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Dysphagia in a group of adult in-patients living with HIV/AIDS in Gauteng, South Africa.

Kim Alborough

A research thesis submitted for the degree of Masters of Arts in Speech Pathology in the Faculty of Humanities, The University of the Witwatersrand.

DECLARATION

I, Kim Alborough, hereby declare that this submission is my own original work and that the assistance which I have received is detailed in the Acknowledgements of this report. To the best of my knowledge and belief, it contains no material which has been accepted for the award of any other degree or diploma at any other university or other higher institute of higher learning, except where due acknowledgement has been made in the text. I am responsible for the study and conclusions that have been reached.

Kim Alborough

Date

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Psalm 107:1

Give thanks to the Lord, for He is good; His love endures forever.

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ABSTRACT

Aims: The aims of this research were to describe the signs and symptoms of dysphagia in people who are living with HIV/AIDS and to see what participant variables such as CD4 count, age and diagnosis affect dysphagia.

Methods: This study was a descriptive, cross-sectional, quasi non-experimental design. The sampling method that was used for this research was non-probability and convenient. These patients were referred to the speech therapy and audiology department from various multidisciplinary team members for dysphagia assessments. There were 106 participants in total. Eighty participants underwent only a clinical bedside assessment and 26 underwent a bedside assessment as well as a modified barium swallow. The Mann Assessment of Swallowing Ability (MASA) was used to conduct the clinical bedside assessments and a modified barium swallow (MBS) was used as an objective measure. The data was analysed using both descriptive and inferential statistics. These tests included the Wilcoxon signed rank test, Spearman Rho test, Kruskal-Wallis and Mann Whitney U-test.

Results: Descriptively, the results revealed that participants with neurological conditions appeared to present with more severe signs and symptoms of dysphagia. The results from the Wilcoxon signed rank test showed that participants with a neurological disorder experienced more severe signs and symptoms of dysphagia, except with laryngeal elevation. The Wilcoxon signed rank test also showed that older participants experienced more dysarthria and oral transit difficulties. The results from the Kruskal-Wallis test highlighted that participants with a lower CD4 count had more significant respiration and voice difficulties. The results from the Mann-Whitney U test showed that participants who were on a HAART regimen experienced increased difficulty in the pharyngeal phase and aspirated more frequently. The Spearman-Rho test results showed that the MASA was seen as a valid bedside assessment tool for assessing adult dysphagia in an acute hospital setting.

Discussions: Dysphagia does occur in the HIV/AIDS population in South Africa in participants who have neurological conditions as well as opportunistic infections. The SLP needs to play a key role in the assessment and management of these patients. The MASA is a good assessment tool to use in settings where objective measures are not available.

Keywords: dysphagia – assessment - HIV/AIDS- speech language therapist/pathologist (SLT/P) – Mann Assessment of Swallowing Ability – Modified Barium Swallow – South Africa.

Introduction

1. INTRODUCTION

1.1. Introduction to HIV/ AIDS and the AIDS Epidemic

HIV/AIDS can cause numerous complications within the body which can affect how it functions. One of these complications is how HIV/AIDS can affect a person's ability to swallow. The swallowing process starts when the person places food in their mouth and ends as the food enters the oesophagus (Logemann, 1997). As swallowing is a continuous process, it can be affected at one or more stages. HIV/AIDS can affect an individual's swallowing ability in different ways, for example through various opportunistic infections, as a side effect from Highly Active Antiretroviral Therapy (HAART) and from the treatments from various opportunistic infections for instance: radiation to treat Kaposi Sarcoma (Adedigba, Jeboda, Naidoo, and Ogunbodede, 2008).

Millions of people worldwide have become infected with HIV/AIDS and it is now an epidemic. AIDS is considered to be a collection of numerous conditions that manifest themselves in the body (UNAIDS, 2009). HIV is the Human Immunodeficiency Virus which invades a human's immune system and results in the immune system becoming less effective, therefore becoming vulnerable to opportunistic infections (Conner, Fan & Villarreal, 2007). AIDS stands for Acquired Immune Deficiency Syndrome which occurs when a person's immune system can no longer fight off infection due to HIV (Van Dyk, 2008). According to the United Nations (2009) the majority of people in Africa who are affected with HIV are adults who fall within the working class. HIV is negatively impacting Africa's economy because people who should be working can no longer do so due to their illnesses (UNAIDS, 2009). HIV/AIDS is also having a negative effect on Africa's social systems because the majority of people who are dying from the AIDS epidemic are adults and this is resulting in millions of orphans, especially in Africa. As a result of this, it is turning families into child headed or grandparent headed households (UNAIDS, 2009). Sub-Sahara is home to the largest portion of the world's HIV/AIDS population. However, South Africa continues to be the country that has the largest portion of the world's HIV/AIDS population – 5.6 million people (UNAIDS, 2010). As a result of all of these factors, HIV/AIDS is currently one of the major challenges facing South Africa today (UNAIDS, 2009).

