and older admitted to the medical wards of CHBAH from 01/08/2014 - 22/03/2015.

2.1.1 Geographic details

CHBAH is a South African hospital located in the heart of Soweto and is responsible for providing healthcare services to a vast majority of people residing in the south of Johannesburg. It is a tertiary government hospital that accepts referrals from nearby areas and provinces as well as a few neighbouring countries, such as Swaziland, Lesotho and Mozambique. As a result of its location the preponderance of patients are therefore South Africans of black ethnic origin.

2.1.2 Sampling method

Eligible participants were approached on the day of their admission by the principal investigator and asked to participate in the study. A patient information leaflet (appendix

D) was given to each potential participant and if agreeable, written informed consent was obtained.

The informed consent process covered the details of the study and the nature of information required from the participants, both demographic and medical. After obtaining written informed consent, a study number was allocated to each participant and a data collection sheet (appendix C) was completed. Exclusion criteria were untreated acute or chronic psychiatric illness, dementia, confusion, disorientation or delirium. If a confused or disorientated patient recovered normal cognitive function during the course of their stay in hospital they were asked to participate. Patients in whom there were language barriers between themselves and the researcher were excluded. No interpreters were asked to assist in the collection of data.

The following demographic data were collected: age on day of interview; employment status, if unemployed what were alternative sources of income: a pension, social grant, assistance from a family member or begging; number of dependants in the household, where a dependant was defined as those who relied upon them financially, irrespective of age; type of residence where a "house" pertained to all forms of housing including reconstruction and development programme (RDP) housing and a "non-fixed dwelling" encompassed living on the street, in a homeless shelter, or no secure/permanent place of living.

The following medical data were collected: HIV status including year and month diagnosed; if HIV-positive, the latest CD4 count, HIV viral load and duration of ART (if on treatment). In relation to the current admission, the presenting symptoms, duration of current illness and history of other chronic medical illnesses were ascertained.

Participants were examined, appropriate bedside and other investigations carried out, a diagnosis made by the attending clinician and treatment initiated. Participants were

subsequently followed up in the medical wards and results of blood and other investigations were checked. If the admission diagnosis was altered, based on results from investigations and the consultant's assessment, this revised diagnosis was used.

Participants', who were diagnosed as HIV-positive at the time of admission, were counselled by the doctor and a member of the HIV voluntary counselling and testing (VCT) service.

Confidentiality was maintained throughout the entire process of data collection by ensuring patient data were collected from participants in a private room or with curtains drawn at the bedside. The data collection sheets were securely stored.

All data collected were entered onto a RedCap database that is accessible through the University of the Witwatersrand. Accessed was granted by the administrator, Irma Mare. RedCap is a secure, web-based data collection tool with off-site back up. It also allows for the de- identification of patient information and preservation of patient anonymity.

When reviewing the data for different studies pertaining to older patients, it was noted that different age cut-offs were utilized in different studies to describing their cohort of 'older patients', while some used an cut off age of 50 years and older, others utilized 55 or 60 years of age as their cut off. For the purposes of uniformity, an age of 50 years has been utilized in the description of older patients in this study.

2.2 Statistical analysis

A descriptive analysis of the data was performed to summarise categorical and continuous variables. Categorical data were summarised and presented in percentages. Continuous variables were summarised by either the mean and standard deviation or the median and interquartile ranges depending on their pattern of distribution. Comparisons of categorical and continuous data were carried out by a number of different tests. Where two groups of

categorical data were compared, a Chi^2 test was used to compare the proportions of patients or data between the two groups. Where less than 100 patients were compared per group, or where the numbers within each group were very small a Fisher's exact test was carried out. For comparison of both continuous and categorical data, the t-test method was used and where more than one group or multiple variables were compared, the analysis of variance (ANOVA) test was utilized. A sample size calculation was also carried out in order to determine whether the population size was appropriate and to determine if the sample size would answer the key research questions of the study. It was determined that a study population of 200 participants was appropriate for this research.

Data were analysed using the using SAS (Statistical Analysis System) statistical software (version 9.4 for Windows). The statistical analysis was carried out by Dr Petra Gaylard (DMSA), who was consulted in November of 2015 to assist with the analysis.

CHAPTER THREE

RESULTS

3.1 Recruitment

A total of 268 patients were recruited and 200/268 (74.6%) were eligible to participate in this study. Of those who were ineligible (68/268; 25.4%), exclusion was based on the following criteria: 49/68 (72.1%) were confused; 10/68 (14.7%) had suffered a cerebrovascular accident; 6/68 (8.8%) were admitted with seizures; 3/68 (4.4%) each of whom were acutely psychotic, too distressed to answer questions without tiring and had an incorrect date of birth, respectively. Of the total 200 patients included in the study 67 (34%) were HIV-positive, 74 (37%) were HIV-negative and the remaining 59 (29%) patients' HIV status was unknown. In the initial proposal, all of the University of Witwatersrand's teaching hospital sites were included as the candidate was unsure whether the target sample size would be achieved at one hospital only. Subsequently, all participants were recruited from CHBAH and additional sites were therefore not required for inclusion in the study.

3.1.1 Social and demographic characteristics of older patients admitted to CHBAH

The social and demographic data of the study sample (n=200) included the following variables: age, gender, ethnicity, residence, employment, income and number of dependants (table 3.1). A further sub-analysis was performed comparing the social and demographic data of the HIV-positive and HIV-negative groups. This analysis showed the HIV-positive group was younger ($p<0.0001$), had higher levels of informal housing ($p<0.0001$), and fewer received financial support in the form of a pension ($p<0.0001$) (table 3.1).

