TITLE OF DISSERTATION:

A profile of geriatric admissions admitted to King Edward VIII Hospital, Durban, in 2005

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DECLARATION

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ACKNOWLEGEMENTS

I would like to dedicate this thesis to my daughter, Simran, who was with me through it all…

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ABBREVIATIONS

AEASA	Action on Elder abuse South Africa
AF	Atrial fibrillation
AIDS	Acquired immunodeficiency syndrome
COAD	Chronic obstructive airway disease
CVS	Cardiovascular system
DCM	Dilated cardiomyopathy
GIT	Gastrointestinal system
GSH	Groote Schuur Hospital
HIV	Human immunodeficiency virus
KEH	King Edward VIII Hospital
LE	Life expectancy
NCD	Non communicable disease
NHS	National Health Service
PVD	Peripheral vascular disease
RENAL	Renal system
RRT	Renal replacement therapy
SA	South Africa
SAGS	South African Geriatric Society
UCT	University of Cape Town
UI	Urinary incontinence
UK	United Kingdom
US	United States

ABSTRACT

Introduction: Ageing is a phenomenon that has preoccupied the minds of humankind for generations but it was only in the twentieth century that medical care dedicated to the elderly was created. The field of Geriatric Medicine has grown in South Africa and globally, to be recognized as a subspecialty of Internal Medicine in its own right. Physiological changes in the elderly impact on the increased prevalence of non–communicable diseases and the raised burden of disease in this age group. The altered spectrum of diseases in this age group and atypical manifestations of these conditions make geriatric health care truly unique. In spite of the recognition that the elderly have specific medical conditions, a dedicated health care policy to improve geriatric health care is yet to be developed In South Africa. For such a policy to be created, more needs to be known about the causes of mortality and morbidity that contributes to the burden of disease in this age group.

Method: A retrospective chart review was conducted on 218 admissions of persons aged 60 years and over to the medical wards of King Edward VIII Hospital. This is a regional facility in Durban, South Africa, that provides mainly secondary and tertiary levels of care. An ethical waiver was obtained from the Biomedical Research Ethics Committee of the University of KwaZulu-Natal and all data sheets were de-identified. A structured data extraction sheet was used to record demographic and clinical data, including the admission diagnoses, presence of concomitant diseases, management and

complications of some of these diseases, length of hospitalization and outcome of admission.

Results: The study population comprised 191 patients aged 60 years and over, with a mean age of 70.5 ± 7.4 years (range 60 – 90 years). The patients were predominantly female (61.3%) and Black African (83.8%). While the majority of patients had only 1 admission, most were admitted with multiple diagnoses. Four or more diagnoses were recorded for 58.1% of the patients, with 50 patients (26.2%) having four diagnoses and 38 patients (19.9%) having five diagnoses. A history of current smoking was recorded in 38% of males and 7.2% females.

Respiratory disease was the most common admission diagnosis (42.7%), followed by cardiac (42.2%) and renal disease (40.4%). An infection was present in 116 cases (53.2%) on admission, the commonest being pneumonia in 71 (61.2%), followed by urinary tract infection in 34 (28%) and septicaemia in 11 (9.5%).

Cardiovascular disease was the most common underlying chronic disease, with hypertension being present in 150 patients (68.8%) and cardiomyopathy in 60 patients (25.5%). Of the patients with hypertension, evidence of end organ damage was present in 128 patients (85.3%), with hypertensive heart disease in 97 patients (75.8%), renal disease in 61 patients (47.7%), cerebrovascular disease in 37 patients (28.91%), hypertensive retinopathy in 11 patients (8.6%) and peripheral vascular disease in 5 patients (3.91%).
The most common risk factors for congestive cardiomyopathy were hypertension in 55 cases (67%) and diabetes mellitus in 24 cases (40%). In

addition, infection was the most common identifiable precipitating factor for cardiac failure in 40 % of cardiac failure cases Eleven patients were on anticoagulant therapy, of which three (27.3%) presented with over-warfarinization. More importantly, eight of the 17 patients (47%) with atrial fibrillation were not on anticoagulants.

Neurological disease was present in 27.5% of the admissions with cerebrovascular disease being the most common (75% of all neurological cases)

A diagnosis of malignancy was recorded in 13.1% of admissions with the most common primary site being the lung. In eight patients (32 % of those with malignancy) there was evidence of metastatic disease.

Men were more likely than women to be admitted with respiratory disease (22.8% vs. 2.2%, $p < 0.0001$) such as chronic obstructive airways disease (57% vs. 34.5%, $p = 0.001$). Although pneumonia was more common in men than in women, this did not reach clinical significance (40.5% vs. 28.8%, $p = 0.053$). In contrast, more women were admitted with arrhythmias (16.5% vs. 6.3%, $p = 0.03$), congestive cardiac failure (30.2% vs. 15.2%, $p = 0.013$) and endocrine diseases (23.7% vs. 12.7%, $p = 0.048$). Renal disease was more common in women than in men, but did not reach statistical significance (44.6% vs. 32.9%, $p = 0.060$)

In the 191 patients, 64 deaths (33.7%) were recorded during hospitalization. The mortality rate was found to be significantly higher in patients with

cerebrovascular accidents, acute renal failure, diabetes mellitus, and infection (including pneumonias).

Conclusion: This study confirms the high prevalence and disease burden of non-communicable diseases in older patients, with the majority of patients having multiple diagnoses on admission. Hypertension and other cardiovascular diseases were identified as being most common with a high prevalence of target organ damage. Furthermore, in the patients with malignancy metastatic disease was common. These findings suggest that older patients may present late due to a lack of awareness, limited access to appropriate health care, or lack of adequate treatment and screening programmes. In addition to the burden of non-communicable diseases (NCD), infection (particularly pneumonia) emerged as a common cause for admission and mortality.

These findings confirm the high burden of non-communicable diseases and their complications in the older population and highlight the need screening programs to improve detection and better management of these conditions. Furthermore the association of a high mortality with infections, finding underscores the need for implementation and adherence to treatment guidelines, and to develop and adhere to vaccination guidelines. Furthermore, training of health care personnel at all levels should be intensified in an attempt to decrease the burden of disease in older persons and to improve their quality of life.

CHAPTER 1 INTRODUCTION

1.1. History of Geriatric Medicine

The prospect of aging has occupied the minds of physicians, philosophers and poets for centuries. Aristotle penned a theory of aging based on the loss of heat while Hippocrates described common conditions found in later life. However, it was only in the early twentieth century that medicine dedicated to the geriatric population was developed (1).

Ignatz L Nascher, an Austrian immigrant to the United States (US), coined the word “geriatrics” in 1909 (1), which resulted in biological and social research being done on this age group. It was Dr Marjory Warren however, who first advocated the creation of a medical specialty dedicated to the care of the elderly in the 1940s (1). She cared for several hundred elderly patients at the West Middlesex Hospital in the United Kingdom (UK), and concentrated on a multi-disciplinary approach to the management, addressing their health, social and economic needs, as well as providing measures to prevent further disability (1). Her work attracted observers from elsewhere in the United Kingdom (UK) and abroad, and she lectured in Australia, Canada and the US (1). Geriatric medicine was recognized as a specialty in the UK in 1948, with the first consultant geriatricians being appointed within a few months of the introduction of the National Health Service (NHS) in 1949 (1). These first geriatricians were mainly entrusted to care for elderly patients who required long hospital stays and rehabilitative care. It was subsequently recognized that many of these patients would not have required such institutionalized care had they been more appropriately managed in the acute stage of their

condition (1). This resulted in a shift in the focus from only rehabilitative management to include the care of acutely ill patients. This led to the formation of two models of service: the 'aged defined model, which was based on separate medical services above and below a certain age cut-off; and the integrated' model, where geriatricians joined medical firms with other specialist interests while retaining separate rehabilitation facilities (1).

In the 1960's and 1970's, geriatric medicine grew as a specialty throughout Britain, with most medical schools acquiring academic departments in the 1970's (1). In 1988, the first examination for certification in geriatric medicine was conducted in Canada and the US (2). While geriatric medicine has grown from strength to strength world-wide, research in this field still needs attention.

In South Africa (SA), geriatric medicine was only recently established as a subspecialty. In 1955, the National Conference on Welfare for the Aged recognized a need for geriatric medicine and resolved that "medical schools be requested to establish the departments of gerontology and geriatrics for the investigating the handicaps of ageing and for the training of medical personnel in their treatment" (3). The executive of the National Council for the Care of the Aged then sent written statements to the various medical faculties in SA, detailing their views (3). The replies at this time were largely negative, listing the lack of staff able to teach a subspecialty such as geriatrics and that this part of medical training was adequately covered by medical schools (3). The National Council persisted in their endeavours, and numerous appeals were made to hospital directors and medical schools (3).

In 1975, the South African Geriatric Society (SAGS) was formed and in 1978, Tygerberg Hospital established facilities dedicated to the care of the elderly. The first chair, named the William Slater Chair of Geriatric Medicine, was advertised by the University of Cape Town (UCT) in 1980 and the first incumbent started duties in October 1981 (3). This was followed by the creation of the first Geriatric Unit in UCT. Following recommendations of a study by Tibbit *et al.*, a memorandum was drawn up requesting the allocation of specific acute beds in long stay wards dedicated to the care of geriatric patients (3). As it was not the intention, nor would it have been technically possible, for the Unit to provide services to all elderly persons it was incorporated into the Department of Medicine. This amalgamation allowed the Geriatric Unit to gain support and strength within the Department of Medicine due to the increased availability of resources (3).

During the subsequent years, several deficiencies in geriatric care were identified and addressed. A visit by the Geriatric Unit of UCT to the Settlers' Hospital in Grahamstown in 1984 led to the recognition that hospital based geriatric medicine needed to extend to community care of the elderly as well (4). It was also recognized that there was a dearth of readily accessible information regarding geriatric care facilities and services (5). A manual containing information regarding services available to the elderly was produced, resulting in assistance with residential placement for geriatric and psycho-geriatric assessments (5).

Despite the recognition of geriatric medicine as a subspecialty of internal medicine, the formalization of a training programme and sub-specialist certification examination by the Colleges of Medicine of South Africa, there has been little growth of the sub-specialty. In addition to the units at Tygerberg and Groote Schuur Hospital (GSH), Geriatric Units were subsequently established in the Departments of Medicine at the Universities of Free State and KwaZulu-Natal the latter in 2000 (6), which was done due to an endowment by the Aaron Beare Foundation (6). More importantly, Geriatric Medicine units have not yet been established in four of the eight medical schools in South Africa.

1.2. Ageing demographics in South Africa and the world

The definition of 'old age' has been accepted by most western countries as being ≥ 65 years of age (7) .However, the United Nations cutoff for 'old age' is ≥ 60 years (7). Over the past few years, the demographic pattern of the world has evolved from one typified by high birth and death rates to one of low birth and death rates. The result of this transition is a large growth in the aged population. Currently, one out of every ten individuals in the world is aged 60 years and over (8). This figure is projected to rise to one out of five individuals by the year 2050 (Fig. 1.1) (8).

According to the World Heath Report 1998, the global life expectancy (LE) has increased by 20 years to 66 years. Furthermore, it is projected to reach 73 years by 2025 (9). These changes are not consistent throughout the world however, with striking differences noted between developed and developing countries.

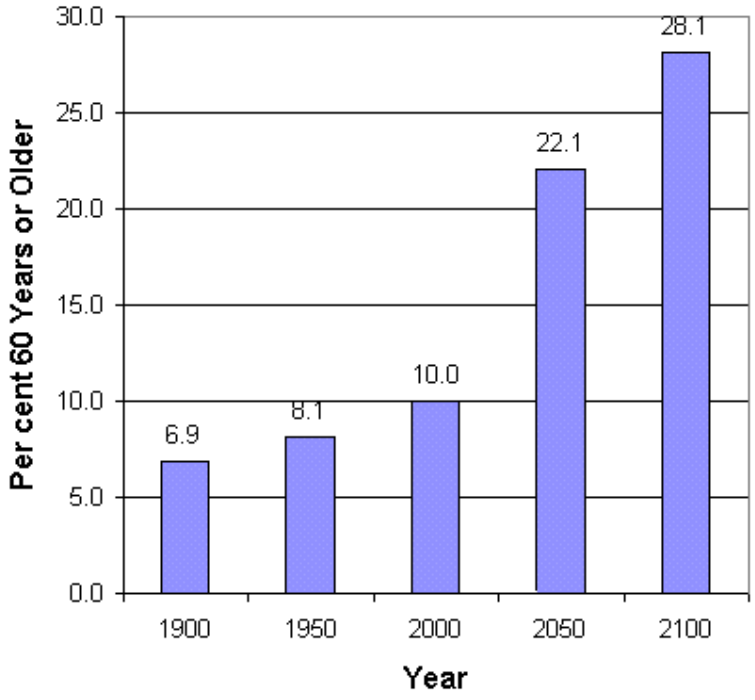


Figure 1.1: Three Centuries of World Population Ageing

Long-Range World Population Projections: Based on the 1998 Revision reproduced from (10).

In Europe, the proportion of elderly persons is 20% of the total population and this figure is expected to increase to 37% in 2050 (11). In contrast, Africa is the continent with the youngest population. Its proportion of older persons is currently 5% but is likely to double to 10% over the next 50 years (Fig. 1.2) (11). The same discrepancies are observed when comparing life expectancy (LE), with developed countries have a lower mortality rate and therefore a higher LE compared to developing countries (75 years versus 63 years in the years 1995 - 2000) (11).