Quite a lot of research looking at the relationship between HIV/AIDS and dysphagia has been conducted. Most other studies have been conducted by professionals other than speech – language pathologists (SLPs) (Anteyi, Idoko, Thatcher & Yohanna, 2003). These professionals mainly included dentists and periodontists (Anteyi et. al, 2003; Scannapieco, 1999). These professionals have mostly gathered the data for their studies by using clinical oral examinations as well as biopsies that were analysed in a laboratory in order to confirm the diagnoses and questionnaires or radiographic studies (Daly, 2004; Halvorsen, Kearney & Moelleken, 2003). Most studies focused on oral manifestations present in adults living with HIV/AIDS (Anteyi et.al., 2003; Anup, Doshi, Pai, Sharma, Suhas & Ramapuram, 2006; Besige, et. al, 2007). Consequently swallowing difficulties have mainly been inferred from the presenting symptomatology rather than those actually assessed. Research looking at the relationship between HIV/AIDs and dysphagia has been conducted in developing countries such as Nigeria, Uganda and India (Anteyi et.al, 2003; Anup, et. al, 2006; Besige, et. al, 2007).There is currently very little research that speaks to the South African population from a speech language therapist's perspective. There is evidence from one South African study which concluded that there are different causes of dysphagia in a patient living with HIV/AIDS and how dysphagia affects an individual's quality of life (Daly, 2004). However, this study only utilised a questionnaire and looked at participants who were outpatients (Daly, 2004). Most of the studies that were done in developing countries were conducted using clinical oral examinations or subjective and objective measures (Anup et. al, 2006), whereas developing countries utilised radiographic instrumentation or objective assessments. There are currently no published research studies conducted by speech pathologists within South Africa (or other developing nations) that describe the swallowing difficulties that are experienced by adults who are living with HIV/AIDS by using subjective and objective measures. In addition, there are no specific signs and symptoms that have been documented and therefore no profile has been developed which describes how dysphagia presents in patients with HIV/AIDS. As mentioned above, the majority of HIV infected people (5.7 million) in the world reside in South Africa. Consequently, the current research becomes very pertinent as many SLP's practicing in South Africa work in under resourced health settings that do not allow for the expensive objective measures to be used. It is imperative that information be collected regarding on how reliable clinical examinations or subjective measures can be. The current study was therefore conducted at a regional adult only public sector hospital in Johannesburg, South Africa. The fact that the current study was conducted

within a hospital context allowed for utilisation of both clinical and objective measures during data collection.

The purpose of this research was to assess the swallowing abilities of adults with HIV/AIDS by utilising both clinical (bedside assessment) and objective (modified barium swallow) measures and to describe their signs and symptoms of dysphagia.

The following questions were asked:

1.2. Research Questions

1.2.1. What were the clinical signs and symptoms of dysphagia in a group of adult in-patients living with HIV/AIDS?

1.2.2. Was there a difference between the obtained signs and symptoms in patients with different medical histories (specifically these with neurological versus opportunistic infections)?

1.2.3. Did a relationship exist between the presentation of the dysphagia and the participants' CD4 count, age and HAART regimen?

1.2.4. Did the results of the Mann Assessment of Swallowing Ability (MASA) (Mann, 2002) significantly correlate with the results of the Modified Barium Swallow (MBS)?

Literature Review

2. LITERATURE REVIEW

2.1. Overview of HIV/AIDS

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) have had far reaching consequences for both the scientific and medical sectors throughout the world. HIV was discovered in the USA in 1981 when a rare combination of diseases was co-occurring in numerous patients. Only in 1983 was it discovered that a virus was causing these diseases and in 1986 the scientists termed it the Human Immunodeficiency Virus (Van Dyk, 2008). There is evidence that is now supporting the idea that HIV originated in Africa (UNAIDS, 2003). Experts in the field of HIV suggest that in the 1960's approximately 2 000 people in Africa were infected with the virus (UNAIDS, 2003). The first epidemic is believed to have occurred in Kinshasa in the 1970's as there was a sudden increase in the number of patients with cryptococcal meningitis, Kaposi's sarcoma and pneumonia (UNAIDS, 2003). Due to labour migration that occurred throughout Africa in the 1980's the spread of HIV was steadily reaching epidemic proportions. However, it is thought that the first case of HIV in South Africa was a white homosexual air steward from the United States of America in 1982. Initially, in South Africa, HIV was restricted to the white homosexual population in the 1980's but this rapidly started to change during the early 1990's as HIV/AIDS was beginning to be seen in rural African populations (UNAIDS, 2003).