TABLE 3.1 Social and demographic data of older participants admitted to CHBAH

Variable	Overall	HIV Unknown	HIV Positive	HIV Negative
Total population	200 (100%)	59 (29.5%)	67 (33.5%)	74 (37.0%)
Age Median(IQR) (n=199) [1]	59 (54-66)	66 (61-75)	54(52-58) [1]	60 (56-66) [1]
Gender (n=200): Female	109 (54.5%)	37 (62.7%)	36 (53.7%)	36 (48.6%)
Male	91 (45.5%)	22 (37.2)	31(46.3%)	38 (51.4%)
Dependants (n=200): 0	61 (30.5%)	20 (33.8%)	16 (23.9%)	25 (33.8%)
1-2	82 (41.0%)	16 (27.1%)	34 (50.7%)	32 (43.2%)
3-4	39 (19.5%)	17 (28.8%)	12 (17.9%)	10 (13.5%)
5 or more	18 (9.0%)	6 (10.1%)	5 (7.5%)	7 (9.5%)
Ethnicity (n=200): Black	189 (94.5%)	52 (88.1)	67 (100.0%)	70 (94.6%)
Indian	6 (3.0%)	5 (8.4%)	0 (0.0%)	1 (1.4%)
Coloured	5 (2.5%)	2 (3.3%)	0 (0.0%)	3 (4.1%)
Residence (n=200): House[2]	173 (86.5%)	52 (88.1%)	48 (71.6%)[2]	73 (98.6%)[2]
Shack[2]	22 (11.0%)	4 (6.7%)	17 (25.4%)[2]	1 (1.4%)[2]
Flat	2 (1.0%)	2 (3.3%)	0 (0.0%)	0 (0.0%)
Non fixed dwelling	3 (1.5%)	1(1.6%)	2 (3.0%)	0 (0.0%)
Employed n=200 Yes	32 (16.0%)	5(8.4%)	16 (23.9%)	11 (14.9%)
No	168 (84.0%)	54 (91.5%)	51 (76.1%)	63 (85.1%)
Income (n=200) Social Grant	27 (13.5%)	6 (10.1%)	12 (17.9%)	9 (12.2%)
Pension[3]	85 (42.5%)	39 (66.1%)	8 (11.9%)[3]	38 (51.4%)[3]
Other	61 (30.5%)	13 (22.0%)	31 (46.3%)	17 (23.0%)

[1]$p<0.0001$ HIV-positive participants were significantly younger than HIV-negative participants

[2]$p<0.0001$ HIV-positive participants had significantly less access to formal housing than HIV-negative participants

[3]$p<0.0001$HIV-positive participants had significantly less access to a pensions funds

3.1.2 The spectrum of acute medical illness for which older patients were admitted at CHBAH

The spectrum of acute medical illness for which older patients were admitted were categorised, in decreasing order of frequency as respiratory, cardiac, GIT, genito-urinary, haematological, neurological and rheumatologic (table 3.2). A sub-analysis performed to compare HIV-positive and HIV-negative patients showed no statistically significant difference within each category when comparing the two groups however, there were significantly more infectious illnesses in the HIV-positive group (table 3.2). Although not statistically significant; the HIV-positive group had higher numbers of patients with respiratory and gastro-intestinal illnesses, while patients who were HIV-negative had a higher proportion of cardiac disease.

TABLE 3.2 Spectrum of acute medical illness in older patients admitted to CHBAH

Variable (Clinical Disease)	Overall (x/200)[2]	HIV Unknown (x/59)[2]	HIV Positive (x/67)[2]	HIV Negative (x/74)[2]
Respiratory	78/200 (39.0%)	19/59 (32.2%)	33/67(49.3%)	26/74 (35.1%)
Cardiac	49/200 (24.5%)	21/59 (35.6%)	9/67 (13.4%)	19/74 (25.7%)
Gastro-intestinal	38/200 (19.0%)	5/59 (8.5%)	20/67 (29.9%)	13/74 (17.6%)
Genito-urinary	27 /200(13.5%)	12/59 (20.3%)	7/67 (10.4%)	8/74 (10.8%)
Neurological	20 /200 (10.0%)	4/59 (6.7%)	8/67 (11.9%)	8/74 (10.8%)
Haematological	26/200 (13.0%)	4/59 (6.7%)	10/67 (14.9%)	12/74 (16.2%)
Rheumatologic	2/200 (1.0%)	0/59 (0.0%)	0/67 (0.0%)	2/74 (2.7%)
Other	39/200 (19.5%)	16/59 (27.1%)	7/67 (10.4%)	16/74 (21.6%)
Infectious illness	94/200 (47%)	21/59 (22.3%)	43/67 (45.7%)[1]	30/74 (31.9%)[1]
Non-infectious illness	106/200 (53%)	38/59 (35.8%)	24/67 (22.6%)	44/74 (41.5%)

[1]p =0.0068 HIV-positive participants had significantly higher rates of infectious illnesses than HIV-negative

[2]These numbers represent the number of participants in each subgroup as well as the denominator by which the variable is divisible.

3.1.3 Chronic non-communicable comorbid illnesses in older patients admitted to CHBAH

Table 3.3 represents the chronic clinical co-morbidities for the group overall. These included hypertension, diabetes, ischaemic/cardiac disease, dyslipidaemia, chronic kidney disease (CKD) and chronic obstructive pulmonary disease (COPD) Overall, hypertension and diabetes were the most common. When comparing the HIV-positive and negative groups, a significantly higher proportion of HIV-positive participants had very few or no comorbidities ($p<0.0004$). Furthermore, a significantly higher proportion of HIV-negative participants had hypertension and diabetes ($p<0.0024$ and <0.0095 respectively).

Table 3.3 Comparison of chronic non-communicable comorbidities in older patients admitted to CHBAH

Co-morbidities	Overall (x/200) [4]	HIV Unknown (x/59) [4]	HIV Positive (x/67) [4]	HIV Negative (x/74) [4]
None[1]	47/200 (23.5%)	6/59 (10.1%)	29/67 (43.3%)[1]	12/74 (16.2%)[1]
Hypertension[2]	120/200 (60.0%)	48/59 (81.3%)	25/67 (37.3%)[2]	47/74 (63.5%)[2]
Diabetes[3]	42/200 (21.0%)	25/59 (42.5 %)	3/67 (4.5%)[3]	14/74 (18.9%)[3]
Dyslipidaemia	2/200 (1.0%)	2/59 (3.9%)	0/67 (0.0%)	0/74 (0.0%)
Ischaemic/ Cardiac disease	17/200 (8.5%0	8/59 (13.6%)	2/67 (3.0%)	7/74 (9.5%)
CKD	10/200 (5.0%)	1/59 (1.7%)	3/67 (4.5%)	6/74 (8.1%)
COPD /chronic lung disease	24/200 (12.0%0	5/59 (8.5%)	6/67 (9.0%)	13/74 (17.6%)
Other	62/200 (31.0%)	16/59 (27.1%)	20/67 (29.9%)	26 /74 (35.1%)

[1]p =0.0004 A significantly higher proportion of HIV-positive participants had no comorbid NCD than HIV-negative participants

[2]p =0.0024 HIV-negative participants had significantly higher rates of hypertension than HIV-positive participants

[3]p =0.0095 HIV-negative participants had significantly higher rates of diabetes mellitus than HIV-positive participants

[4]These numbers represent the number of participants in each subgroup as well as the denominator by which the variable is divisible.