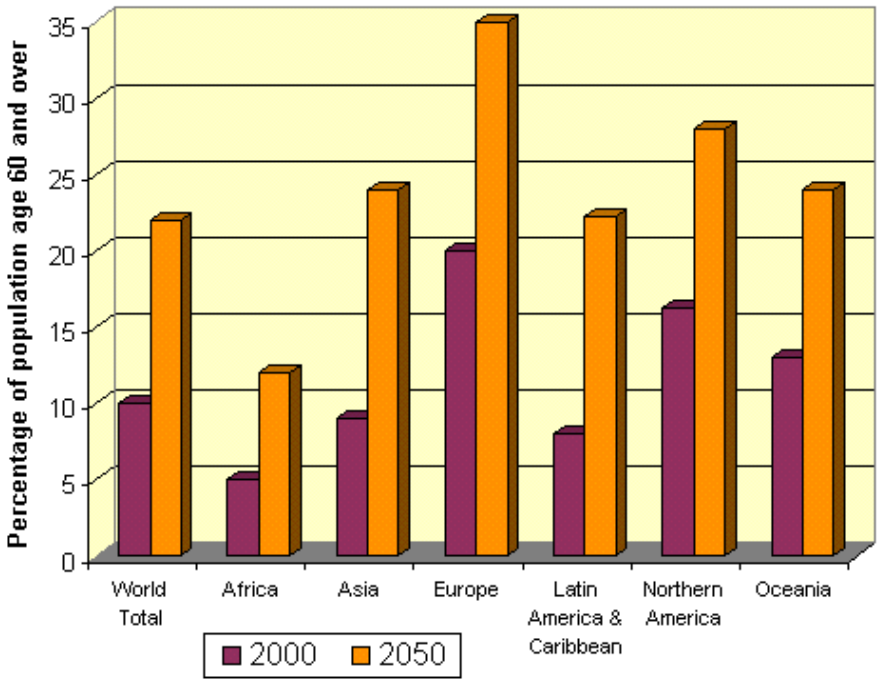


Figure 1.2: Percentage Increase in Age 60 and Over by Region, 2000-2050

World Population Prospects, the 1998 Revision, Volume II: Sex and Age reproduced from (10).

In SA, demographic changes in the elderly population are similar to other African developing nations but it has one of the continent's highest percentages of older inhabitants. In 2008, it was estimated that there were over 3.5 million people over the age of 60 years of age, comprising approximately 7.6% of the total population of the country (12). These estimates confirm that despite the demographic differences noted between the developed and developing countries, the SA population is ageing at a steady rate. The elderly also use a proportion of the health care bill that is in

excess of their numbers (13). This is an indication that more attention should be given to the subject of population ageing, and the social and health ramifications that accompany this phenomenon. Furthermore, research is required to assess the best way to provide appropriate health care resources to this age group (13).

The demographic trends of the aged population in SA are affected by the racial diversity of the country. The white SA population simulates the age structure of a developed country, typified by low fertility rates and a significant proportion of the population, approximately 25% being older than 50 years of age, and approximately 14% of the population being older than 60 years of age (Fig. 1.3) (14).

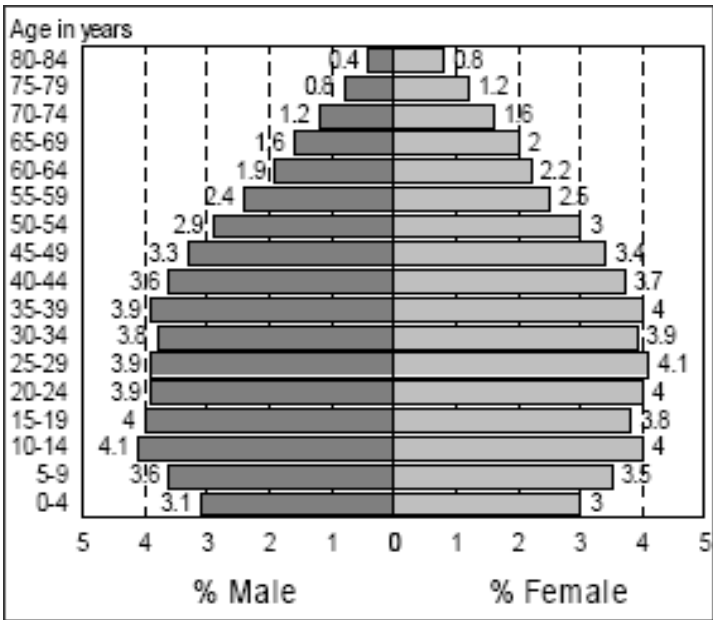
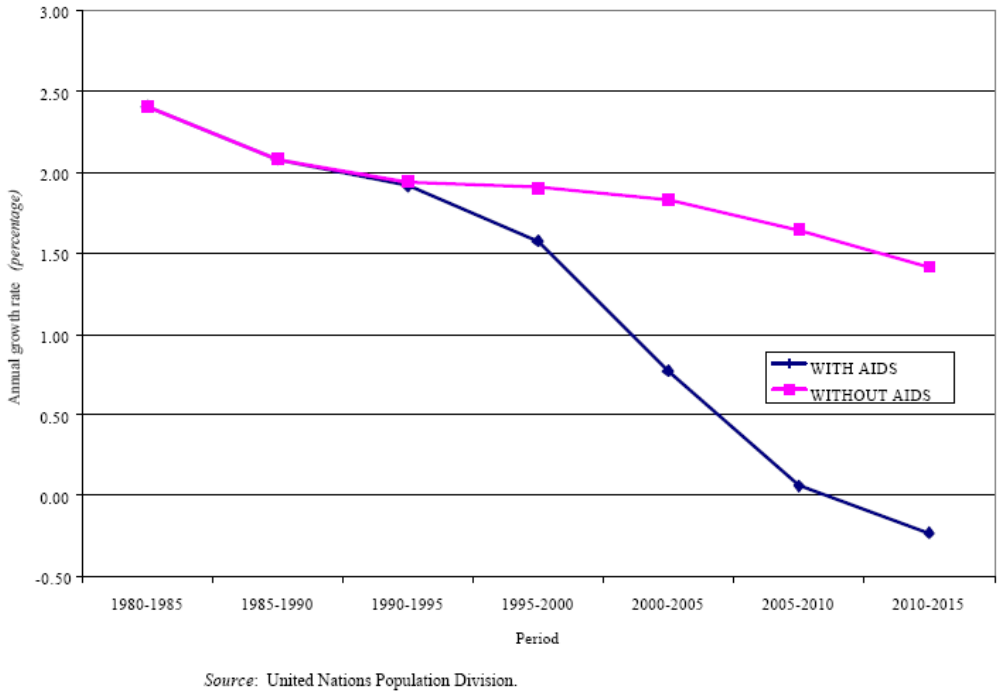


Figure 1.3: Age structure of South African White population

Statistics South Africa, the Population of South Africa: An overall and demographic description of the South African population based on the Census 1996 reproduced from (14).

The age structure of the black African population in SA has been affected by the epidemic of human immunodeficiency virus (HIV)/ acquired immunodeficiency syndrome (AIDS) (11). The LE among black South Africans is expected to decrease to 47.4 years by 2010, 18 years lower than it would have been without AIDS (11). Together with a lower fertility rate than other sub-Saharan countries affected by HIV, SA is the only highly affected country where the population growth is expected to decrease; from 1.9% in 1990 - 1995 to 0% by 2010, and to become negative by 2015 (Fig. 1.4) (11).



Source: United Nations Population Division.

Figure 1.4: Annual population growth rate, South Africa, 1980-1985 to 2010-2015 reproduced from (11).

In the pre-HIV era, the age structure of the black population resembled that of other developing countries, with a pyramidal shape (9). This typical pyramidal shape is now changing however, due to a lower fertility rate. Nevertheless, the current shape of the age structure of the SA black population continues to represents a predominantly large “young” population where most people are 20 years of age or younger (Fig. 1.5) (14).

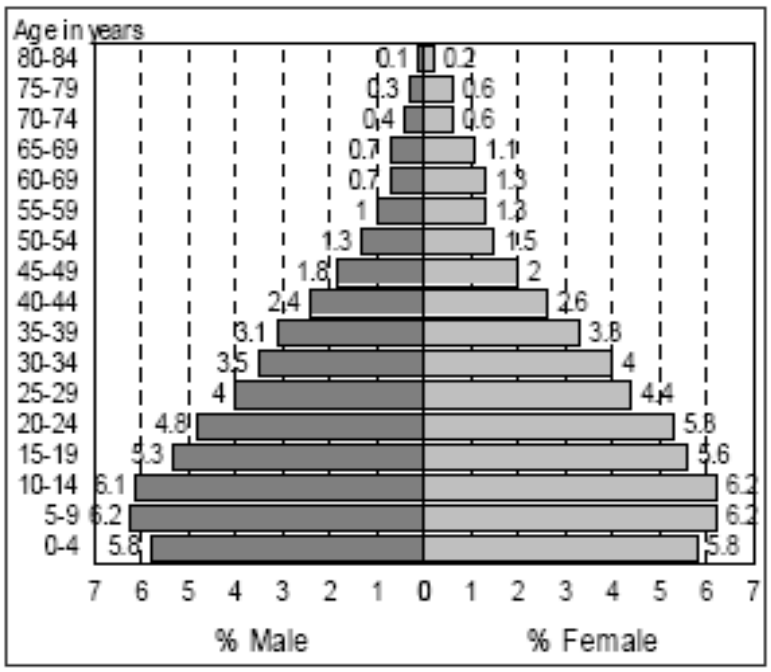


Figure 1.5: Age structure of South African black population based on the Census 1996 reproduced from (14).

The racial diversity is also evident in the estimates of LE and issues related to burden of disease. The LE at birth for a white female is approximately 77 years compared to 55 years in a black female. Similarly, the LE for a white male is 70 years and that for a black male, 52 years (15). Despite these disparities, as a whole, the total population growth rates in SA are decreasing (11). Future projections estimate that more people will live to older ages, resulting in the geriatric population growing at a faster rate (15).

1.3. The impact of ageing on health and disease

Advanced age is accompanied by physiological changes, which in turn influence changes in disease patterns and presentation. These physiological changes assist in understanding the pathophysiology of various common

diseases in the elderly, and are essential to understanding the disease profile of the elderly. Changes occur at the molecular, tissue and organ levels, and vary not only between individuals but also between the different organ systems in the body. For example, the significant changes in the cardiovascular and neurological systems have an impact on the disease profile, while the gastrointestinal system and endocrine system appears to be less affected by age.

With advancing age, there are changes in the body composition which include sarcopaenia, increased total body fat and reduced bone mineral content. Sarcopaenia is defined as the degenerative loss of skeletal muscle mass and strength, and may occur on the basis of physical inactivity, or as a result of ageing alone which leads to reduced aerobic and functional capacity (16). Ageing has also been associated with a reduction in fat-free mass which results in increased weight and body mass index (16). This shift of reduced muscle mass and increased fat mass increases the risk of developing chronic disorders such as hypercholesterolaemia, hypertension, atherosclerosis, insulin resistance and non-insulin dependent diabetes mellitus (16).

In addition, there is a reduction in the total percentage body water due to impaired volume regulation with a reduced thirst drive, a reduced anti-diuretic hormone (ADH) response to states of hypovolaemia, and impaired renal function (16).

Age-related structural and functional changes in the cardiac and respiratory systems impact directly on disease prevalence. In the cardiovascular system,

reduced elasticity of the aorta and the great vessels leads to reduced aortic compliance resulting in increased resistance to outflow from the left ventricle and increased ventricular overload (17). As the aorta stiffens with ageing, there is a greater drop of diastolic than systolic pressure, resulting in a raised pulse pressure (17). The reduction in myocytes in the ageing myocardium, together with the left ventricular overload, results in left ventricular hypertrophy (17). The reduced diastolic pressure in conjunction with the left ventricular hypertrophy contributes to subendocardial ischaemia and interstitial fibrosis (17). The cardiac conduction system also undergoes physiological changes with advancing age. These include a reduction in atrial pacemaker cells which contribute to a slower intrinsic heart rate and atrioventricular heart block, a reduction in reactivity to chemoreceptors and baroreceptors which result in a reduction in responsiveness to β adrenergic stimulation and increased circulating catecholamines. There is also fibrosis and calcification of the fibrous skeleton of the heart which results in aortic valve sclerosis and stenosis, as well as atrioventricular block (17).

In the respiratory system, maximal lung function is achieved at the age of 20 years in females and at the age of 25 years in males (18), after which there is progressive decrease in lung function (18.) However, the respiratory system remains capable of maintaining adequate gas exchange throughout a lifespan unless there is concomitant respiratory disease (18). In the normal ageing lung, there is dilatation of alveoli, resulting in air space enlargement, a decrease in surface area for gas exchange and a loss of supporting structures for peripheral airways (18). This is termed ‘senile emphysema’ and results in a

reduction of static elastic recoil of the lung with an increase in the residual volume and functional residual capacity (18). Mechanical impairment to respiration occurs due to reduced chest wall compliance secondary to calcification within the rib cage and its articulations, as well as a reduction in respiratory muscle strength (18). Ageing also results in a reduction of respiratory reserve due to a decreased response of the respiratory centres to hypercapnia and hypoxia (18). This becomes significant in episodes of acute disease where the reduced sensitivity of the respiratory centres results in a suboptimal ventilatory response in situations such as cardiac failure, airway obstruction or infection (18).

Immune dysregulation and reduced basal temperature has also been described in the elderly and is caused by a reduced responsiveness and number of T cells, reduced activity of T cell helper and cytotoxic cells. The antibody mediated humoral response is also impaired (19). The normal rectal and oral body temperature is on average 1^0 below a younger adult (19). This is thought to be due to reduced muscle activity resulting in decreased thermogenesis. There may also be an impaired meal related thermogenesis in older adults (19).

In the urinary tract of an ageing person, there is a lack a clear definition of what constitutes normality. Age related changes include reduced detrusor contractility, bladder capacity, and the ability to delay voiding (20). This is accompanied by an increased prevalence of detrusor overactivity, post voidal

residual volume and incidence of nocturia. The latter is thought to be due to an altered circadian sleep-awake urinary cycle (20).