2.2. Burden of the disease

HIV/AIDS has become the world's most serious public health problem (UNAIDS, 2009). Since the start of the epidemic, almost 60 million people have become infected with HIV/AIDS and 25 million people have died from HIV related illnesses in Africa (UNAIDS, 2009). Over the past few years, there has been an alarming increase in the amount of HIV/AIDS patients recorded in Africa (Besige, et.al, 2007). This disease has orphaned over 14 million children worldwide (UNAIDS, 2009). Sub-Saharan Africa is the region from where most of the HIV infected population originates, which is 67% of the HIV population, estimated to be 22.4 million people (UNAIDS, 2009). Within Sub-Saharan Africa, these HIV/AIDS epidemics vary greatly from country to country. However, in South Africa the levels of people being infected with HIV/AIDS is increasing and varies within each province with Kwa-Zulu Natal being the province with the majority of HIV infected individuals

(UNAIDS, 2009). The majority of the world's HIV population is found in South Africa which is approximately 5.7 million people (UNAIDS, 2009). In terms of gender, Statistics South Africa (2010) showed that 19,7% of the adults who are living with HIV/AIDS were female and therefore 80.3% were male. In regard to age, Statistics South Africa (2010) revealed that the largest age group of people who were infected with HIV/AIDS were between 15 and 49 years of age. UNAID (2010) stated that the prevalence of the virus in women is between the ages of 25 -29 whereas for men it is between the ages of 30 to 44. These statistics show that the virus is affecting adults who are in their child rearing years and who are of working age.

Due to the large number of individuals with HIV/AIDS, this epidemic can affect a country in numerous ways. Most people in Africa, who are living with the virus, are in the economically productive age group that supports both younger and older generations. However, when these individuals develop the symptoms of AIDS they will be the ones who will most likely receive little care (Morison, 2001). Bollinger and Stover (1999) state that there are numerous economical effects that HIV/AIDS can cause in a household. These will be the loss of income of the patients when they are sick, household expenditures may increase and other members of the family may miss school or work as a result of assisting their sick family member. The social impact is the fact that there will be a large portion of children who will be raised by siblings or grandparents. Currently, there are 3.4 million orphans and these children will then become an economic and social burden on the country (UNAIDS, 2010). HAART is expensive and negatively affects a country's financial status as the majority of patients who are living with HIV/AIDS require HAART as a form of treatment (Conner, Fan & Villarreal, 2007). Furthermore, the HIV/AIDS individuals also require hospitalisation which is also costly for the country's healthcare sector (Evian, 1992). These factors have a significant effect on HIV/AIDS management in the poorer and/or developing countries such as South Africa.

2.3. HIV – the virus

HIV is a retrovirus which has previously been associated with animals and these viruses are usually simple in nature (Van Dyk, 2008). However, HIV is in fact a complex virus and this

means that the virus can change itself rapidly enough so that different variants of the same virus which can be found in the same individual (Van Dyk, 2008). HIV is different from other viruses in that it has the ability to invade the immune system of the host (Evian, 1992). The virus itself is circular in shape and in the inner core, the virus stores its genetic material and proteins (Conner et. al., 2007). The genetic material and the proteins give the virus its ability to multiply (Van Dyk, 2008). HIV then attaches itself to a T-lymphocyte (CD4 cell) and these cells are the building blocks of the human immune system (Van Dyk, 2008). The virus then multiplies once it is inside another cell. The virus can only live inside human cells (Van Dyk, 2008). Once the HIV is inside the CD4 cell, it destroys it and this results in the decrease in the number of immune cells. The individual becomes infected with outside diseases (opportunistic infections) as the body has lost the ability to protect itself (Conner et. al, 2007).

2.4. Phases of the disease

As described above, the HI virus progresses and the CD4 cell count deteriorates. This results in a person moving to the stage of the infection termed AIDS (Larson, 1998). The higher the patient's viral load, the lower their CD4 count is and vice versa (Van Dyk, 2008). The progression of the patient developing AIDS is reported to be faster if their viral load is higher (Van Dyk, 2008). The clinical illness is usually two to four weeks from the time of HIV exposure (Brew, 2007). The illness itself is acute at onset with a median duration of 18 days and during this stage, the patient will experience flu-like symptoms (Brew, 2007). In most patients, there is a rapid resolution of these symptoms that is followed by a period of asymptomatic infection that can last for years (Brew, 2007). Patients that present with symptoms of HIV, especially for a period of longer than two months, reportedly progress to AIDS more rapidly (Brew, 2007).