3.2 Comparison of infectious and non-infectious causes for the acute medical presentation to hospital in older patients admitted to CHBAH

Overall, 94/200 (47.0%) patients presented with an acute infectious illness as the cause of their admission. However, when comparing the HIV-positive to the HIV-negative group, statistically more HIV-positive patients presented with an infectious aetiology 43/94 (45.7%) versus 30/94 (31.9%) in the HIV-negative group; (p= 0.0068). The difference in the rates of infectious illness according to HIV status, time at diagnosis and duration on ART is demonstrated in Table 3.4.

Table 3.4 Comparison of infectious and non-infectious causes of acute illness according to HIV status in older patients admitted to CHBAH

Participants	Non-infectious (x/106) [2]	Infectious (x/94) [2]
Total participants	106 (53%)	94 (47%)
HIV Positive Participants with/out infectious illness	24 /106 (22.6%)	43/94 (45.7%)[1]
HIV Negative Participants with/out infectious illness	44/106 (41.5%)	30/94 (31.9%)[1]
HIV Unknown with/out infectious illness	38/106 (35.8%)	21/94 (22.3%)
HIV Positive on admission with/out infectious illness	6/106 (25.0%)	14/94 (32.6%)
HIV Positive Prior to admission with/out infectious illness	18/106 (75.0%)	29/94 (67.4%)
On ART: Yes	13/106 (54.2%)	14/94 (32.6%)
Not on A RT	9/106 (37.5%)	27/94 (62.8%)

[1]p =0.0068 HIV-positive participants had significantly higher rates of infectious illnesses than HIV-negative

[2]These numbers represent the number of participants in each subgroup as well as the denominator by which the variable is divisible

3.2.1 Aetiology of acute infectious and non-infectious illnesses in older patients admitted to CHBAH

The aetiology of acute infectious and non-infectious illnesses on admission are presented in Table 3.5 and include respiratory, cardiac, GIT, genito-urinary, neurological, haematological, rheumatologic and other systems of disease. In those with an infectious aetiology, a significantly higher proportion had conditions affecting the respiratory and gastro-intestinal systems (p=<0.0001 and p=0.013 respectively) when compared to the non-infectious group. In those with a non-infectious aetiology, significantly higher proportion had cardiac or haematological disease (p=0.0010 and p=<0.0001) respectively.

Table 3.5 Differences in acute clinical diagnosis between infectious and non-infectious older patients admitted to CHBAH

Variable	Non-Infectious	Infectious
Respiratory[1]	17 (16.0%)[1]	61 (64.9%)[1]
Cardiac[2]	36 (34.0%)[2]	13 (13.8%)[2]
GIT[3]	13 (12.3%)[3]	25 (26.6%)[3]
Genito-urinary	6 (5.7%)	21 (22.3%)
Neurological	12 (11.3%)	8 (8.5%)
Haematological[4]	23 (21.7%)[4]	3 (3.2%)[4]
Rheumatologic	2 (1.9%	0 (0.0%)
Other	19 (17.9%)	20 (21.3%)

[1]p <0.0001 Participants in the infectious group had significantly higher rates of respiratory infectious illnesses compared to the non-infectious groups

[2]p =0.0010 Participants in the non-infectious group had significantly higher rates of non-infectious cardiac illnesses compared to the infectious groups

[3]p =0.013 Participants in the infectious group had significantly higher rates of GIT illnesses compared to non-infectious participants

[4]p <0.0001 Participants in the non-infectious group had significantly higher rates of haematological illnesses compared to the infectious participants

3.3 Older HIV-positive patients admitted to CHBAH

67/200 (%) older patients in this study were HIV-positive. Of these patients, 47/67 (70.1%) participants had a known HIV-positive diagnosis at the time of admission and the remainder were diagnosed on the admission 20/67 (29.9%). A large proportion of the participant's HIV status remained unknown 59/200 (29%). Of the 47/67 (70.1%) who had been diagnosed prior to admission, half of these participants 27/47(57.4%) were on ART. For this component of the study, analysis was done for all of the HIV-positive older patients and then comparing those who were newly diagnosed on admission to those whose HIV-positive status was known on admission. Parameters compared included CD4 count,

viral load and the presence of /absence of ART. These findings are represented in Table 3.6.

3.3.1 Comparison of new and previously diagnosed HIV-positive older patients admitted to CHBAH

There were no significant differences between those with known HIV infection and those who were diagnosed on admission when comparing demographics, symptoms, clinical presentation and comorbidities. As a result, these findings are not tabulated or represented in a graphical format. Median CD4 count, HIVVL and presence/absence of ART were compared for the newly diagnosed and known HIV-positive groups; between the infectious and non-infectious groups of HIV-positive patients as well as for those patients on /not on ART (table 3.6).

The CD4 counts were noted to be significantly lower in patients who were undiagnosed at admission, compared to those already diagnosed at admission ($p=0.018$). When comparing the group that presented with infectious illnesses compared to those with non- infectious illnesses, the CD4 counts once again were significantly lower in the former compared to the latter group ($p=0.0027$).

The HIVVL was higher in those who were newly diagnosed compared to those already diagnosed on admission; this effect was not statistically significant. When comparing those patients who were and were not on ART, those who were on ART had significantly lower HIVVL ($p= 0.018$), this effect was expected.