The neurological system also undergoes physiological alterations with ageing, the most significant change being a reduction in the number of brain cells and total brain weight (21). The reduction in neurons results in a decrease in neurotransmitters and post synaptic receptors (21), and is accompanied by a decrease in the function of spinal cord pyramidal tracts (21). The end result is that the nerve conduction velocity is reduced and the reaction time of an older individual is also impaired (21). Other effects include a poor response rate to stimuli and a difficulty in maintaining balance resulting in an increased risk of falls (21).

Alterations that occur in the endocrine system with ageing include changes in the secretion, metabolism and activity of hormones, with an associated impairment of the circadian control of hormonal balance (22). With advancing age, there is a decrease in the secretion of thyroid and growth hormones (22). A decline in thyroid hormone levels results in a slow metabolic rate which causes a loss in sensitivity to temperature changes (22), which could explain the higher risk of heat stroke among the elderly (22). A decrease in growth hormone levels directly impacts on a reduction in muscle mass and increased fat storage (22).

There is wide variation in the gastrointestinal changes with ageing, including impaired smell and taste, alterations in gastric motility, gastric hormone

release and intestinal overgrowth (23) which contribute to the phenomenon of "physiological anorexia of ageing" (23). Faecal incontinence and constipation can occur due to alterations in intestinal functioning, and impaired colonic wall strength can result in the formation of diverticula in this age group (23).

These physiological changes impact on the burden of disease in the elderly and contribute to the increased prevalence of non–communicable disease (NCD).

1.4. Spectrum of disease in the elderly

The most prominent causes of morbidity and mortality among the geriatric population in SA are NCDs (as seen in Fig. 1.6 and 1.7). Common causes of loss of life due to NCD in males include ischaemic heart disease, stroke, chronic obstructive pulmonary disease, diabetes mellitus hepatic cirrhosis and asthma (14). Among females, ischaemic heart disease, hypertensive heart disease, diabetes mellitus, cervical cancer, asthma, nephritis and chronic obstructive airways disease (COAD) are common (14).

This is in sharp contrast to the burden of disease observed in infant and young adult population, where HIV and AIDS are the main causes for mortality (14). The burden of disease among the elderly is directly influenced by these health patterns.

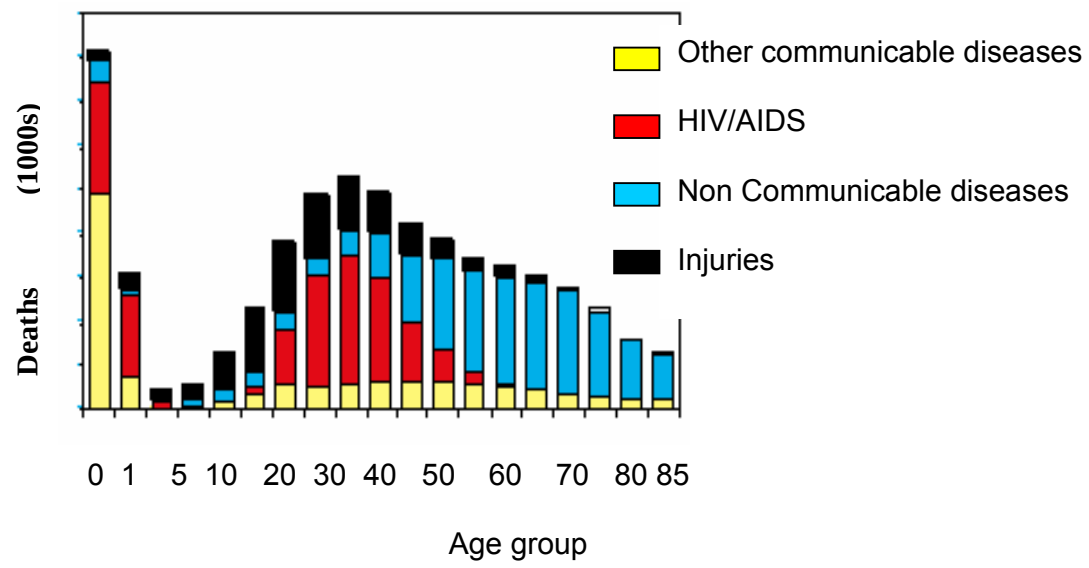


Figure 1.6: Age distribution of deaths by group of causes and male sex in 2000 reproduced from (24)

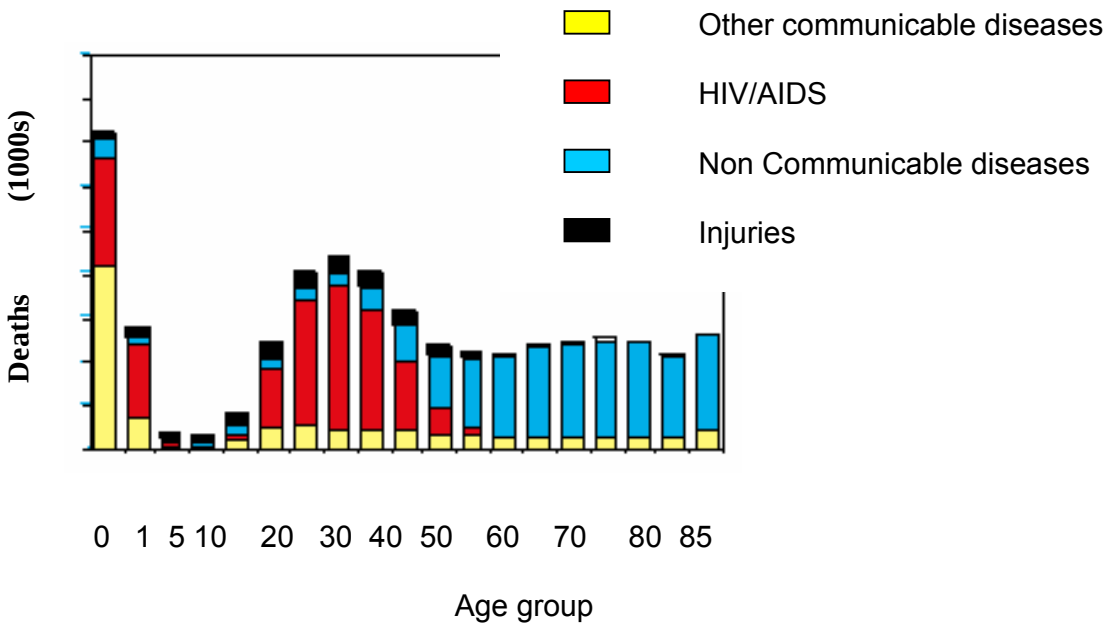


Figure 1.7: Age distribution of deaths by group of causes and female sex in 2000, reproduced from (24)

1.5 Atypical presentation of disease in the elderly

The elderly commonly present with atypical symptoms of disease which can confound establishing a correct diagnosis and instituting appropriate therapy. The common conditions that are frequently manifested in an atypical manner are sepsis, myocardial infarction and hyperthyroidism.

Elderly patients with sepsis present atypically, in that up to 52% may present with a change in mental status or functional status (19). Furthermore, approximately 13 % of patients with sepsis may be afebrile (19), while other modes of presentation include anorexia, and falls or alteration in the blood sugar (19). Due to the immune dysregulation, there may not be an appropriate immune response to the infection, resulting in a normal white blood cell count in the setting of overwhelming infection or sepsis. These atypical presentations have led to a high mortality rate of approximately 30-40% in elderly patients (19) which may be due to a delay in diagnosis and use of an appropriate antibiotic.

A myocardial infarction in an elderly patient may manifest atypically with confusion, syncope or even just palpitations, making the diagnostic process more difficult and the patient being less likely to receive appropriate therapy such as thrombolysis where indicated (19).

Unlike younger patients with hyperthyroidism who present with a fine tremor, increased perspiration, opthalmopathy and bowel frequency, the older patient may present less typically with anorexia, weight loss, proximal muscle wasting

and congestive cardiac failure (19). These unusual presentations can frequently lead to misdiagnosis of potentially life-threatening conditions. A high index of suspicion is thus required.

1.6. Common diseases in the elderly

The physiological changes mentioned above contribute to an increased prevalence of certain conditions in the elderly which are considered the "giants of geriatric medicine". They include: cognitive disorders, incontinence, impaired balance and falls, immobility, impaired vision and impaired hearing (25).

Cognitive impairment can manifest as either delirium or dementia (26), and while delirium presents acutely with impaired attention and fluctuating level of consciousness, dementia is a progressive disorder of cognition that has a gradual onset. The most prominent feature of dementia is impaired memory (26) although these patients can have a normal level of consciousness (except in severe dementia). There is no epidemiological data regarding the prevalence of dementia in SA while in the US, the prevalence is 5-8% of individuals greater than 65 years of age. This number doubles with every 5 year increase after the age of 65 years (26).

Immobility can include difficulty with walking up hills or ramps, crossing roads with traffic, walking along uneven pavement, or negotiating even steps. More severe restrictions can result in the older individual requiring assistance with daily activities, as they may be housebound or even bed bound (27). The risk

of immobility increases progressively with ageing, with factors that can lead to immobility including chronic co-morbid conditions (e.g. cardiac, respiratory or neurological disorders), sensory deprivation, previous history of falls, or mental barriers (e.g. loss of adaptability, introversion or fear of socializing) (27).

Urinary incontinence (UI) is also a common cause of disability in the elderly and it is frequently misconceived that this is a normal consequence of ageing. It is more common in the elderly due to physiological changes in the anatomical system of the urinary system with ageing (20). However, there are several other potentially reversible causes of UI that should be excluded. These include urinary tract infection, drugs such as diuretics, poorly controlled diabetes mellitus, and constipation causing bladder outlet obstruction and reduced bladder capacity, and excessive fluid intake (20).

Impaired balance leading to falls is common and is determined by the adequate functioning of the ocular, vestibular and proprioceptive receptors (28) which are frequently impaired in the elderly. Reduced visual acuity together with a poorly lit environment, can lead to problems with balance (28). Vestibular mechanisms can also be impaired in the elderly (29). The proprioceptive receptors are located in the cervical inter-facetal joints therefore; conditions such as cervical spondylosis (found commonly in the elderly) can result in impaired functioning of these receptors (29).

Approximately one third of elderly persons and 60% of nursing home residents experience at least 1 fall per year and this figure increases progressively with age (30). Major injuries can occur in 5 – 15% of fall cases,

after which most individuals lose confidence (30). Causes of falls include impaired balance, environmental factors, concomitant illnesses, drug use (especially sedatives, hypnotics or alcohol), impaired vision, and impaired hearing (30).

1.7. Elder abuse

The definition of elder abuse in SA is varied and while Action on Elder Abuse South Africa (AEASA) describes it in more general terms as victimization and any act that causes harm and suffering to an older individual, the Older Persons Act categorizes abuse as physical, psychological, economic and sexual abuse (31). The National Strategy on Elder abuse (run by the Department of Health) has a more restrictive definition; focusing on harm inflicted upon an elderly person (31). It is thought that this variation in definitions could hamper research into this prevalent problem (31). The most common forms of abuse experienced by the SA geriatric population include disrespect, exploitation, marginalization and violence (31). Although not addressed in this study, it remains an issue that requires more attention with regards to research and public awareness (31).

1.8 Changes in the South African public health care system

During the apartheid era, health care access in SA was poor among the disadvantaged communities and practically non-existent in some rural areas.

The country has since undergone political transformation and although health policies and access to health care have been dramatically improved, the current policies place more emphasis on child and maternal care. The elderly still experience difficulty in accessing these services due to lack of transport, the presence of co-morbid disabilities which make them more dependent on family members, as well as other social issues. A dedicated health policy to promote geriatric health care is yet to be created.

To create such a health policy will not only require accurate knowledge regarding the burden of disease and causes for mortality among the geriatric population, but also insight into the common pathologies resulting in hospital admissions. Furthermore, with the advent of HIV and the subsequent increase of mortality in the younger age groups, the elderly are playing an increasingly more important role in the social and functional dynamics of the population. There is a trend of the elderly being responsible for caring for their orphaned grandchildren, making them an important part of society (32). It is therefore essential, that more insight be obtained regarding the medical care needed by this age group, specifically regarding geriatric admissions to hospital.

1.9 Disease prevalence and patterns among the elderly in South Africa and world-wide

Studies in various countries have described the hospital admissions of geriatric patients. Condelius *et al*. undertook a study in southern Sweden which included 4907 elderly patients (65 years and older) who were admitted over a 1 year period in 2001 (33). The study investigated acute and planned

admissions and the relationship to multiple co-morbidities, demographic profile, outpatient care and municipal care (33). Patients with three or more hospital admissions had a higher median number of contacts with a physician and other medical staff on an outpatient basis (33). These patients with more frequent admissions also were diagnosed with more conditions than those patients who were admitted once or twice previously (33). Diseases in the cardiovascular system were the most prevalent diagnoses among the study group (33). Furthermore, patients with multiple co-morbidities and more frequent admissions were also identified to have a higher mortality rate (33).

In Hong Kong, a retrospective survey conducted by C.F. Ko *et al*. studied the unplanned readmission of geriatric patients (34). The main diagnosis for the index admission was found to be respiratory disease (24 patients or 39.3%) (34). The study established that 19% of all readmissions were potentially avoidable (34). The main reason for readmission was a new clinical problem, but other reasons included medication problems, inadequate medical management and a natural clinical course of an existing disease (34).