There are different stages during the progression of the disease and these stages are categorised according to a person's CD4 count (Larson, 1998). The first stage is the Primary HIV Infection stage and this is when the patient changes from being HIV negative to HIV positive (seroconversion) (Shoub, 1999). Literature says that 60% of patients in this stage will present with symptoms similar to that of glandular fever e.g. sore throat, nausea,

vomiting, muscle pain, swelling of lymph nodes and gastrointestinal symptoms (Van Dyk, 2008). Symptoms at this stage will also include: wasting syndrome (unexplained weight loss), lymphadenopathy (swelling of the lymph glands) and neurological diseases which result in dementia, spinal cord damage and peripheral nerve damage (Conner, et. al., 2007). The second stage of the disease is termed the Asymptomatic Latent Stage and this is when the person has a CD4 cell count of between 500 and 800 cells/mm^3 of blood and presents with symptoms such as: swelling of lymph nodes, fever, herpes zoster, rashes, oral lesions, respiratory infections and fatigue (Evian, 1992). The third stage of the HIV infection is termed the Minor Symptomatic Stage and this is when the patient has a CD4 count of between 350 and 200 cells/mm^3 (Brew, 2007). During this stage the individual may experience the following symptoms: candida, recurrent herpes infections, night sweats, diarrhoea, abdominal discomfort and hairy leukoplakia, persistent coughs, lymphadenopathy and bacterial skin infections (Van Dyk, 2008). The fourth and final stage is termed the Severe Symptomatic Stage (AIDS- defining stage) which is when a person has a CD4 count of less than 200 cells/mm^3. During this stage, a patient is emaciated, with recurrent candida, herpes zoster as well as infections of the mouth, throat and oesophagus (Van Dyk, 2008). This means that the patient may have complications in their ability to swallow. Other symptoms during this stage include: diarrhoea, nausea, vomiting, pneumonia, peripheral neuropathies, HIV encephalopathy and gastrointestinal tract infections (Conner, et. al, 2007).

2.5. Transmission of HIV

A person acquires HIV/AIDS through bodily fluids such as blood and sexual fluids (Larson, 1998). An individual can contract HIV via contact with blood such as in needle sharing/blood transfusions and mother to child transmission through childbirth (Brew, 2007). A person can also contract HIV through sexual fluids (semen and vaginal fluids) when having unprotected sexual intercourse (Evian, 1992). In South Africa, the most common form of transmission is via sexual intercourse followed by mother to child transmission (UNAIDS, 2009). The least reported form of transmission in South Africa is that of needle sharing and blood transfusions (UNAIDS, 2009).

2.6. HIV testing

In South Africa, the majority of HIV antibody tests are done by testing a patient's blood (Conner, et. al., 2007). An antigen test can be done which is called the HIV PCR RNA test. This test looks at the number of viral RNA particles available in every ml of blood (viral load) (Van Dyk, 2008). However, it is very expensive and needs to be analysed in a laboratory. These tests only show a positive result 10-14 days after the individual became infected (Brew, 2007). The cheapest and most commonly used test is the ELISA test. This test is considered rapid and does not require laboratory analysis (Conner, et. al., 2007). A patient will have a positive result if the virus is detected within the blood sample (Brew, 2007). However, it is important to note that in some individuals it may take 6-12 months after their initial HIV exposure for their test results to be positive (Van Dyk, 2008). An acknowledged limitation of the test is that there can be false positives. However, in South Africa, two positive ELISA test results are considered adequate evidence of the HIV infection (Van Dyk, 2008).

2.7. HAART

People who are infected with HIV/AIDS are treated with Highly Active Antiretroviral Therapy (HAART) (Larson, 1998). HAART is a powerful, life-saving drug that is not a cure for HIV but that can slow down the progression of the disease and add many years to the lives of those who take them (Cohen, 1999). HAART has four primary goals:

1. To reduce the viral load as much as possible

2. To restore and/or preserve the immunological function as much as possible

3. To improve the patient's quality of life and

4. To reduce HIV-related illnesses and death (Van Dyk, 2008).

HAART works by inhibiting the HI virus activity in the cell at various points. These points include the attachment of the HI virus to the human, the replication of the RNA and the maturation of the HI virus within the cell (Conner, et al. 2007). HAART therefore works because it blocks the process of converting the cells RNA to DNA (Cohen, 1999). HAART also blocks a protein which prevents the virus from getting out of the cell causing it to die

(Cohen, 1999). HAART comprises of three or four different types of medications which include NRTIs, NNRTIs and PIs. NRTIs (Nucleoside/ Nucleotide Reverse transcriptase inhibitors) and NNRTIs (Non - Nucleotide Reverse transcriptase inhibitors) work to inhibit the HI virus from replicating its' RNA. Protease inhibitors interfere with the formation of new viruses by 'paralysing' the protease enzyme and therefore preventing the virus from replicating itself (Brew, 2007). Fusion inhibitors prevent the HI virus from entering the host cell (Van Dyk, 2008).