TABLE 3.6 Comparison of CD4 counts and HIVVL in newly diagnosed and known older HIV-positive patients admitted at CHBAH

Variable	HIV+ Overall	HIV Positive on Admission	HIV Positive Post Admission	HIV Positive on ART	HIV Positive Not on ART
Total HIV positive/ Total no. patients (67/200)	67/200 (33.5%)	47/67 (70.1%)	20/67 (29.9%)	27/67 (40.3%)[6]	36/67 (53.7%)[6]
[4]CD4 Count Median(IQR)	154 (70 – 317)	205[1] (92 – 361)	87[1] (28 – 281)	185 (88- 329)	137 (49-317)
[5]HIVVL Median(IQR)	4.71 (2.0- 5.35)	4.08 (1.30–5.18)	5.05 (4.75– 5.50)	2.00[2] (0.5- 3.80)	5.00[2] (4.80- 5.50

[1]p =0.018 CD4 counts were significantly lower in participants who were newly diagnosed HIV-positive compared to those who were HIV-positive on admission

[2]p =0.018 HIVVL were significantly higher in participants on ART compared to those not receiving ART

[3]p =0.0027 CD4 counts were significantly lower in participants with infectious illnesses compared with those with non-infectious illnesses

[4]CD4 count (cells/mm[3]), 5 participants had missing CD4 count results

[5] HIV viral load (log copies/ml), 10 participants had missing HIVVL results

[6]Missing data: 4 participants had missing data regarding whether they were receiving ART or not

CHAPTER FOUR

DISCUSSION

4.1 Demographics and socio-economic status in older patients

Overall, the median age of the study sample was 59 (range 54 - 66) years of age with those in the HIV infected group being significantly younger than the HIV-negative group, median age of HIV-positive group was 54 years (range of 54 – 58). There is very little data from SSA countries, however, studies from LMIC such as Sudan and Nigeria demonstrated similar ages for acute admissions in elderly patients at 56 years and older (Eze, 2013, Noor et al., 2015). None of these studies however elucidate the average age of their HIV-positive versus the HIV-negative participants at admission. A UK based study showed the median age at diagnosis of older patients with HIV in their cohort was 55 years (Smith et al., 2010) bearing similarities to the median age of the HIV-positive patients in this study.

Rates of unemployment were high with many relying on social grants, pension funds and family assistance to support their day to day living. Unemployment rates were most relevant in participants younger than 60 years of age as they continue to make up part of the national workforce as opposed to those over the age of 60 who are expected to be unemployed or retired. Despite this, HIV-positive participants demonstrated poorer socio-economic circumstances than their HIV-negative counterparts, with significantly fewer patients accessing monetary funds in the form of a social grant or pension fund to support their daily living (table 3.1). The lack of pension funding in the HIV-positive group may also be the result of ineligibility due to younger age. HIV-positive participants were further compromised by their lack of access to formal housing rendering them more economically unstable.

Adult pension funds and social grants are a very necessary monetary tool in many of the socioeconomically disadvantaged communities in this country and this study was no

exception. Indeed studies in SA have demonstrated that older patients often utilize their pension funds as the primary income in the home (Hosegood, 2006). In 2006, a study in Kwa-Zulu Natal (KZN) revealed that adult pensions were the only source of income in one-third of households with 30 to 40% of the pension being responsible for school expenses for dependants, while the rest was utilized for other household needs. Benefits for the older patients are that of being cared for in a family unit and the provision of necessary assistance in carrying out activities of daily living. Their pension fund is therefore thought to confer a protective effect on health, not only on the older patient but on their dependants as well (Hosegood, 2006). On the other hand, because of the dependence of other family members on their small income the older person is vulnerable in terms of financial security and economic stability.

4.2 Differences in hospitalisation of older men and women

Higher numbers of older women than men were admitted during the course of this study. This is a finding different from that seen in other studies where males appeared to have higher rates of help seeking behaviour than women (Noor et al., 2015, Tadros et al., 2012, Eze, 2013, Odenigbo, 2009). This difference may be explained by the observation that in most African countries women constitute the majority of the older population. Potential explanations for this in SA have been higher life expectancy observed in women and high male mortality due to accidents and homicide (Hosegood, 2006, Joubert and Bradshaw, 2006) . Although women accounted for higher population numbers, because of lifelong gender disadvantages, including poorer socioeconomic status, income instability and vulnerability (as a result of being widowed) women are more at risk of higher rates of morbidity(Joubert and Bradshaw, 2006). These factors are also thought to be some of the

mechanisms increasing women's vulnerabilities and risks of acquiring HIV/AIDS. Studies also revealed that older females were more likely than men to require admission to hospital and that despite the initiation of ART, women continued to have worse morbidity. This may also be an explanation for the preponderance of female participants found in this study (Mugavero et al., 2007, Antoniou, 2012).

4.3 Hospitalisation of older adults and the spectrum of clinical illness, both infectious and non-infectious

The greater burdens of acute medical illness in patients admitted to CHBAH were for respiratory, cardiac and gastrointestinal disease, this was independent of HIV status and whether the disease was infectious or not. Many elderly patients, particularly those in the HIV-negative group presented predominantly with NCD (cardiovascular and haematological). Many of the HIV-positive patients presented with high rates of infectious disease in comparison to HIV-negative participants. These infectious illnesses involved the respiratory and gastro-intestinal tract, with a preponderance of pneumonia, tuberculosis and gastro-enteritis specifically. The prevalence rate of HIV in these hospitalised patients was high.

These findings bear similarity to those in HIC countries in that cardiovascular, respiratory and GIT ranked amongst the most foremost causes for hospitalisation (Russo, 2006, Tadros et al., 2012, Akgun et al., 2013). They also revealed higher rates of respiratory communicable disease as a cause of admission in their HIV-positive group of patients (Akgun et al., 2013, Tadros et al., 2012).

The high burden of HIV infection in this study group, the low number of patients on ART, and the relatively low numbers of viral suppression in those receiving ART may be the

contributory factors to the infectious burden of disease noted. This may be further compounded by the poor socioeconomic factors that were observed.

A third of patients recruited to this study did not know their HIV status and this may be a reflection of the delay in the health system in recognizing older patients as an at risk group. It may also result in patients being tested late in the clinical course of disease or once all other diagnoses have been excluded. Older patients lack of education and understanding as well as social stigmata regarding the disease may also be a major contributory factor in patients denying or delaying testing. In a UK study conducted over an eight year period in which late diagnosis was significantly higher in older adults, several factors including missed opportunities in the health care system, patient education and perception of risk were most influential in late HIV diagnosis in their cohort of older patients (smith et al).

4.4 Non-communicable comorbid illnesses in older patients

The HIV-negative group in the study had a significantly higher proportion of chronic non-communicable co-morbid disease, with hypertension and diabetes mellitus being the most common. Fewer HIV-positive patients had NCD, these findings may have been confounded by the younger age of admitted HIV-positive patients as most NCD will increase with older age.