Studies have also been conducted in SA focusing on the admission of geriatric patients to hospital. Tibbit studied the admission and discharge patterns of patients to GSH in 1978 (35). They found that geriatric patients (defined as being 65 years of age and over) who occupied acute beds were discharged before optimal health was achieved and that there was a necessity for bridging accommodation and services (35). They examined the diagnosis of the admitted patients and found that cardiac disease was the

main cause of disability in their study population (35). However, this study was undertaken in mixed race and white South African populations only. A prospective analysis performed over a one year duration by Morris in 1987 dealt with the discharge diagnoses of patients focusing on the important differences in disease incidence between black and white adult geriatric populations treated at the Department of Medicine at Frere Hospital (36). Among black geriatric patients, an increased incidence of tuberculosis, pulmonary circulatory disorders and cardiomyopathy was reported, whereas, ischaemic heart disease, cerebrovascular disorders and chronic obstructive airways disease were more prevalent among white geriatric patients (36).

A more recent study was conducted at the Universitas Hospital in Bloemfontein by Van Staden *et al*. from 1999 to 2003 (37). This retrospective study described 791 elderly patients aged 65 years or older who were admitted to the Internal Medicine Geriatric Unit over a four year period (37). The more common causes for admission were listed as hypertension, heart failure, ischaemic heart disease and anaemia (37) and patients were admitted for an average of 11 days (37). The authors concluded that successful geriatric care required service support from psychiatry, internal medicine, urology and orthopaedic medicine, and the social and welfare system needed to be redesigned to meet the increasing needs of the elderly (37).

There is however, a scarcity of recent information in KwaZulu-Natal describing the common disease processes that necessitate admission of the elderly to hospital. With the prevalence of HIV, the spectrum of medicine has been drastically altered, where even elderly patients present with complications of the disease. SA has also become a democratic nation, and health care, offered to all races in the public sector, has become standardized. Furthermore, studies detailing the epidemiology of the elderly admitted to a hospital in terms of gender, age and race in relation to the diagnosis are lacking in SA. This study was therefore undertaken to obtain knowledge about geriatric in-hospital care and to enable hospitals to be better equipped it to meet the needs of this section of the population.

The aim of this study was to establish the profile of geriatric admissions admitted to King Edward VIII Hospital, Durban, in 2005.

The objectives were to:

- Determine the distribution of geriatric patients admitted to King Edward VIII Hospital medical wards according to age, gender and race.
- Evaluate the distribution of disease in these patients according to gender and race.
- Assess the common admission disease processes resulting in admission.
- Assess the length of hospitalization according to age, gender and diagnosis.
- Determine the outcome of these patients according to age, sex and diagnosis – either referral to recuperation facility, discharge, or death.

CHAPTER 2 METHODS

2.1. Study design and study group

This is a retrospective study of all patients aged 60 years and over admitted to the medical wards and/or geriatric unit at King Edward VIII Hospital (KEH) between 1 February 2005 and 31 October 2005. King Edward VIII Hospital is a regional hospital, located in Durban, SA, which provides secondary and tertiary levels of care. Data was obtained from the in-patient files and/or discharge summaries of these patients.

2.2. Ethical consent and information collected

As this was a chart review, a waiver for patient consent was obtained from the Biomedical Research Ethics Committee of the University of KwaZulu-Natal. All data extraction sheets were de-identified to maintain the anonymity of the study group and the data obtained in relation to their admission.

2.3 Data collection

The admission records of the acute medical admission ward were used to identify all patients aged 60 years and over admitted to the medical wards of King Edward VIII Hospital between 1 February 2005 and 31 October 2005. Using the inpatient admission numbers, the inpatient case records of the identified study participants were reviewed in detail by the principal investigator and relevant information was collected with the aid of a data extraction sheet (Appendix A).

2.4 Demographic data

The age of the patients was recorded from the identifying data entered onto the admission case sheet. Where available the date of birth was used to verify the age. The subjects were further divided into age bands to determine the distribution of subjects within the various bands. Similarly the gender of the subjects was extracted and the ratio of women to men was calculated. Data on the ethnicity was obtained from the hospital identifying data and the distribution was noted. In addition, a history of smoking and alcohol intake where recorded was extracted

2.5 Number of admissions

The records of the 218 admissions were reviewed and the name, age and other identifying data such as date of birth and previous inpatient and outpatient numbers used to determine whether there were repeat admissions. The number of admissions per subject was recorded. Where repeat admissions were identified, this was taken into account when describing the demographic data so as not to double enter data.

2.6 Admission diagnosis/es

Each chart was carefully reviewed to extract the clinical on the acute conditions necessitating the admission under review, namely the admission diagnosis. These were obtained from the clerking notes on admission and verified by the subsequent assessment by the consultant and the relevant investigations. All conditions that were acute or unstable at the time of admission were considered to be the admission diagnosis; therefore it was

possible for a patient to have more than one diagnosis. Where recorded and appropriate the risk factor or precipitating cause for the admission diagnoses was noted as was the, management and complications of these conditions, length of hospitalization and outcome of admission. The data extraction sheets were cross referenced with the clinical progress, prescription sheets, laboratory and radiological investigations.

2.6.1 Admission diagnosis by system involvement

The admission diagnoses were classified into the system involved and the frequency of involvement of the different systems was calculated.

2.6.2 Admission diagnosis by gender distribution

In addition, the frequency of admission diagnoses was compared in men and women to determine whether there was any difference and the possible reason for this where possible.

2.6.3 Admission diagnosis and age

The prevalence of the admission diagnoses was compared across the different age groups, namely between patients aged 60 to 64 years and those aged 65 years and above to determine whether there was any differences in presentation with advancing age.

2.7 Overall disease burden

In addition to the admission diagnosis, each chart was carefully reviewed to determine the presence of co-morbid diseases, namely those conditions that

co-existed with the admission condition/s, but which were stable at the time of admission, to determine the overall disease burden. These were generally chronic diseases obtained from the past medical history. These conditions were also verified from the clinical evaluation of the patient, results of investigations and medications prescribed. The clinical notes, investigations and medications were systematically reviewed to detect the presence of disease, the frequency of the known complications associated with the condition and the possible predisposing cause.

2.7.1 Cardiovascular system

To ascertain involvement of the cardiovascular system, the notes were reviewed for the presence of hypertension and other cardiac diseases. Where hypertension had been recorded, the notes and results of investigations were further reviewed for evidence of target organ damage such as hypertensive heart disease, renal disease, retinopathy, and cerebrovascular disease. Similarly, when cardiac failure was recorded, the charts and special investigations were reviewed to determine whether a cause for cardiac failure had been found and whether a specific diagnosis such as cardiomyopathy, pulmonary hypertension, ischaemic heart disease, valvular disease or cor pulmonale had been made. In addition, attempt was made to identify a risk factor for the specific diagnosis and a precipitating cause for the cardiac failure.

2.7.2 Respiratory system

Clinical, radiological and medication data were reviewed to determine the prevalence of pre-existing respiratory disease. Conventional nomenclature for diagnoses was used.

2.7.3 Neurological involvement

The neurological findings and diagnosis recorded by the admitting doctor in the past medical history was verified with the clinical findings of the consultant physician and special investigations were available.

2.7.4. Malignancy

Malignancy involving various systems was reviewed according to clinical, biochemical and radiological data.

2.7.5. Anticoagulation

Data regarding indications for anticoagulation and side effects of anticoagulant therapy was recorded.

2.8. Admission duration

The duration of each admission was documented according to the clinical notes.

2.9. Admission outcome

The outcome of each admission was documented according to whether the patient died, was transferred to another health care facility or discharged home.

2.10. Data management and statistics

Data was entered in to a Microsoft Excel spreadsheet and imported into the SPSS version 15.0 statistics program. Descriptive statistics were applied and data are presented as mean ± standard deviation and in table and bar graphs. To determine the statistical significance of associations the Pearson Chi-square and Fisher's exact test were used. The Pearson's chi square test was used when less than 20% of the variables studied had expected counts less than five, with no variables having a zero value. If the expected count was less than five in more than 20% of the variables studied, or if there were any variables with a value of zero then Fisher's exact test was used. Levels of significance were determined using a 95% confidence interval; a p value < 0.05 was taken to be statistically significant.

Missing data was excluded from analysis. Valid percentage was used instead of overall percentage in cases of missing data.

CHAPTER 3 RESULTS

3.1. Demographic data

There were 218 admissions for patients aged 60 years and over in the study period. On review of the charts, it was established that these admissions were for 191 patients with some patients having multiple admissions.

The mean age of the patients was 70.5 ± 7.4 years (range 60 – 90 years) with the majority being in the 65 to 74 years age group. There were 117 women and 74 men, and 83.8% were Black African, 15 (7.9%) Indian and 16 (8.4%) White (Table 3.1). A history of current smoking was recorded in 38% of males and 7.2% females.

Table 3.1 Demographic profile of patients aged 60 years and over admitted to the medical wards at KEH between 1 February 2005 and 31 October 2005

Age	**No of patients (%)**
Mean age ± SD	70.5 ± 7.4 years
60-64 years	42 (22%)
65-74 years	93 (48.7%)
75-84 years	45 (23.6%)
≥85 years	11 (5.8%)
Ethnic groups	
Black African	160 (83.8%)
Indian	15 (7.9%)
White	16 (8.4%)
Gender	
Male	74 (38.7%)
Female	117 (61.3%)

3.2. Number of admissions

Of the 191 patients, 170 had had one admission during the study period, 16 patients had two admissions, four had three admissions and one patient had four admissions (Table 3.2).

Table 3.2 Number of admissions in the 191 patients aged 60 years and over admitted to the medical wards at KEH between 1 February 2005 and 31 October 2005

Number of admissions	Number of patients (%)
1	170 (89)
2	16 (8.4)
3	4 (2.1)
4	1 (0.5)

3.3. Admission diagnoses classified by the system involved

The acute medical conditions necessitating admission was initially classified according to the system involved and thereafter by specific disease. Respiratory disease was the commonest reason for admission (42.7%), followed by cardiovascular disease (42.2%), renal disease (40.4%), gastrointestinal disease, neurological disease and endocrine disease in descending order of frequency (Fig. 3.1).

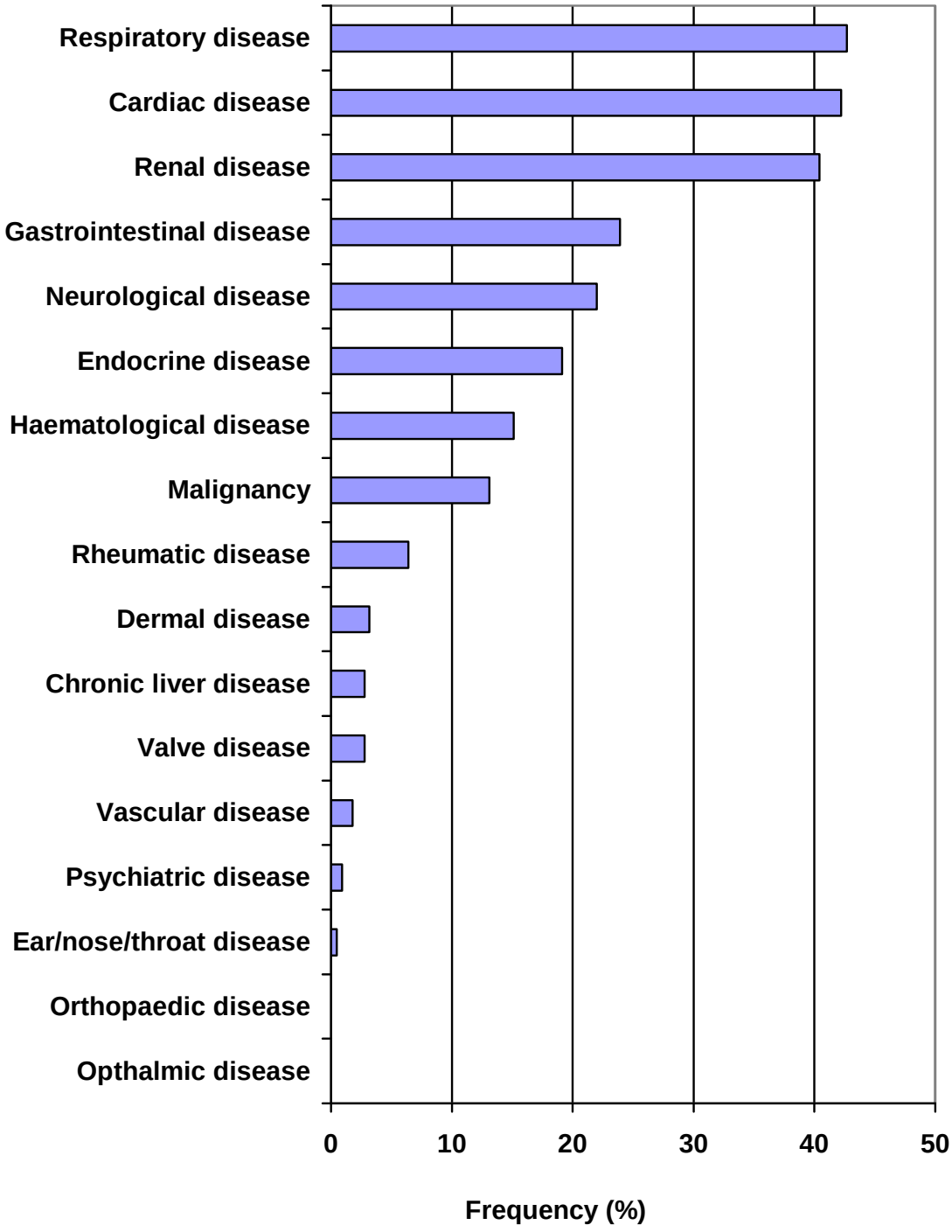


Figure 3.1: Frequency of admission diagnoses in patients aged 60 years and over admitted to the medical wards at KEH between 1 February 2005 and 31 October 2005,

3.4. Admissions due to infections

A diagnosis of infection was made at the time of admission in 116 cases (60.7%). This was largely a presumptive clinical diagnosis and the rate of bacteriological confirmation of infection was low. Pneumonia was the commonest infection noted in 71 patients (62.1%), followed by urinary tract infection in 32 patients (27.6%) and septicaemia in 11 patients (9.5%). Less common sites of infection were the skin and subcutaneous tissues, meningitis, gastrointestinal tract, peritoneum and joints (Fig. 3.2 and Table 3.3). Of the 71 cases of pneumonia admitted, a causative organism was isolated in three patients only; *Streptococcus pneumoniae* in two and *Escherichia Coli* in one.