In South Africa, HAART became freely available to the public health sector in April 2004 (National Antiretrovial Treatment Guidelines, 2004). Fusion inhibitors are currently not available in South Africa.

There are three different HAART regimens which are used in South Africa. These regimens represent the combination of the different drugs that are used in each regimen (National Antiretrovial Treatment Guidelines, 2004).

Table 1: HAART regimens used in South Africa

Regime	**Drug**	**Category**	**Indication**
1 a	D4T 3TC EFV	NRTI and NRTI and NNRTI	For men and women who are not in child bearing ages and who are using injection contraception
1 b	D4T 3TC NVP	NRTI NRTI NNRTI	Women who cannot guarantee reliable contraception
2	AZT Ddl	NRTI NRTI	For patients who are virologically failing regime 1 despite

Regime	Drug	Category	Indication
	Lopinavir/ ritonavir	PI	showing their adherence to the regime.

(National Antiretroviral Treatment Guidelines, 2004).

There are various side effects of the HAART which are mentioned in the table below (Van Dyk, 2008). These side effects can lead to a decrease in the individual's quality of life as well as poor adherence to the medication (Daly, 2004).

Table 2: HAART medication and side effects

Medication name	Class of drug	Side effect
AZT	NRTI	Gastro – intestinal (GI) upset, headache, myopathy
Videx	NRTI	Peripheral neuropathy, nausea, diarrhea,
Hivid	NRTI	Peripheral neuropathy, oral ulcers,
Epivir	NRTI	GI upset, anaemia
D4T	NRTI	Peripheral neuropathy,
Abacavir	NRTI	GI upset
Combivir (AZT & lamivudine)	`NRTI	Myopathy, nausea, vomiting,
Tenofovir	NtRTI	Headache, GI upset,
Nevirapine	NNRTI	Rash and hepatitis

Medication name	Class of drug	Side effect
EFV	NNRTI	Rash, CNS symptoms
Nelfinavir	PI	Diarrhea
Indinavir	PI	GI disturbances, headache
Ritonavir	PI	GI upset, diarrhea, taste perversion
Fortovase	PI	GI upset, headache

(Van Dyk, 2008)

Side effects such as GI upsets, taste perversions as well nausea and vomiting may lead to a person not wanting to or having an inability to eat (Daly, 2004). It is therefore important for the SLP to assess the causes of the dysphagia as to determine whether the patient was on HAART at the time of the assessment.

2.8. Normal swallow physiology

Swallowing is an extremely complex process that requires the involvement of the central nervous system to co-ordinate it. The co-ordination centre responsible for the process of swallowing is located in the reticular formation in the medulla which is located in the brainstem (Bass, 1997). The involvement of the central nervous system (CNS) would indicate that swallowing encompasses both voluntary and involuntary movements that rely upon both sensory and motor input from cranial nerves. Swallowing is a complex process that utilizes 31 pairs of striated muscles (Bass, 2006).

The act of swallowing or deglutition is a continuous process (Langley, 1993). The act of swallowing is better understood if it is considered as one continuous process with four components or stages. These stages act together in an integrated manner to achieve a successful swallow function. By dividing the swallow into four stages, it makes the process

easier to identify where the dysphagia is occurring and how to assess and manage it. (Langley, 1993). Each of these stages is interdependent and must be carefully assessed to fully understand dysphagia (swallowing disorder). The four stages of swallowing are the oral preparatory phase, the oral phase, the pharyngeal phase and the oesophageal phase (Cichero, 2006). Respiration is also important in the swallowing process. In the oral phase the patient breathes through their nose. As the pharyngeal phase begins, breathing is ceased for approximately one second. Breathing is then commenced again during the oesophageal phase. If a patient has difficulty with respiration or the co-ordination of the respiration during the swallow, then that can also lead to a dysphagia (Cichero, 2006).