One of the earliest ground breaking studies that have been instrumental in demonstrating rising rates of non-communicable diseases in SA is the Agincourt study. It demonstrated that despite rising rates of HIV and TB, morbidity and mortality from non-communicable disease have increased, ranking highest as a cause for illness particularly in those patients aged 65 years and older. The predominating disease in these patients were vascular diseases (Tollman, 2008). Many HIC have demonstrated an epidemiological transition with

a reduction in CD and rising rates of NCD within the adult population (Noor et al., 2015). In this group of patients these high rates of NCD are most likely a reflection of increased burden of NCD at an older age.

4.5 HIV and its' effects in this cohort of older patients

HIV prevalence rates in hospitalised patients were 33.5% in the study with 75% having had a diagnosis of HIV prior to admission. These numbers may be higher still as 29.5% of the study participants were not tested for HIV during the course of their admission. Only 40.3% of participants previously known to be HIV positive at the time of admission were accessing ART yet their median CD4 counts were well below 350ml/cell^{3}which was the level previously required to initiate ART. Furthermore CD4 counts were significantly lower in those patients who were newly diagnosed compared to those who were already known as well as those with infectious illnesses.

The in hospital prevalence rates of HIV-positive patients in the study were high. National HIV prevalence was 7.6% in 2012 with rates of 12.4% in the Gauteng province (Shisana et al., 2014). A study conducted in Thessaloniki, Greece, over a 10 year period reported an HIV prevalence rate of 18.5% in hospitalised patients, higher than the national prevalence of 15.1% at the time (Metallidis et al., 2013). Younger patients in SA also demonstrated an in hospital prevalence rates of 60.1 % compared to the national prevalence of 18.8% in those 15-49 years of age in a study conducted in Cape Town over a 16 month period (Meintjes et al., 2015, Shisana et al., 2014).

There are no studies from SA with in-hospital data demonstrating prevalence rates of HIV in elderly patients. SA prevalence data available from community based studies demonstrate rising rates of HIV infection among the elderly. These rates were as high as

7.8% in women and 12.9% in men in a community based study in rural KZN (Wallrauch et al., 2010).

The advent of ART and its exponential scale up programme in SA has played a significant role in the survival of patients receiving ART into older age. The larger majority of HIV-positive patients (75% of the group) who knew of their HIV status prior to admission are testament to voluntary testing and counselling taking place within communities. Several factors still exist that contribute to poor ART access, despite awareness of HIV status and non-compliance as few of the patients requiring ART (40.3%) were receiving it in this study. Other studies also demonstrate poor ART access in the SA setting with 34.4% of the 84.4% of the patients diagnosed prior to admission and requiring ART accessing it (Meintjes et al., 2015). This was demonstrated in a younger population of patients in SA, however many of the determinants hindering access to ART and compliance are applicable to an older population. Although the reasons for lack of ART access were not explored, factors that may impact on compliance may include patient refusal, delayed initiation, poor follow up or patient ineligibility (Meintjes et al., 2015).

In this study, older patients with HIV who were not on ART demonstrated very low median CD4 counts implying late presentation with advanced clinical disease. A UK study conducted over a seven year period revealed late presentation in a significant number of older patients with CD4 counts below 200 compared to younger participants (Smith et al., 2010). HIV and ageing have a combined deleterious effect on CD4 cells/mm^3 counts worsening risks of adverse morbidity and mortality. Other studies have already alluded to, the slow recovery of the immune system in older patients with HIV who are initiated on ART. Patients on ART in the study demonstrated higher median CD4 counts in comparison to those who were not initiated, however these remained well below the

national CD4 required for ART initiation demonstrating poor immune recovery and perhaps rendering them vulnerable to ongoing opportunistic infections.

Themba Lethu, an ART clinic in Helen Joseph Hospital, conducted a study in which the majority of older patients mounted poorer clinical response to ART by 6 and 12 month follow up compared to younger patients. (Maskew et al., 2012). Viral suppression in their study, however was noted to be better in patients 50 years and older and this was attributed to older people having better adherence to therapy in comparison to their younger counterparts (Maskew et al., 2012). Studies from HIC also demonstrated adequate virological suppression but slower rates of immunological recovery in older patients (Gebo, 2008). Viral suppression was suboptimal in patients on ART in this study, perhaps as a result of inadequate compliance on ART and viral resistance.

Some studies have alluded to the potential benefits of initiating ART at higher CD4 counts, including the decrease in syndromes such as HIV associated frailty, decrease in opportunistic infections and improvement in health outcomes, which has implications for the findings in this study (Smith et al., 2010).

4.6 Limitations of this study

1. Diagnosis of acute condition: difficulties were encountered in some patients as many had ongoing investigations which may have altered the diagnosis at the time of presentation to time of discharge
2. Incomplete/missing clinical and laboratory data, however this was not extensive and has been indicated in table 3.6.
3. A significant proportion of patients went untested and therefore the HIV unknown group comprised a larger group than anticipated.

4. The HIV unknown group was older than the rest of the cohort
5. Nearly 20% of patients were excluded due to acute confusion at the time of the study, which may have possibly biased the proportion of neurological and neurocognitive disease in these patients.
6. Information regarding the date of HIV diagnosis in those who were positive could not be accurately determined which did not allow for estimating the duration of known HIV disease
7. This study was only conducted at a single site and may not be as representative as it may have been if conducted at all three sites, as initially planned

4.7 Recommendations from the study

This study demonstrated that older patients admitted to CHBAH had difficult socio-economic circumstances and a significant burden of both infectious and non-communicable disease. The prevalence of HIV infection (33.5%) was high in older hospitalised patients and more studies are required to investigate this finding. The results of this study may be useful in directing further research and assisting guidelines:

1. Investigation of incidence and prevalence of HIV in the older South African population and in hospitalised patients. This will inform public health policy for management of chronic diseases, HIV, and the poor socio-economic factors that make older people vulnerable.

2. Investigation of chronic disease profile in the older patients and an institution of policies and guidelines regarding management thereof.

3. Recommendations for HIV screening and prevention programmes in the elderly.

4. Specific Guidelines for ART initiation and management that take into account chronic illness and burdens of polypharmacy.