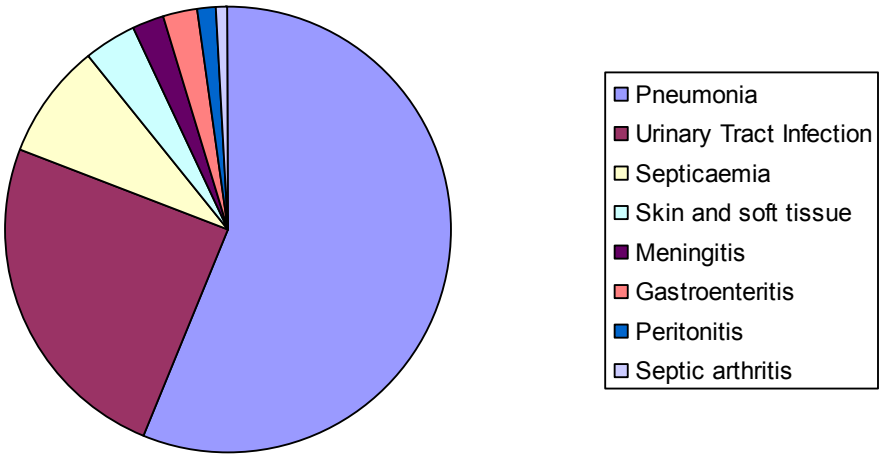


Figure 3.2: Spectrum of infection in 116 patients, aged 60 years and over, admitted to the medical wards in KEH between 1 February 2005 and 31 October 2005

Table 3.3: Spectrum of infection in 116 patients, aged 60 years and over, admitted to the medical wards in KEH between 1 February 2005 and 31 October 2005

Type of infection	Number n =116 (%)
Pneumonia	71 (61.2)
Urinary tract infection	32 (27.6)
Septicaemia	11 (9.5)
Infection of skin and subcutaneous tissues	5 (4.3)
Meningitis	3 (2.6)
Gastrointestinal infection	3 (2.6)
Peritonitis	2 (1.7)
Septic arthritis	1 (0.9)

3.5. Admission diagnosis by gender distribution

The frequency of admission diagnoses categorized by the system involved and the specific illness was compared in men and women (Figure 3.3 and Table 3.4). Men were more likely to be admitted with respiratory disease than women (57% vs. 34.5%, p = 0.001), specifically chronic obstructive airways disease (COAD) (22.8% vs. 2.2%; p<0.0001). Although pneumonia was more common in men than in women, this did not reach statistical significance (40.5% vs. 28.8%, p = 0.053). Women were more often admitted for congestive cardiac failure (30.2% vs. 15.2%, p = 0.013), arrhythmias (16.5%

vs. 6.3%, p = 0.03) and endocrine disease (23.7% vs. 12.7%, p = 0.048). Renal disease was more common in women than in men, but did not reach statistical significance (44.6% vs. 32.9%, p = 0.060).

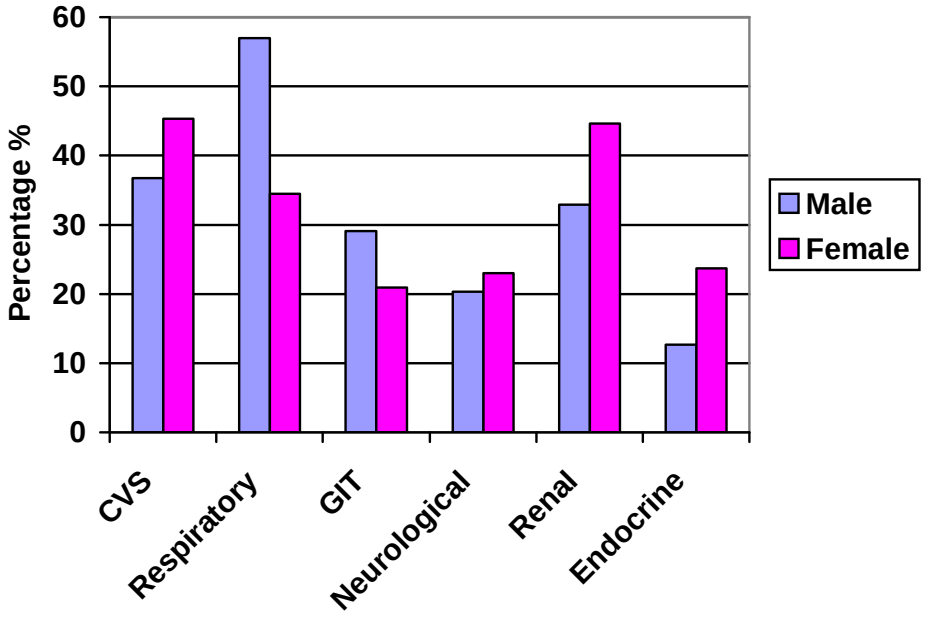


Figure 3.3 Frequency of admission diagnosis according to the system involved in men and women aged 60 years and over admitted to the medical wards at KEH between 1 February 2005 and 31 October 2005

Abbreviations: CVS: cardiovascular, GIT: gastrointestinal tract.

Table 3.4: Frequency of admission diagnosis classified by system involved and specific illness in women and men aged 60 years and over admitted to the medical wards at KEH between 1 February 2005 and 31 October 2005

	Women (%)	Men (%)	p value
Cardiovascular disease	45.3	36.7	0.137
Hypertension	11.5	10.1	0.471
Congestive cardiac failure	30.2	15.2	0.013
Cor pulmonale	0	3.8	0.046*
Ischaemic heart disease	7	0	0.638
Valvular heart disease	3.6	1.3	0.421
Cardiomyopathy	12.2	8.9	0.299
Arrhythmia	16.5	6.3	0.030
Pacemaker	2.2	1.3	0.541
Pulmonary hypertension	2.2	3.8	0.377
Deep vein thrombosis	1.4	0	0.405
Respiratory disease	34.5	57	0.001
Pneumonia	28.8	40.5	0.053
Pulmonary tuberculosis	3.6	6.3	0.272
Pulmonary embolus	0.7	1.3	0.595
Chronic obstructive airways disease	2.2	22.8	<0.001
Asthma	2.9	0	0.163
Bronchiectasis	1.4	2.5	0.459
Pleural effusion	1.4	7.6	0.028*
Empyaema	0.7	1.3	0.595
Gastrointestinal disease	20.9	29.1	0.114
Peptic ulcer disease	4.3	1.3	0.209
Gastritis	2.9	2.5	0.623
Oesophagitis	0.7	0	0.638
Diverticulitis	0.7	0	0.638

Gastrointestinal malignancy	0	2.5	0.130
Dysentery	2.2	0	0.257
Gastroenteritis	5	6.3	0.453
Chronic liver disease	1.4	5.1	0.128
Hepatic failure	2.2	6.3	0.117
Acute hepatitis	0	2.5	0.130
Chronic hepatitis	0	1.3	0.362
Neurological disease	23	20.3	0.384
Cerebrovascular accident	17.3	11.4	0.167
Alzheimer's disease	0.7	1.3	0.595
Other dementia	0	1.3	0.362
Parkinson's disease	0.7	0	0.638
Meningitis	1.4	0	0.405
Epilepsy	4.3	2.5	0.396
Spinal disease	1.4	0	0.405
Renal disease	44.6	32.9	0.060
Chronic renal failure	23	13.9	0.072
Acute renal failure	10.1	16.5	0.123
Urinary tract infection	17.3	10.1	0.107
Other renal disease	3.6	1.3	0.293
Endocrine disease	23.7	12.7	0.048
Diabetes mellitus	10.1	5.1	0.150
Hyperosmolar non-ketotic coma	7.9	0	0.006*
Ketoacidosis	2.9	0	0.163
Hypoglycemia	6.5	2.5	0.170
Hyperlipidaemia	2.9	1.3	0.403
Hypothyroidism	0.7	1.3	0.593
Subclinical hypothyroidism	0.7	0	0.638
Subclinical hyperthyroidism	0	1.3	0.362

Rheumatological disease	7.9	3.8	0.185
Rheumatoid arthritis	2.9	0	0.163
Osteoarthritis	3.6	1.3	0.293
Septic arthritis	0.7	0	0.638
Gout	2.2	1.3	0.541

* 20% or more of the variables have an expected count of less than five, therefore the p value is not significant

3.6. Admission diagnosis and age

The admission diagnosis was compared in 2 age groups; those between 60 and 64 years and those aged 65 years and over.

Renal disease was more common in the younger age group i.e. 60 – 64 years, with a frequency of 53.1% compared to 36.7% in those aged 65 years and over (p = 0.04). In particular, chronic renal failure was significantly more common in the 60 – 64 year age group compared to the older group, 32.7% vs. 16% (p = 0.01). There was no difference in the other admission diagnoses (Table 3.5).

Table 3.5: Association between age and admission diagnosis

Admission diagnosis	**Age group**		**p value**
	60-64 (years)	**>= 65 (years)**	
Cardiac disease	20	72	0.824
Hypertension	4	20	0.470
Cardiomyopathy	4	20	0.470
Arrhythmia	5	23	0.530
Pulmonary hypertension	1	5	1.000
Ischaemic heart disease	1	0	0.225
Valvular disease	0	6	0.341

Cor pulmonale	1	2	0.650
Respiratory disease	21	72	0.975
COAD	2	19	0.174
Pulmonary Tuberculosis	3	7	0.398
Pulmonary embolus	0	2	1.000
Carcinoma of the lung	1	3	1.000
Asthma	0	4	0.577
Bronchiectasis	2	2	0.219
Pleural effusion	2	6	1.000
Gastrointestinal and liver disease	12	40	0.905
Peptic ulcer disease	1	6	1.000
Chronic liver disease	2	4	0.619
Gastrointestinal malignancy	0	2	1.000
Diverticulitis	0	1	1.000
Hepatic failure	2	6	1.000
Chronic hepatitis	1	0	0.225
Neurological disease	9	39	0.484
Cerebrovascular accident	7	26	0.850
Epilepsy	3	5	0.383
Spinal disease	1	1	0.400
Other dementia	0	1	1.000
Alzheimer’s disease	0	2	1.000
Parkinson’s disease	0	1	1.000
Renal disease	26	62	0.040
Chronic renal failure	16	27	0.010
Acute renal failure	6	21	0.973
Endocrine disease	12	31	0.341
Diabetes mellitus	3	15	0.769
DKA	2	2	0.219
HONK	3	8	0.714
Hypoglycaemia	3	8	0.714
Hyperlipidaemia	1	4	1.000

Hypothyroidism	0	2	1.000
Subclinical hypothyroidism	0	1	1.000
Subclinical hyperthyroidism	0	1	1.000
Rheumatological disease	1	13	0.200
Osteoarthritis	0	6	0.341
Gout	1	3	1.000
Rheumatoid arthritis	0	4	0.577
Infection			
Pneumonia	16	55	0.950
Meningitis	0	2	1.000
Urinary tract infection	5	27	0.315
Disseminated tuberculosis	1	4	1.000
Pulmonary Tuberculosis	3	7	0.697
Septic arthritis	0	1	1.000
Dysentery	0	3	1.000
Gastroenteritis	3	9	0.734
Acute hepatitis	0	2	1.000

3.7. Overall disease burden

Each chart was reviewed to determine the overall prevalence of diseases including the admission diagnosis and other co-existing chronic diseases. The majority of patients (96.9%) had more than one diagnosis, with a single diagnosis being present in only 6 (3.1%). Four diagnoses or more were present in 58.1% of the patients with 50 patients (26.2%) having four diagnoses in total and 38 patients (19.9%) having five diagnoses in total (Fig. 3.4).

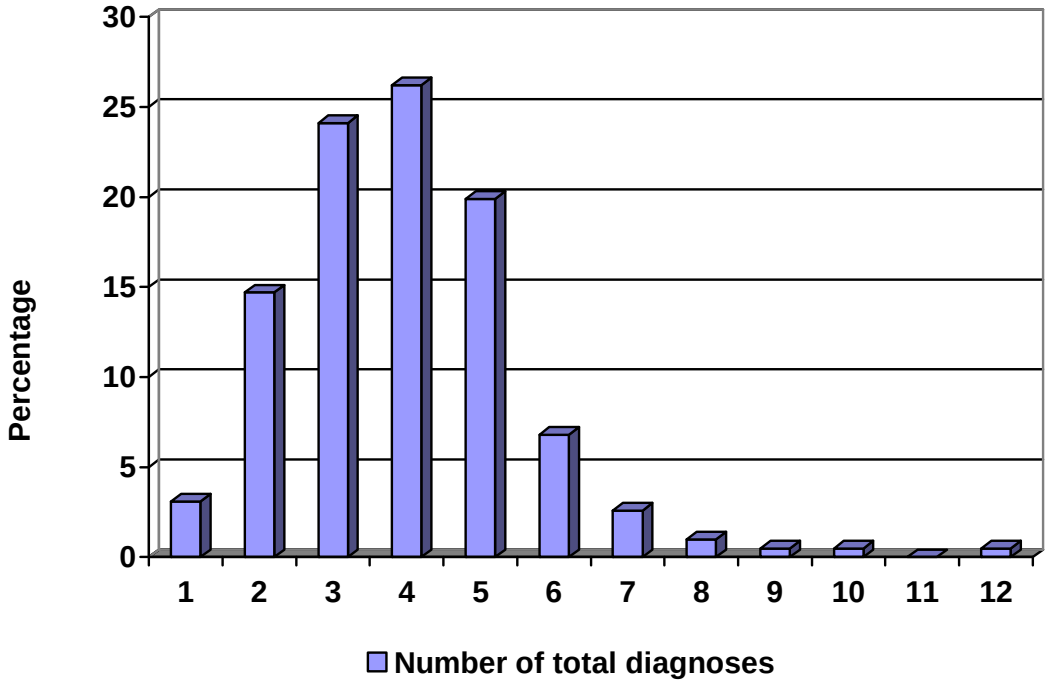


Figure 3.4 Percentage of patients with multiple diagnoses

3.7.1. Disease burden categorized by the systems involved

The overall disease burden was initially analyzed according to the system involved (Fig. 3.5 and Table 3.6). The cardiovascular system was the most affected system followed by the respiratory and renal systems. Thereafter for each of the systems, the frequency of the specific condition or diagnosis was analyzed (Table 3.7).