The first stage of the swallowing process is the oral preparatory phase (Langley, 1993). The oral preparatory phase involves lip closure, buccal and facial musculature tension, mandibular (jaw) movement, lingual range of motion (ROM) and anterior velar movement. During this stage food is transferred from the oral cavity to the oropharynx (Bass, 2006). The movements that occur in the oral preparatory phase will be dependent on the consistency of what is being swallowed (Cichero, 2006). During this phase, the food is mixed (chewed) and manipulated with saliva to form a bolus (Logemann, 1998).

Chewing is a voluntary process which is stimulated by placing food between the molars and the sensory information is picked up by the teeth and gums (Cichero, 2006). The masseter, medial pterygroids and temporalis muscles are involved with mastication (Bass, 2006). For chewing or mastication to occur, the jaw needs to actively engage by opening and closing. This involves the digastric and lateral pterygroids muscles which allow the mandible to open and close (Langley, 1993). Secondly, the shaping of the bolus must occur. The tongue moves around the oral cavity, pressing the bolus against the hard palate and the ridge of the teeth. The buccinator muscle is involved in keeping the lips closed so that the food remains in the mouth (Logemann, 1983). The soft palate is lowered during this stage and nasal breathing occurs (Langley, 1993).

The next phase of the swallow is the oral phase. This phase begins as the bolus is prepared to be moved posteriorly towards the pharynx (Logemann, 1998). The tip and blades of the

tongue then rise and form a chute and funnels the bolus to the pharynx (Langley, 1993). When the bolus reaches the faucial arches the swallowing reflex is initiated. The soft palate rises and breathing ceases for approximately one second (Langley, 1993). The oral phase needs adequate lip closure to prevent anterior spillage, adequate lingual movement and intact buccal musculature to prevent pooling (Cichero, 2006). When the food enters the pharynx, the pharyngeal phase begins.

The pharyngeal phase begins when the swallow reflex is initiated. This phase involves the highly co-ordinated transport of material from the oropharynx, around the occluded laryngeal vestibule and into the relaxed oesophagus (Bass, 2006). This stage is involuntary (Langley, 1993). During this stage, breathing has ceased. The bolus is thrust down as the faucial arches constrict, the soft palate elevates and the pharyngeal constrictors contract. The bolus is then moved into the valleculae as the pharyngeal muscles constrict, the base of the tongue moves forward, the larynx elevates, the vocal cords adduct and the epiglottis folds down over the opening of the larynx (Langley, 1993). The bolus is then moved through the final part of the pharynx and into the cricopharyngeal sphincter and enters the oesophagus via peristalsis. Peristalsis is described by Schulze-Delirieu & Perlman (1998) as a co-ordinated propulsive contraction of the oesophagus which helps propel the bolus through the oesophagus into the stomach. The pharyngeal phase should usually last approximately one second (Logemann, 1997).

Finally, the bolus enters into the involuntary oesophageal phase. This stage is when the material is transported along the oesophagus into the gastro-oesophageal sphincter (Bass, 2006). The food moves down the oesophagus through peristalsis (Logemann, 1983). The bolus then enters the stomach via the gastro-oesophageal sphincter (Langley, 1993).

In summary, normal deglutition is a continuous process that is rapid and involves both voluntary and involuntary aspects that require complex neuromuscular control (Logemann, 1997). This control involves the interplay of numerous sensory and/or motor cranial nerves as well as specific parts of the brain that are supplying information to the appropriate muscles of deglutition (Bass, 2006). The process of swallowing basically involves the transfer of food

from the mouth to the stomach where it can be digested. If there is an abnormality in any part of this process, it is termed a dysphagia.

Dysphagia can occur as result of numerous medical complications which can affect the CNS or the anatomy of the swallowing mechanism. How can a CNS complication result in a dysphagia? A study done by Hoshino & Kobayashi (1994) highlighted that stroke is a leading cause of dysphagia and aspiration pneumonia in adults. Langley (1993) and Logemann (1997) state that swallowing disorders occur in patients with numerous neuromuscular effects such as: stroke, head injuries, cranial nerve palsies, myopathies and degenerative diseases. As the CNS serves as a reservoir for the HI virus, this can result in neurological complications, thereby causing a possible dysphagia (Brew, 2007). It is therefore important for a study to be conducted in this area especially in South Africa where there is an epidemic of HIV disease.

2.9. How HIV can lead to dysphagia

HIV destroys the immune system of its host and eventually leads to AIDS. It also provokes a variety of problems, one of which is dysphagia. Dysphagia in adults who are infected with HIV/AIDS can be triggered by the effects of the virus, opportunistic infections and HAART.