4.8 CONCLUSION

HIV-positive patients admitted to CHBAH are younger and have poorer socioeconomic backgrounds than the HIV-negative patients from this community. They have less access to pension funds and higher rates of informal housing. Prevalence rates of HIV in hospitalised patients are high at 33.5%; this may be higher still as a third of hospitalised patients were not tested. The incidence of new infections diagnosed in this population was 10% implying that HIV in the elderly will continue to present challenges for health care providers. There is a greater requirement for voluntary testing and counselling in this population group. The rates of infectious illnesses were significantly higher in older HIV-positive patients compared to those who were HIV-negative. Acute clinical infectious disease of the respiratory and GIT were most prevalent in HIV-positive patients, while cardiac and haematological NCD disease predominated in the HIV-negative group. Hypertension and diabetes were the most prevalent chronic comorbid disease in this group, particularly those who were HIV-negative. CD4 counts were severely decreased in those patients who presented with predominantly infectious disease and opportunistic infectious illnesses continue to plague HIV-positive patients despite ART initiation. Both CD and NCD play an important role in hospitalisation of older adults. More research concerning HIV, the elderly and chronic CD and NCD is needed in order to advise future guidelines.

REFERENCES

1. Akgun, K. M., Tate, J. P., Pisani, M., Fried, T., Butt, A. A., Gibert, C. L., Huang, L., Rodriguez-Barradas, M. C., Rimland, D., Justice, A. C. & Crothers, K. (2013). Medical ICU admission diagnoses and outcomes in human immunodeficiency virus-infected and virus-uninfected veterans in the combination antiretroviral era. Crit Care Med, 41(6), pp1458-67.
2. Antoniou, T., Zagorski B, Loutfy M.R., Strike R., Glazier R.G. (2012). Socio-economic- and sex-related disparities in rates of hospital admission among patients with HIV infection in Ontario: a population-based study. Open Medicine, 6(4), pp146-54.
3. Cahill, S. & Valadéz, R. (2013). Growing Older With HIV/AIDS: New Public Health Challenges. American Journal of Public Health, 103(3), pp7-15.
4. Celesia, B. M., Castronuovo, D., Pinzone, M. R., Bellissimo, F., Mughini, M. T., Lupo, G., Scarpino, M. R., Gussio, M., Palermo, F., Cosentino, S., Cacopardo, B. & Nunnari, G. (2013). Late presentation of HIV infection: predictors of delayed diagnosis and survival in Eastern Sicily. Eur Rev Med Pharmacol Sci, 17(16), pp2218-24.
5. Chiao, E. Y., Ries, K. M. & Sande, M. A. (1999). AIDS and the elderly. Clin Infect Dis, 28(4), pp740-45.
6. Effros, R. B., Fletcher, C. V., Gebo, K., Halter, J. B., Hazzard, W. R., Horne, F. M., Huebner, R. E., Janoff, E. N., Justice, A. C., Kuritzkes, D., Nayfield, S. G., Plaeger, S. F., Schmader, K. E., Ashworth, J. R., Campanelli, C., Clayton, C. P., Rada, B., Woolard, N. F. & High, K. P. (2008). Workshop on HIV infection and aging: what is known and future research directions. Clin Infect Dis, 47(4), pp542-53.

7. Eze, C. O., Agu,C.E.; Kalu, U.A.; Maduanusi,C.A.; Nwali, S.N.; Igwenyi C (2013). Pattern of Medical Admissions in a Tertiary Health Centre in Abakaliki South-East Nigeria. Journal of Biology, Agriculture and Healthcare, 3(12), pp90-95.

8. Fagnoni, F. F., Vescovini, R., Passeri, G., Bologna, G., Pedrazzoni, M., Lavagetto, G., Casti, A., Franceschi, C., Passeri, M., & Sansoni P., (2000). Shortage of circulating naive CD8+ Tcells provides new insights on immunodeficiency in aging. Blood 95(9), pp2860-2868.

9. Gavazzi, G., Hermann, F., Krause, K. (2004). Aging and Infectious Diseases in the Developing World. Aging and infectious diseases 39, pp83-91.

10. Gebo, K. A. (2008). Epidemiology of HIV and response to antiretroviral therapy in the middle aged and elderly. Aging health, 4, pp615-27.

11. OAR Working Group on HIV and Aging (2012). HIV and aging: state of knowledge and areas of critical need for research. A report to the NIH office of AIDS research by the HIV and Aging Working Group. J Acquir Immune Defic Syndr, 60, S1-18.

12. Hosegood, V. & Timaeus, I.M., National Research Council. (2006). Aging in Sub-Saharan Africa: Recommendations for Furthering Research. Panel on Policy Research and Data Needs to Meet the Challenge of Aging in Africa. Barney Cohen and Jane Menken, (eds). Committee on Population, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press, pp250-275.

13. Joubert, J. & Bradshaw, D. South African Medical Research Council, (2006). Krisela Steyn, Jean Fourie, Norman Temple (eds). Chronic Diseases of

Lifestyle in South Africa: 1995 - 2005. Technical Report. Cape Town: pp204-19.

14. Lekalakala, M. E. (2011). A literature review of the impact of HIV and AIDS on role of the elderly in sub-Saharan African community. Health SA Gesondheid 16(1), pp564-70.

15. Maskew, M., Brennan, A. T., Macphail, A. P., Sanne, I. M. & Fox, M. P. (2012). Poorer ART outcomes with increasing age at a large public sector HIV clinic in Johannesburg, South Africa. J Int Assoc Physicians AIDS Care (Chic), 11(1), pp57-65.

16. Mayosi, M. B. Flisher, A.J., Lalloo, U.G., Sitas, F., Tollman, S.M., Bradshaw, D., (2009). The burden of non-communicable diseases in South Africa. Lancet, 374, pp934–47

17. Meintjes, G., Kerkhoff, A. D., Burton, R., Schutz, C., Boulle, A., Van Wyk, G., Blumenthal, L., Nicol, M. P. & Lawn, S. D. (2015). HIV-Related Medical Admissions to a South African District Hospital Remain Frequent Despite Effective Antiretroviral Therapy Scale-Up. Medicine, 94(50), pp1-10.

18. Metallidis, S., Tsachouridou, O., Skoura, L., Zebekakis, P., Chrysanthidis, T., Pilalas, D., Bakaimi, I., Kollaras, P., Germanidis, G., Tsiara, A., Galanos, A., Malisiovas, N. & Nikolaidis, P. (2013). Older HIV-infected patients an underestimated population in northern Greece: epidemiology, risk of disease progression and death. Int J Infect Dis, 17, pp883-91.

19. Mugavero, M. J., Castellano, C., Edelman, D. & Hicks, C. (2007). Late diagnosis of HIV infection: the role of age and sex. Am J Med, 120 (4), pp370-3.

20. Negin, J. & Cumming, R. G. (2010). HIV infection in older adults in sub-Saharan Africa: extrapolating prevalence from existing data. Bull World Health Organ, 88(11), pp847-53.