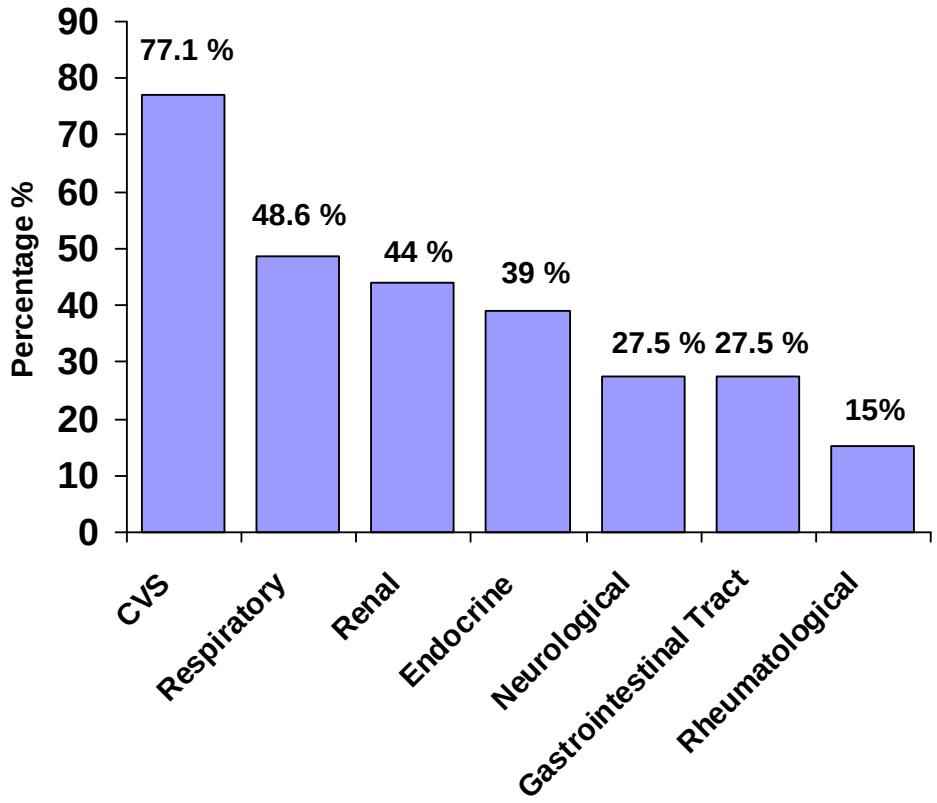


Figure 3.5: Overall disease prevalence in patients aged 60 years an over admitted to the medical wards of KEH between 1February 2005 and 31 October 2005

Abbreviations: CVS: cardiovascular, GIT: gastrointestinal tract;

Table 3.6: Overall prevalence of disease according to system involvement in patients aged 60 years and over admitted to the medical wards at KEH between 1 February 2005 and 31 October 2005.

System	Number (%)
Cardiac disease	168 (77.1)
Respiratory disease	106 (48.6)
Renal disease	96 (44.0)
Endocrine disease	86 (39.5)
Neurological disease	60 (27.5)
Gastrointestinal disease	60 (27.5)
Rheumatological disease	33 (15.1)

3.7.2 Cardiovascular disease

Hypertension and cardiomyopathy were the most common cardiac diseases, being present in 89.3% (150 cases) and 35.7% (60 cases) of all cases admitted with cardiac disease respectively (Table 3.7).

3.7.2.1 Hypertension

In the 150 patients with hypertension, target organ damage was present in 128 (85.3%) cases, with hypertensive heart disease in 97 cases (75.8% of hypertensive cases), renal disease in 61 cases (47.7%), cerebrovascular disease in 37 cases (28.91%), hypertensive retinopathy in 11 cases (8.6%) and peripheral vascular disease in 5 cases (3.91%).

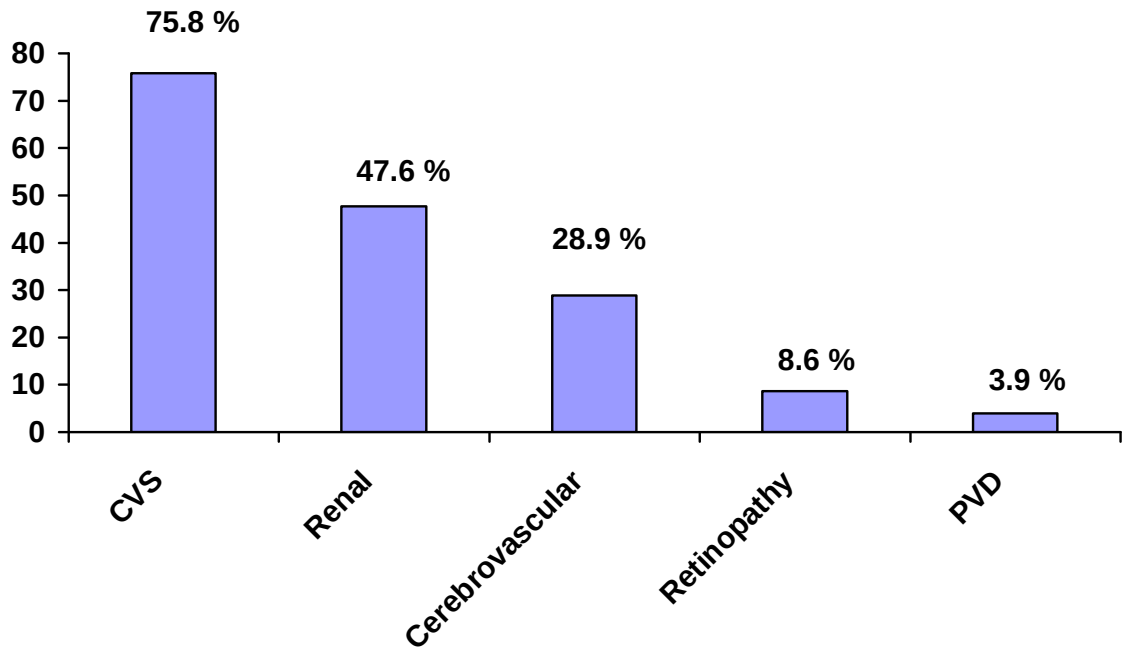


Figure 3.6 Spectrum of hypertensive complications in patients aged 60 years and over admitted to the medical wards at KEH between 1 February 2005 and 31 October 2005.

Abbreviations: CVS: cardiovascular, PVD: peripheral vascular disease

3.7.2.2 Congestive cardiomyopathy

The diagnosis of congestive cardiomyopathy or dilated cardiomyopathy (DCM) was recorded in 60 patients (27.5 %). The likely risk or predisposing factor for the cardiomyopathy was hypertension in 55 cases (91.67% of DCM cases) followed by diabetes mellitus in 24 cases (40% of DCM cases). Other risk factors documented included ischaemic heart disease (6 cases) and alcohol intake (3 cases).

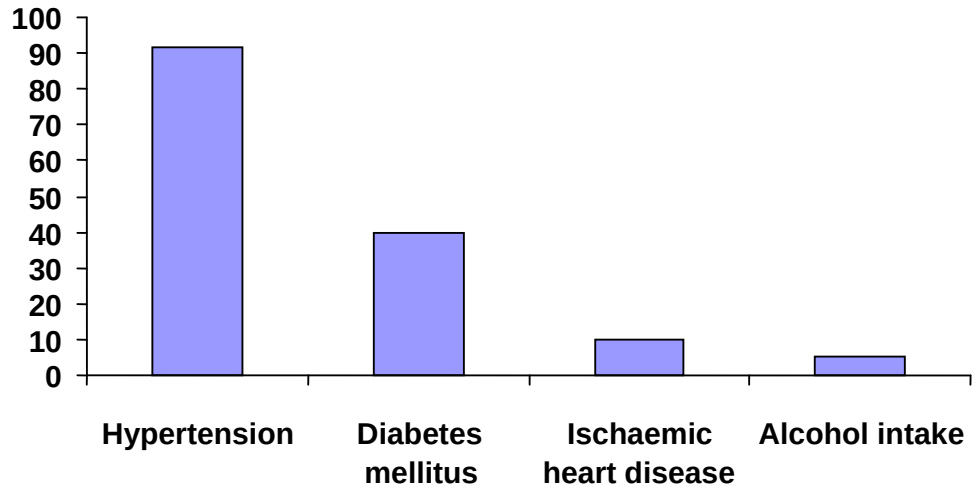


Figure 3.7 Risk factors for congestive cardiomyopathy

Infection was identified as the lead precipitating factor for cardiac failure in 24 cases (40% of cardiac failure cases), followed by arrhythmia in 11 cases (18.3%) and anaemia in 2 cases (3.3%).

3.7.3. Respiratory disease

Respiratory disease was the second most affected system with respiratory diseases occurring in 106 cases (48.62%). Pneumonia was the commonest respiratory disease, occurring in 71 cases (67%). The second most frequent respiratory disease was chronic obstructive airway disease (Table 3.7).

3.7.4 Neurological disease

Neurological disease occurred in 27.5% of admissions. Cerebrovascular accidents were the commonest cause of neurological disease (75% of neurologic disease). Epilepsy was noted in nine patients (15% of patient with

neurological disease, whereas peripheral neuropathy and Alzheimer's disease were less common, being found in three cases each. Parkinson's disease was found in a single patient.

3.7.5 Renal, Endocrine and Rheumatological disease

Chronic renal failure was present in 57 patients (59.4%) of the patients with renal disease, while diabetes was the commonest endocrine disease. A rheumatological diagnosis was recorded in 33 patients with osteoarthritis being the most common in 23 (69.7%) (Table 3.7).

3.7.5 Malignancy

Malignancy was recorded in 13.1% of all admissions. Metastatic disease, the commonest presentation of malignancy, was found in eight cases (32% of all malignancies). Carcinoma of the lung occurred in four cases (16% of all malignancies, followed by haematological malignancy in three cases (12%). Gastrointestinal, renal and prostatic malignancy was found in two cases each (8%) (Fig. 3.8)

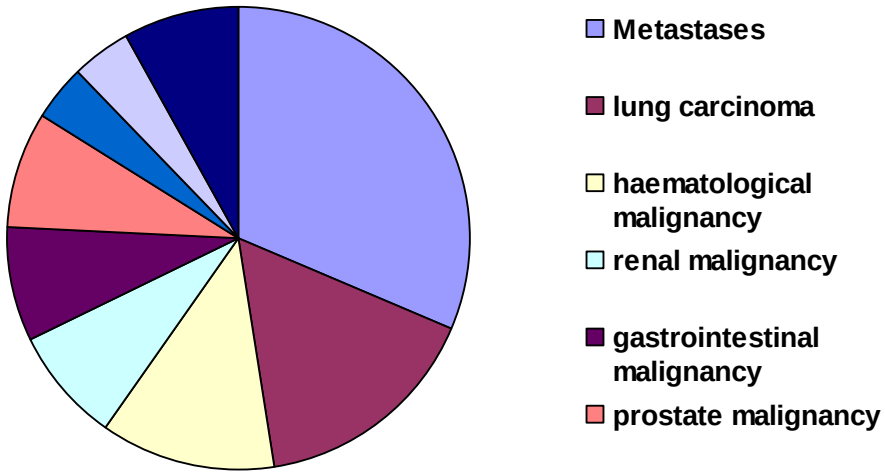


Figure 3.8 Sites of malignancy among geriatric admissions

3.7.6 Anticoagulation

There were 11 patients on anticoagulation in the study group. Three patients (27.3%) had presented with over-warfarinization. However, a haemorrhagic complication was documented in one case only, with the patient presenting with a soft tissue haematoma. The indication for anticoagulant therapy was atrial fibrillation (AF) in nine patients (81.8%), venous thromboembolism in three patients (27.3%) and a left ventricular thrombus in one patient (9.1%). There were 17 patients with atrial fibrillation, however, only 9 (52.9%) were on anti-coagulation.