2.9.1. HIV

The HI virus is able to affect the CNS which comprises of the brain and spinal cord (Brew, 2007). Cohen & Burger (2007) highlighted the fact that the brain was the second most common organ to be affected by the HI virus, second only to the lungs. Mochan, Modi & Modi (2002) stated that up to 40% of HIV positive patients will have some form of neurological manifestation. The virus is able to cross the blood brain barrier and can therefore lead to changes in white matter of the brain and can affect the functioning of the cranial nerves and blood vessels (Brew, 2007). If the cortex (posterior cortex and brainstem) is affected it will affect the overall swallowing physiology especially on muscle functioning such as in the case of meningitis, dementia or stroke (Logemann, 1997). In the case of a stroke, the exact role of how the HI virus can cause a stroke is not yet known. It is suggested that due to vasculopathies of the extra and intracranial arteries the virus can cause a stroke

may perhaps occur (Bryer, Candy, De Villiers, Tipping & Wainwright, 2007). The vasculopathies are also true in the cases of dementia (Bryer, et. al, 2007). As the HI virus affects the dorsal root ganglions and causes degeneration of the distal axons of the nerves, a neuropathy can arise (Cherry, Hoke, Keswani, McArthur & Pardo, 2002). HIV related neuropathies are the most common neurological manifestation in the HIV population (Cherry, et. al, 2002). These neuropathies can lead to a dysphagia as both the oral and pharyngeal phases require optimal functioning of the cranial nerves. The most commonly affected cranial nerves have found to be the sixth nerve followed by the third, fourth, seventh, eighth, tenth, eleventh and twelfth (Cohen & Berger, 2007). The HI virus can also result in myopathies which affect the musculature that is required at all the stages of the swallow (Cherry, et. al, 2002). Therefore, it can be assumed that in a patient who has a myopathy, it is possible that the patient has an oropharyngeal dysphagia. It can therefore also be assumed that as the CNS holds and is affected negatively by the HI virus in that it can lead to a dysphagia (Brew, 2007). As the virus effects the functioning of the CNS, this can lead to various oral and pharyngeal phase disorders. The medical consequences of the CNS related dysphagia can be a poor cough reflex, poor sensation and therefore possible aspiration.

2.9.2. Opportunistic infections

The CNS can also be affected due to various opportunistic infections (Bryer, et. al, 2007). As the viral load begins to increase, the patient becomes more vulnerable to opportunistic infections (Katz, 2003). Studies that have been conducted in the area of HIV/AIDS have discovered other opportunistic infections that can result in a dysphagia as these infections affect the anatomy of the swallowing mechanism. Bhojwani and Prasad (2006) showed that 49% of patients who were living with HIV/AIDS complained of oropharyngeal symptoms and up to 70% of those patients developed oropharyngeal symptoms during the course of the disease. The opportunistic infections can be categorised into bacterial, fungal, viral and malignant (Brew, 2007). Some bacterial infections include: meningitis, herpes simplex and toxoplasmosis. The most common bacterial infection found in patients who are living with HIV/AIDS is reported to be bacterial meningitis (Cohen & Berger, 2007). Bacterial infections have also been known to cause various neuropathies which will affect the functioning of the cranial nerves (Cohen & Berger, 2007). As these infections can lead to poor functioning of

the cortex and cranial nerves, it can be inferred that a patient who has a bacterial infection which affects the CNS, may present with a dysphagia.

2.9.2.1. Fungal infections

The most common fungal infection that can occur in a patient who is living with HIV/AIDS is candida (Anteyi et. al, 2003). The most common oral manifestation found in numerous studies done in both developed and developing countries was oral candida (Besige, et. al, 2003; Bhojwani & Prasad, 2006; Gillespie, 1993). These studies also assert that if a patient presents with oral candida that the patient is predisposed to developing oesophageal as well as possible laryngeal candida (Bhojwani & Prasad, 2006). Candida has been proven to lead to dysphagia and odynophagia (painful swallow). However, the specific presentation of the dysphagia in terms of the actual symptomology has not been widely investigated. Candida can occur in the oral cavity as well as in the larynx and oesophagus (Cohen & Berger, 2007).

2.9.2.2. Viral infections

The numerous viral infections that can occur in a patient living with HIV/AIDS are: meningitis, Guillen-Barre syndrome, cytomegalovirus as well as viruses that can lead to encephalopathies and myopathies (Brew, 2007). Myopathies and Guillen-Barre syndrome result in muscle pains and weakness (Berger &Cohen, 2007). In order for a normal swallow to occur, it is imperative that the muscles of the head, neck and spinal cord are functioning optimally, therefore a patient who is suffering from a CNS related disorder, may suffer from dysphagia. Cytomegalovirus can result in encephalitis and therefore suppress the functioning of the CNS which can lead to a dysphagia (Brew, 2007). CMV can also lead to complications within the oesophagus resulting in a possible mechanical cause of dysphagia (Cohen & Berger, 2007).