21. Negin, J., Martiniuk, A., Cumming, R. G., Naidoo, N., Phaswana-Mafuya, N., Madurai, L., Williams, S. & Kowal, P. (2012). Prevalence of HIV and chronic comorbidities among older adults. AIDS, 26 (1), pp55-63.

22. Nguyen, D. H. & Holodniy, M. (2008). HIV infection in the elderly. Clinical Interventions in Aging, 3(3), pp453-472.

23. Noor, S. K., Elmadhoun, W. M., Bushara, S. O. & Ahmed, M. H. (2015). The Changing Pattern of Hospital Admission to Medical Wards: Burden of non-communicable diseases at a hospital in a developing country. Sultan Qaboos Univ Med J, 15(4), pp517-22.

24. Odenigbo, C. U., Oguejiofor, O.C. (2009). Pattern of medical admissions at the federal medical centre, Asaba-a two year review. Nigerian Journal of Clinical Practice, 12, pp395-397.

25. Pathai, S., Gilbert, C., Weiss, H. A., Cook, C., Wood, R., Bekker, L. G. & Lawn, S. D. (2013). Frailty in HIV-infected adults in South Africa. J Acquir Immune Defic Syndr, 62(1), pp43-51.

26. Rickabaugh, T. M. & Jamieson, B. D. (2010). A challenge for the future: aging and HIV infection. Immunol Res, 48(1-3), pp59-71.

27. Russo, A. C. & Elixhauser, A. (2006). Hospitalizations in the Elderly Population, 2003, pp1-8.

28. Shisana, O., Rehle, T., Simbayi, L., Labadarios, D., Jooste, S., Davids, A., Ramlagan, S., Zuma, K., Mbelle, N., Van Zyl, J., Onoya, D. & Wabiri, N.

(2014). South African National HIV Prevalence, Incidence and Behaviour Survey, 2012. South African National HIV Survey, pp1-195.

29. Smith, R. D., Delpech, V. C., Brown, A. E. & Rice, B. D. (2010). HIV transmission and high rates of late diagnoses among adults aged 50 years and over. AIDS, 24(13), pp2109-15.

30. Tadros, A., Shaver, E., Davis, S. M. & Davidov, D. M. (2012). Hospitalizations of older patients with human immunodeficiency virus in the United States. J Emerg Med, 43(6), pp1138-44.

31. Tollman, M. S., Kathleen, K. K., Sartorius, B., Collinson, M.A., Clark,S.J., Garenne M.L. (2008). Implications of mortality transition for primary health care Lancet in rural South Africa: a population-based surveillance stud. Lancet, 372, pp893–901.

32. UNAIDS (2013a). HIV and Aging special supplement to the UNAIDS report on the global aids epidemic 2013. Aging and HIV. http://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2013/november/20131101praging

33. UNAIDS (2013b). UNAIDS methodology- understanding the HIV estimates. http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2013/gr2013/20131118_Methodology.pdf

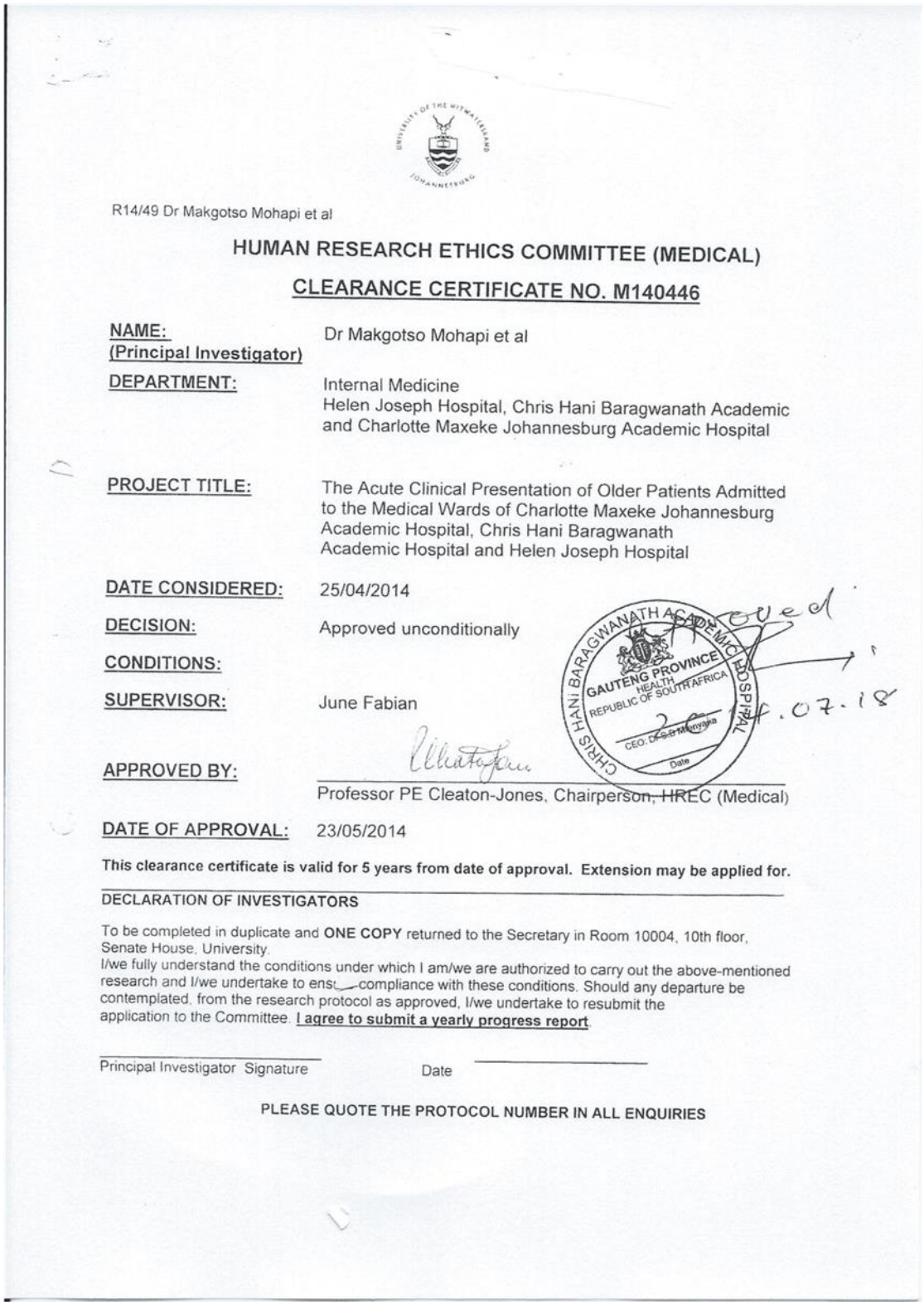
34. Wallrauch, C., Barnighausen, T. & Newell, M. L. (2010). HIV prevalence and incidence in people 50 years and older in rural South Africa. S Afr Med J, 100(12), pp812-4.