Table 3.7: Spectrum of chronic disease in patients aged 60 years and over admitted to the medical wards at KEH between 1February 2005 and 31 October 2005

Disease	Number (%)
Cardiac disease	
Hypertension	150 (89.3)
Cardiomyopathy	60 (35.7)
Arrhythmia	37 (22.0)
Pulmonary hypertension	31 (18.5)
Ischaemic heart disease	17 (10.1)
Valvular disease	13 (7.7)
Cor pulmonale	4 (2.4)
Respiratory disease	
Pneumonia	71 (67)
COAD	29 (27.4)
Pulmonary Tuberculosis	11 (10.4)
Carcinoma of the lung	5 (4.7)
Asthma	5 (4.7)
Bronchiectasis	4 (3.8)
Gastrointestinal and liver disease	
Chronic liver disease	10 (16.6)
Gastrointestinal malignancy	2 (3.3)
Diverticulitis	1 (1.7)

Neurological disease	
Cerebrovascular accident	45 (75.0)
Epilepsy	9 (15.0)
Spinal disease	4 (6.7)
Other dementia	4 (6.7)
Peripheral neuropathy	3 (5.0)
Alzheimer's disease	3 (5.0)
Parkinson's disease	1 (1.7)
Renal disease	
Chronic renal failure	57 (59.4)
Renal malignancy	2 (2.1)
Endocrine disease	
Diabetes mellitus	72 (83.7)
Hyperlipidaemia	12 (14.0)
Hypothyroidism	2 (2.3)
Subclinical hypothyroidism	1 (1.2)
Subclinical hyperthyroidism	1 (1.2)
Rheumatological disease	
Osteoarthritis	23 (69.7)
Gout	7 (21.2)
Rheumatoid arthritis	4 (12.1)
Osteoporosis	2 (6.1)

3.8 Gender differences in overall disease prevalence

Overall, cardiovascular, renal and endocrine disease was more common in females than males.

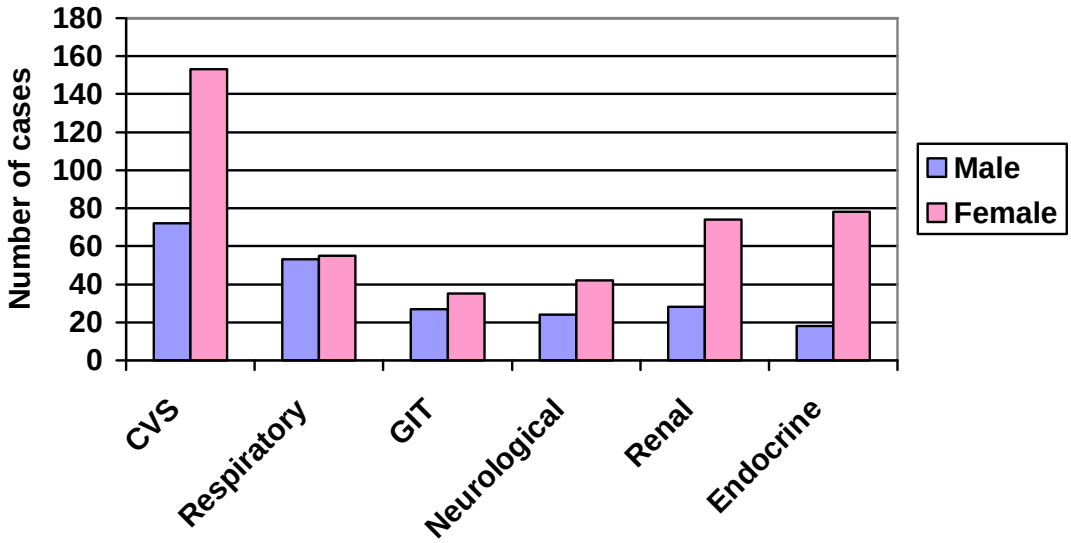


Figure 3.9: Gender differences in overall disease prevalence

Abbreviations: CVS: cardiovascular, GIT: gastrointestinal tract

3.9. Admission duration

There was no correlation between duration of admission with the age and gender of the study cases. However, patients with hypertension as an admission diagnosis were found to have a shorter admission diagnosis compared to those without hypertension as an admission diagnosis ($p = 0.026$). Furthermore, cases admitted with a urinary tract infection as an admission diagnosis had a longer duration of ($p = 0.03$).

3.10. Admission outcome

Association between admission outcome and age and gender was determined.

3.10.1. Admission outcome and age

There was no statistically significant difference in the outcome of admission i.e. discharge, transfer to another facility, or death between the 60 – 64 year age group and those aged 65 years and over (Table 3.8).

Table 3.8: Admission outcome according to age

	Outcome			p value
Age (years)	Discharge (%)	Transfer (%)	Death (%)	
60-64	21 (42.9)	10 (20.4)	18 (36.7)	0.681
≥ 65	90 (54.9)	30 (18.3)	44 (26.8)	

3.10.2. Admission outcome and gender

Furthermore, there was no significant difference in the outcome of admissions in men and women (Table 3.9).

Table 3.9: Admission outcome according to gender

	Outcome			p value
Gender	Discharge (%)	Transfer (%)	Death (%)	
Male	38 (48.7)	14 (17.9)	26 (33.3)	0.646
Female	73 (52.5)	28 (20.1)	38 (27.3)	

3.10.3. Admission diagnosis and mortality

Of the 218 admissions, there were 64 deaths. Patients with pneumonia and infection in general had a high rate of mortality; 49.3% and 39.5% respectively. Significantly higher mortality rates occurred in patients admitted with acute renal failure (63%), cerebrovascular accident (51.5%) and diabetes mellitus (50%) than in patients without the disease (Table 3.10).

Table 3.10: Admission diagnosis and mortality

Admission diagnosis	Mortality		
	With disease (%)	Without disease (%)	p value
Infection	45 (39.5)	19 (18.4)	0.001
Pneumonia	35 (49.3)	29 (19.9)	<0.0001
Gastroenteritis	7 (63.6)	57 (27.7)	0.017*
Acute hepatitis	2 (100)	62 (28.8)	0.086
Meningitis	1 (50)	63 (29.3)	0.504
Urinary tract infection	6 (18.8)	58 (31.4)	0.149
Disseminated tuberculosis	2 (40)	62 (29.2)	0.462
Pulmonary Tuberculosis	4 (40)	60 (29)	0.335
Gastrointestinal disease			
Peptic ulcer disease	5 (71.4)	59 (28.1)	0.025*
Hepatic failure	8 (100)	56 (26.8)	<0.0001*
Neurological disease			
Cerebrovascular accident	17 (51.5)	47 (25.5)	0.003

Admission diagnosis	Mortality		
	With disease (%)	Without disease (%)	p value
Endocrine disease			
Diabetes mellitus	9 (50)	55 (27.6)	0.046
DKA	2 (50%)	62 (29.1%)	0.339
HONK	7 (63.6)	57 (27.7)	0.017*
Hypoglycaemia	3 (27.3)	61 (29.6)	0.585
Cardiovascular disease			
Hypertension	5 (20.8)	59 (30.6)	0.324
Cardiac failure	14 (25.9)	50 (30.7)	0.507
Cor pulmonale	3 (100)	61 (28.5)	0.025*
Arrythymia	5 (17.9)	59 (31.2)	0.148
Pulmonary hypertension	2 (33.3)	62 (29.4)	0.571
Respiratory disease			
COPD	6 (30)	58 (29.4)	0.958
Bronchiectasis	2 (50)	62 (29.1)	0.339
Pleural effusion	4 (50)	60 (28.7)	0.181
Empyaema	1 (50)	63 (29.3)	0.504
Carcinoma lung	2 (50)	62 (29.1)	0.339
Gastrointestinal disease			
Gastritis	1 (16.7)	63 (29.9)	0.429
Gastrointestinal malignancy	1 (50)	63 (29.3)	0.504

Admission diagnosis	Mortality		
	With disease (%)	**Without disease (%)**	**p value**
Chronic liver disease	3 (50)	61 (28.9)	0.244
Neurological disease			
CVA	17 (51.5)	47 (25.5)	0.003
Alzheimer's disease	1 (50)	63 (29.3)	0.504
Epilepsy	4 (50)	60 (28.7)	0.181
Renal disease			
Chronic renal failure	13 (30.2)	51 (29.3)	0.905
Acute renal failure	17 (63)	47 (24.7)	<0.001
Urological disease	1 (9.1)	63 (30.6)	0.114
Osteoarthritis	1 (16.7)	63 (29.9)	0.429
Dermatological disease	2 (28.6)	62 (29.5)	0.66
Haematological disease	9 (28.1)	55 (29.7)	0.519
Deep vein thrombosis	1 (50)	63 (29.3)	0.504

Note that subjects had more than one diagnosis

* 20% or more of the variables have an expected count of less than therefore p value is not significant

4. Discussion

4.1. Demographic profile

The number of older persons in developing countries has increased rapidly in recent years. These countries experience a quadruple burden of disease, consisting of chronic non-communicable disease, HIV/ AIDS, poverty related conditions and trauma (24). However, among the elderly, non-communicable or chronic diseases are the main contributors to the burden of disease, as is also the case with developed countries (24). While geriatric health services have undergone great advancements in developed countries over the past few decades, these services are lagging behind in African and in sub–Saharan Africa in particular. This has resulted in a paucity of epidemiological data on ageing and associated the burden of disease.

Several hospital-based studies have reported disease profiles in the elderly with an emphasis on primary health care. Previously in SA, ambulatory geriatric health care services were separate from general medical services and different for the various ethnic groups. These services have now been incorporated into general medical care and are largely the responsibility of primary and district health levels, which are overburdened. To plan for appropriate geriatric services and to detect and manage chronic diseases of lifestyle, an understanding and documentation of the profile of diseases in this age group is required.

In this study, the case records of 191 patients 60 years of age or older admitted to general medical wards in a regional hospital with largely secondary and tertiary levels of care were reviewed. The majority of the patients were in the 65 – 74 years age group with a mean age of 70.5 years ± 7.4 years. The predominance of Africans in this sample reflects the previous categorization of the hospitals on an ethnic basis. King Edward VIII Hospital was designated for African and Indian patients only, in the previous political dispensation, and although hospitals are now open to all, the legacy remains. This is not unexpected however, as two thirds of older persons in the 2001 census in SA were Black Africans (14). The age distribution is also consistent with the census data (14) and the average LE, but differs from developed countries, where there is a larger proportion of persons aged 75 years and over (8).

4.2 Number of admissions

One of the characteristics of geriatric care is that patients often require multiple admissions due to the presence of multiple co-morbidities and a high burden of chronic or non-curable diseases (33). However, in view of the high risk of iatrogenesis, nosocomial infections and functional decline associated with prolonged hospitalization (38), the emphasis is shifting to outpatient treatment and avoiding hospitalization (39). While there was a high disease burden in this cohort of patient, the short duration of this study probably accounts for the fact that the majority of the subjects had one admission only

4.3. Admission diagnosis by system involvement and disease profile

The majority of patients had more than one acute problem necessitating admission. Similar to the Hong Kong study (34), respiratory disease was the commonest reason for admission.

4.3.1. Respiratory disease

Respiratory disease was the commonest admission diagnosis in this study and the second most prevalent disease (both admission and co morbid disease). Apart from pneumonia, COAD was a prevalent respiratory disease. The increasing burden of respiratory diseases is multifactorial and includes the impact of physiological changes, decreased immunity and an increased risk of infection and smoking and exposure to other pollutants (40). Furthermore, obstructive airways disease is often undiagnosed in the elderly (40). In SA the high prevalence of Stage 2 and Stage 3 COAD (22.2% among males and 16.7% among females) in SA has been attributed to the high levels of previous pulmonary tuberculosis and the high prevalence of smoking (41).

4.3.1. Infections

An important finding in this study was the high number of infections in this cohort, particularly as an admission diagnosis. However, this needs to be interpreted with caution, due the low rate of bacteriological diagnosis, and the true rate of infection may be lower. Immune dysregulation is a physiological phenomenon, found in the elderly, which leads to an impaired immune response to infection and a higher death rate among older patients. The finding of a significantly higher mortality rate among admissions with

infections in this cohort supports this. A study by Michel *et al*. looked at the prevalence of infections in 1919 patients in 9 geriatric care institutions in France and Switzerland; urinary tract infections had the highest prevalence (39.5%), followed by respiratory tract infections (27.9%) and skin infections (16%) (42). In this study, however, pneumonias were the commonest infections among geriatric admissions followed by urinary tract infections. The presence of other co morbid disease is a major risk factor for the development of pneumonia in the elderly (43). *Streptococcus pneumoniae* is the commonest aetiological organism for community acquired pneumonia in the geriatric population (43). A causative bacterial organism was isolated in only 3 cases (2.31%) of pneumonia in this study group, of which there were 2 cases of pneumococcal pneumonia. However, blood cultures are not often done in busy outpatient departments where the diagnosis of pneumonia is obvious and may not often reveal positive results. In a recent study in Singapore, routine blood cultures reveal negative results in 94% of patients (44). Several guidelines recommend pneumococcal vaccination every five years in the elderly, however due to its expense, it is rarely available to this population. Despite the low yield of pneumococcal disease in this cohort, it is well established that pneumococcal pneumonia is common in the elderly. Therefore, making vaccination more readily available is reasonable, particularly given the high mortality associated with pneumonia. Although not interrogated in this study, equally important is the early recognition and appropriate antibiotics and improved adherence to national guidelines (45). Of interest, only four patients were admitted with pulmonary tuberculosis. This is

probably due to the fact that most patients with tuberculosis would be treated at dedicated outpatient facilities.

Overall disease prevalence

The admission profile among this geriatric population indicates that the majority of patients were admitted with multiple diagnoses. Of the 191 patients, only six patients (3.1%) had one diagnosis in total. The majority of patients had multiple diagnoses; ranging from two - 12 diagnoses in total. This supports the finding that there is an increased burden of disease among the elderly, with patients being admitted with multiple medical problems (24). Furthermore, it is in agreement with previous studies from SA (24) and the developed countries (8).

4.3.2. Cardiovascular diseases

Cardiovascular diseases were the most prevalent chronic disease in this cohort of patients. This finding is similar to other studies conducted in SA and in Sweden (33, 35, 37) and is in keeping with the increased burden of NCDs in the elderly. The prevalence rate of hypertension in SA has been estimated to be around 55% (46) with a higher prevalence in blacks compared to whites (47) . Factors thought to contribute to hypertension include rising levels of obesity, urbanization, age and tobacco smoking (46). The high prevalence of hypertension in this study is therefore not surprising. What is of concern though is the high frequency of target organ damage particularly hypertensive heart disease and dilated cardiomyopathy., similar to the previous report in 1989 (36) and a more recent study at Univertas hospital (37). The prevalence

of hypertension has been found to be much higher in patients with dilated cardiomyopathy than in an aged-matched population (48). These complications are likely to impact on the quality of life of older persons and contribute to disability.

4.3.4. Neurological disease

The majority of admissions with neurological disease suffered from cerebrovascular accidents. Stroke has a crude prevalence of about 300/ 100 000 in SA and has been cited to be the fourth most common cause of death, accounting for 6% of all mortality in 2000.(49). The high prevalence of hypertension in this population and the high frequency of end organ damage suggest poor control could explain the high prevalence of stroke in general and in this study.

4.3.5. Malignancy

The incidence of malignancy increases with advanced age (50). It is projected that by 2030, 70% of all cancers will occur in those over the age of 65 years (50). The increase in carcinogenesis in the elderly is attributed to defective tissue genetic repair mechanisms (50). In the US, the cancer rate (adjusted for age) is 2151/100,000 population for those greater than 65 years compared to 208/100,000 for those less than 65 years of age which equates to a more than 10 fold increase in incidence of malignancy in those over the age of 65 (44). In Singapore, an analysis of geriatric hospital admissions revealed that malignancy occurred in approximately 5% of admissions (51). In SA, in a study of older patients, the prevalence of neoplasms was less than 5% in all

race groups (36). In contrast we found a higher prevalence of 13.1% with the majority of cases presenting with metastatic disease. The higher prevalence could be explained by the fact that this study was conducted in a regional hospital which traditionally serves as a referral centre for most of KZN and part of Eastern Cape, with patients being referred from district level and regional level institutions. In SA, screening services do exist for cervical and breast cancer in females, and prostate cancer in males however, these services are not readily available to the majority of the population. The high incidence of metastatic malignancy in this study suggests a late diagnosis and emphasizes the need for better access to care. The distribution of sites of malignancy in this study, namely lung carcinoma, haematological malignancy and renal malignancy being the commonest, is likely to be skewed since this the subjects were admitted to medical wards. Patients with breast, cervical and prostate cancer would present to surgical, gynaecological and urological services. The cost effectiveness of screening programmes have yet to be determined in SA. Whereas the cost effectiveness of cervical cancer screening has been previously studied in sub-Saharan Africa and shown to be beneficial in reducing cancer risk, the screening of other malignancies have not been studied as in depth (52).

4.3.6. Anticoagulation

Anticoagulant therapy among geriatric patients has been controversial, while having a slight increased risk of bleeding, geriatric patients are also likely to benefit from the prevention of thrombo-embolic disease and strokes, particularly in cases of AF (53). A small number of patients (5.8%) were on

anticoagulant therapy in this study The indication for anticoagulant therapy was AF in the majority of patients. However, just over half of patients with AF received anti-coagulation, despite the evidence that long term anticoagulation therapy and monitoring is cost effective in preventing ischaemic strokes in patients over 65 years of age (54). Furthermore, although patients over the age of 75 years had a greater risk of adverse events while on therapy, the cost-effectiveness of stroke prevention was greater in this group (54). The cost effectiveness of anticoagulation has to be balanced with the risk of bleeding. Although 27.3% of the patients were over-warfarinized, only one presented with a bleed.

4.4. Admission diagnosis by gender distribution

Respiratory disease and COAD was found to be significantly higher among males than females. There are a few risk factors for COAD but tobacco smoking remains the highest risk factor (41). In this study the higher frequency of smoking in men is likely to responsible for the higher prevalence of COAD in men.

Cardiac failure, arrhythmias and endocrine disease were more common admission diagnoses in females. Simon *et al*. described gender differences in patients who presented with cardiac failure; women were significantly older and had a more severe New York Heart Association classification (55). Gender differences also exist in cardiac arrhythmias; women have been described to have a greater prevalence of symptomatic long QT syndrome (56). Atrial fibrillation is more prevalent in men however, with advanced age,

the gender difference subsides and women have an increased risk of stroke and poorer survival rates (56). The reasons for these gender differences is unclear but gonadal steroids, possible differences in electrolyte channel function and autonomic properties have been postulated to be involved (56).

4.5. Admission diagnosis by age

There was a significant association between renal disease and chronic renal failure with age; both were more prevalent as admission diagnoses in the 60-64 year age group. In the SA public health system, due to financial constraints, renal replacement therapy (RRT) is only offered to those patients who qualify for renal transplant (57). According to the SA Dialysis and Transplant Registry, the average rate of patients receiving RRT is 99 per million population (58). This is much less than the prevalence rate of RRT in countries in Europe (644 per million population) (57). Individuals requiring renal replacement therapy at 60 years and over are often excluded, based on the presence of co-morbidities. Patients diagnosed with chronic renal failure in this age group, in the public health care system, therefore often have a poor prognosis and may never reach 65 years of age.

4.6. Admission duration

Patients admitted with hypertension as a diagnosis had a significantly lower mean admission duration, whereas those with admitted with urinary tract infections had significantly higher hospital stay. In this retrospective study it is difficult to determine the reasons for these findings, particularly as hypertension was a common co-morbid condition in a cohort of patients with

multiple diseases. It may be that blood pressure control was easily achieved, while urinary tract infections may have required a more prolonged course of antibiotics. Another consideration would be the presence of co-morbid diseases which was not explored in this study.

4.7. Admission outcome

There was a high mortality rate in this study with one in three patients dying. Almost all the patients had multiple acute medical conditions on admissions, each of which could have been a contributing cause for the death. Admissions with cerebrovascular accidents, acute renal failure, diabetes mellitus, and infection (including pneumonias), had a significantly higher mortality rate. Although the clinical course and mortality of acute renal failure does not significantly differ from younger patients, the incidence is higher in the elderly population (58). Bacterial pneumonias have a poorer prognosis in older patients with other co morbidities and immobilization (59) and older age has been reported as an adverse prognostic indicator of functional outcome in those with cerebrovascular accidents (53).

In 2005, the leading medical causes of death in the United states were cardiovascular disease, malignancy, cerebrovascular accidents, chronic lower respiratory diseases and diabetes mellitus (59). In SA, cerebrovascular disease, other forms of cardiac disease, diabetes mellitus, hypertensive diseases and ischaemic heart diseases were more prevalent causes of death in people aged 65 and older (60). Pneumonia, chronic lower respiratory diseases, gastrointestinal malignancies, tuberculosis and gastrointestinal

infectious diseases were more common in people aged between 50 and 64 years (60). Although cerebrovascular accidents and diabetes mellitus were noted to have mortality rates, infection was also a significant cause of high mortality among elderly admissions in this study.

4.8. Implications for the health service

This retrospective study highlights not only the burden of chronic NCDs but also the high frequency of infections in older patients admitted to a regional hospital. The high prevalence of target organ damage especially from hypertension suggests that the diagnosis may have been delayed, the condition may not have been adequately treated or may just reflect the natural progression of NCDs. Another possibility is a delay in the referral of patients from the primary health care centres to the secondary and regional hospitals. A further characteristic of geriatric care highlighted is the presence of multiple co-morbid diseases which complicates the management of these patients This high burden of NCDs with older age has implications for the patients, their communities and on the delivery and the cost of health care services.

The health system in SA is being transformed with an emphasis on primary health care and the majority of patients are attended to by a clinic nurse. Therefore more emphasis is required at this level for the early detection of chronic diseases, appropriate treatment and screening for complications. At the current there are no facilities for laboratory investigations at the primary health care level. Protocols for the management of NCDs should recognize the limitations of primary health care and include clear guidelines on referral

and treatment to prevent the development of complications. Furthermore the high burden of NCDs is bound to increase the dependency of older individuals and affect functional capacity. The major emphasis of the current health system is on curative management with little or no services for rehabilitative medicine.

Infection remains a common reason for admission to hospital and a cause of mortality in older patients. Pneumonia featured as a diagnosis significantly associated with mortality. While only a small percentage of cases had a causative organism isolated for the pneumonia, *Streptococcus Pneumoniae* was isolated in a few patients. A local study in the University of Witwatersrand studied pneumonia in the elderly population and found that various factors such as proper nutrition, implementation of pneumococcal and influenza vaccines may assist in reducing the prevalence of these infections (59). Further studies are required to determine the microbiological spectrum of pneumonia in our population and the need, feasibility and cost effectiveness of pneumococcal vaccination. In the interim awareness of the high mortality associated with infections should prompt stricter adherence to existing guidelines.

In the current era, when most of the resources and research is directed towards HIV/AIDS epidemic, anti-retroviral treatment and opportunistic infections, more awareness has to be directed to the demographic transition of the population and the health challenges and implications of ageing. Currently there is limited data on ageing and health in SA. Consequently

there is limited training in geriatrics and gerontology. It is important therefore to highlight the health challenges with ageing albeit in a hospital setting and to recommend and strengthen training in geriatrics and the expansion of geriatric services.

4.9. Limitations of the study

This was a retrospective study with a small number of patients and although the findings have implications on health care service, generalizations or recommendations cannot be made. The information obtained from this chart review focused mainly on the physical assessment of patients and did not delve into the psychosocial and functional aspects of health, which forms part of a complete geriatric assessment. In the current model of care in tertiary hospitals, these very important aspects are often ignored. The data obtained may also be biased as the study group was a hospital based rather than a community based population. Due to the retrospective nature of this study, some data was missing (including the absence of proper documentation of previous medical illnesses, social habits and presence of disease complications) and could not be obtained. In these events, missing data was excluded and a valid percentage was used instead of an overall percentage.

4.10. Conclusion

The findings of this study are similar to other studies in Africa and in developed countries, with respiratory and cardiac disease being an important cause for hospital admission in older patients. However, this study differed in that infection was a common admission diagnosis, as well as being

associated with a high mortality, with pneumonias featuring prominently. Hypertension and cardiomyopathy were also identified as being a major problem among the elderly. In a proportion of patients, malignancy was an admission diagnosis with the majority of patients presenting with metastatic disease. In terms of appropriate anticoagulation of patients with AF, only 52.9% received this therapy. This could indicate under prescribing by physicians due to a fear of side effects. The majority of cases had four or more diagnoses necessitating admission which supports previous findings of a higher disease burden in the elderly. The increasing number of older persons brings unique challenges for health care provision and

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APPENDIX A

DATA EXTRACTION SHEET					
Study Number:					
Date of Admission		**IP No/OP No**			
Name:					
Date of Birth:		**Age:**			
Address:					
Telephone numbers:					
Next of kin:					
Date of Discharge:					
Admission duration:					
Ward Type:	**Geriatric**		**Medical**		
Diagnosis/es (admission)					
Social History					
Employment	**Current**				
	Past (in chronological order				
Source of income	**Govt pension**		**Private pension**		
	other		**Amount (p.m)**		
Financial responsibility	**Responsible for self only**		**Others**		
	Specify no. and relationship				
	Receives financial assistance (specify)				
Living arrangements	**Alone**		**Alone with part-time carer**		
	With family		**specify**		
Housing	**Single storey**		**Flat**		
	Informal		**No. of rooms**		
Level of Education					

Marital Status	**Married**		**single**		
	Widow/er		**divorced**		
No. of children					
Habits	**Smoking**	**Current**		**past**	
	alcohol	**Current**		**past**	
Past Medical History					
Previous Admissions	**Dates**	**Reasons**			
Chronic diseases	**Date of diagnosis**	**Treatment**			
Hypertension					
Diabetes					
Tuberculosis					
hyperlipidaemia					
Other					
Menstrual history	**Age of menopause**		**Use of HRT**		
Risk factors of OP					
Family history					
Presenting complaints					
Systemic enquiry					
Clinical examination	**Height**		**weight**		
General					
Breast, thyroid and other masses					

Cardiovascular	**Pulse**				
	Blood pressure				
	JVP				
	Apex beat				
	LPH				
	Palpable P2				
	Thrills				
	Heart sounds				
	Murmurs				
	other				
Clinical diagnosis					
Respiratory	**Signs of distress**				
	Signs of failure				
	Shape				
	Movement				
	Trachea				
	Palpation				
	Percussion				
	Auscultation				
	other				
Morphological diagnosis					
Abdomen	**Inspection**				
	Hepatomegaly				
	Splenomegaly				
	Ascites				
	other				
CNS	**Mental state**				
	MMSE				
	Primitive reflexes				
	Neck stiffness				
	Cranial nerves				
	Motor				
	Inspection	**Wasting**			
		Fasciculation			
		RUL	**LUL**	**RLL**	**LLL**
	Power				
	Tone				
	Clonus				
	Reflexes				
	Plantar				
	Sensation				
	Cerebellar				
	extrapyramidal				

Morphological diagnosis		
Endocrine	**Thyroid**	
	Other	
Musculoskeletal	**(Specify joint involvement and diagnosis)**	
Urogenital		
Psychiatric		
Special investigations		
CXR	**Date and no.**	
ECG		
ECHO		
CT SCAN		
DEXA		
Other		
Plan of management		
Treatment and indication		
Outcome of admission (discharge home, referral to recup facility, death, etc.		

Pt Name……
Hosp No……

Date							
Na							
K							
Cl							
CO_2							
Urea							
Cr							
AG							
Ca							
Corr Ca							
PO_4							
Mg							
Tot Prot							
Alb							
Tot Bil							
ALP							
GGT							
ALT							
Hb							
HCT							
MCV							
MCH							
Plt							
MPV							
WCC							
N							
L							
M							
E							
B							
INR							
APTT							
Fibr							
Gluc							

Other Results