35. WHO, UNICEF and UNAIDS. (2013). Global update on HIV treatment 2013: results, impact and opportunities.

http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2013/20130630_treatment_report_en.pdf

APPENDIX A

Ethics approval letter



R14/49 Dr Makgotso Mohapi et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M140446

NAME: (Principal Investigator)	Dr Makgotso Mohapi et al
DEPARTMENT:	Internal Medicine Helen Joseph Hospital, Chris Hani Baragwanath Academic and Charlotte Maxeke Johannesburg Academic Hospital
PROJECT TITLE:	The Acute Clinical Presentation of Older Patients Admitted to the Medical Wards of Charlotte Maxeke Johannesburg Academic Hospital, Chris Hani Baragwanath Academic Hospital and Helen Joseph Hospital
DATE CONSIDERED:	25/04/2014
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	June Fabian
APPROVED BY:	Professor PE Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	23/05/2014

CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL
GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA
CEO: Dr S.S. Mkwanazi
Date

Approved
11.07.14

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.**

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX B

CHBH CEO Approval letter

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL
IN THE OFFICE OF THE CEO
Enquiries: Ms. Thabile Ndlovu
Tel : (011) 933- 9145
Fax: (011) 938-1005
Email: Thabile.Ndlovu2@gauteng.gov.za

To : Dr. Makgotso Mohapi
(M140446)

From : Dr. Sandile Mfenyana
CEO: CHBA hospital

Date : 18 July 2014

Re : The Acute Clinical Presentation of Older Patients Admitted To the Medical Wards

Your application to request permission to conduct the Acute Clinical Presentation of Older Patients Admitted to the Medical Wards at Chris Hani Baragwanath Academic Hospital is approved by the CEO: Dr. Sandile Mfenyana

Hoping that the Institution (CHBAH) will meet the requirements of the study concerned.

Wishing you well in your future endeavors

Regards,

DR. SCB Mfenyana
CEO: CHBA Hospital

CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL
GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA
14.07.18
CEO: Dr S.B Mfenyana
Date

APPENDIX C

Data collection sheet

<table>
<tr><td>Study no.</td><td></td><td></td><td>Known HIV +ve prior to admission</td><td>Y ◯</td><td><u>ART</u>
Y ◯ →→→
N ◯</td><td>Duration of ART (months)</td><td>CD 4:
HIVVL:
(most recent)</td></tr>
<tr><td>Age (years)</td><td></td><td></td><td>HIV +ve on admission</td><td>Y ◯</td><td colspan="3">CD4 :
HIVVL:
(At time of diagnosis)</td></tr>
<tr><td rowspan="2">Sex</td><td rowspan="2">M ◯ F ◯</td><td rowspan="2"></td><td>HIV -ve</td><td>Y ◯</td><td colspan="3">HIV Status unknown
Y ◯</td></tr>
<tr><td>Presenting Symptoms</td><td colspan="4"></td></tr>
<tr><td>No. of dependants at home?</td><td>1 ◯ 5 ◯
2 ◯ 6 ◯
3 ◯ 7 ◯
4 ◯ 8 ◯</td><td>I
L
L
N
E
SS</td><td>Final Dx (consultant opinion)</td><td colspan="2"><u>Communicable</u></td><td colspan="2"><u>Non-communicable</u></td></tr>
<tr><td>Ethnicity</td><td>Black ◯
White ◯
Indian ◯
Coloured ◯</td><td rowspan="2">C
H
R
O
N
IC
ILL
NESS</td><td rowspan="2"></td><td colspan="2" rowspan="2"></td><td colspan="2" rowspan="2"></td></tr>
<tr><td>Area of permanent residence?</td><td>House ◯
Shack ◯
Flat ◯
Non fixed dwelling ◯</td></tr>
<tr><td>Employed</td><td>Y ◯ N ◯ →→</td><td></td><td>Source of income</td><td colspan="4">Social grant ◯
Pension ◯
Other ◯ Specify:</td></tr>
</table>

APPENDIX D

WITS ACADEMIC TEACHING HOSPITALS

Chris Hani Baragwanath

Consent Form: Use of Clinical Information

This document must be explained to the patient/family member/guardian by a member of the clinic staff and a copy of the signed document is to be given to the patient/family member/guardian.

Dear Patient,

You are currently being treated in the medical ward of the hospital for treatment of problems that you are currently experiencing. As a hospital in the University of the Witwatersrand academic complex, the hospital not only renders treatment, but is also actively involved in conducting research aimed at improving the quality of care we deliver. From time to time such research involves the use of patient records from which information is extracted.

The use of such information is subject to:

1. **Approval from the Committee for Research on Human Subjects (University of the Witwatersrand)**
2. **Anonymity, i.e. the identity of the patient from whose file the information is extracted is never revealed to anyone but the researcher, unless specific consent is obtained to do so.**

We are currently involved in a research project looking at the clinical presentation of patients over the age of 50 years. We would like to obtain your consent to use information from your file for the purpose of research, subject to the conditions mentioned above. If you choose not to give consent, this will not compromise your treatment in any way. If at any time you choose to withdraw your consent, you are free to do so and you will not be prejudiced in any manner whatsoever. (Please sign either section A or section B). Should you have any questions at any stage regarding this consent, or your rights as a research participant, please contact Anisa Keshav from the Human research Ethics Committee at 011 -717 1234

~~~~~~

Section A.

I, ____ **hereby give consent for my records to be used as per the above-mentioned condition for the purposes of research**:

Patient:___________________________________ Date:______________________

Witness:___________________________________ Date:______________________

____**OR**______________________________________

Section B.

I, ____ **do not give consent for my records to be used for research purposes:**

Patient:___________________________________ Date:______________________

Witness:___________________________________ Date:______________________
~~~~~~