2.9.2.3. Malignancies

In some cases, opportunistic infections can become malignant such as in the case of Kaposi sarcoma and squamous cell carcinoma (Besige, et. al, 2003). Kaposi sarcoma can lead to

large painful oral lesions which may result in poor oral movement and therefore a dysphagia (Anteyi, 2003). In the case of squamous cell carcinoma, it usually manifests in the larynx and oesophagus (Cohen & Berger, 2007). For malignancies, the treatment is usually radiation or chemotherapy (Katz, 2003). Side effects of these treatments can lead to a dry mouth as well as pain as the oral mucosa which becomes dry and exposed (Gillespie, et. al, 1993).

2.9.3. HAART

HAART, a treatment regimen that patients with HIV/AIDS have to take, has been known to have side effects that can lead to possible dysphagia (Daly, 2004). Some of these side effects include: nausea, vomiting, GI upsets, gastro-oesophageal reflux disease (GORD) and taste aversions (Van Dyk, 2008). HAART can also result in neurotoxicity and cause a neuropathy, specifically in the cases of NRTI and d4T (Cherry, et. al, 2002). If a patient is feeling ill due to these side effects, it will prevent the patient from eating adequately which can lead to malnutrition and dehydration (Daly, 2004). These side effects can also affect a person's quality of life negatively because if a patient feels unwell it will affect their health, psychological and social well being (Daly, 2004). Some of the side effects of HAART can be nausea and vomiting. These are serious side effects as they can lead to dehydration and malnourishment. It is important to manage this in an HIV/AIDS patient as good nutrition is vital in order to maintain an adequate immune system thereby preventing opportunistic infections (Antoni, Costa, Dahn, Gonzalez, Malow, Penedo & Schneiderman, 2003).

In summary, the stages of swallowing can be affected in the following ways:

- Oral candida: oral candida is a fungal infection that occurs in the oral mucosa, mostly on the tongue and can be very painful (Anteyi, et al, 2003)
- Kaposi Sarcoma: this is a form of cancer that is common in HIV positive patients. These cancers can occur in the oral cavity therefore restricting oral musculature movement and creating a blockage so that the bolus is unable to move from the oral cavity to the pharynx (Besige, et al, 2007).
- Neurological conditions such as stroke, meningitis, AIDS dementia complex, myelopathy and cerebellar disorders: as stated above, up to 70% of patient who are living with HIV/AIDS will experience some form of neurological deficit. These neurological impairments can lead to decreased sensation in the oral cavity as well as

decreased strength and movement of the oral musculature which can result in difficulty manipulating the bolus (Bass, 2006).

- Steven Johnson Syndrome: this disease results in the epidermis being removed and subsequent pain and bleeding all over the body including the oral cavity (Clayton & Kennedy, 2007).

How the pharyngeal phase is affected by various infections:

In summary, the pharyngeal phase of the swallow involves the bolus passing from the oral cavity and into the pharynx before it reaches the oesophagus. Breathing is ceased during this phase. HIV/AIDS can affect the pharyngeal stage in the following ways through opportunistic infections:

- Candida: the fungal infection can spread down into the pharynx which can result in pain and discomfort during the swallow (Anteyi, et. al., 2003).
- Neurological conditions: some neurological conditions can result in weakness, delayed and inco-ordinated swallow which can lead to aspiration (Brew, 2007).

How the oesophageal phase is affected by various infections:

The oesophageal phase of the swallow begins when the bolus passes through the UES until the bolus enters the stomach. This can be affected by candida which will result in odynophagia (Anteyi, et. al., 2003).

2.10. Concerns about dysphagia in HIV

Aspiration pneumonia is a common medical consequence of dysphagia and has the most severe side effects on the individual (Ellis, Miford, Morton & Pinnington, 2002). Aspiration pneumonia is caused by aspirating on ingested material. Aspiration is when secretions or ingesta enter below the level of the true vocal cords (Perlamn & Schule-Delirieu, 1998). Therefore, aspiration pneumonia can interfere with breathing or cause pulmonary inflammation or infection and in severe cases, even death (Cichero, 2006). Aspiration can occur before the swallow or during the pharyngeal phase and is more likely to occur during

the pharyngeal phase in patients with a neurodisability due to pharyngeal delay and poor laryngeal elevation (Ellis, et. al, 2002; Curtis & Langmore, 1997). Furthermore, poor laryngeal elevation can lead to impaired laryngeal inlet closure and patients can therefore aspirate during the swallow (Ellis, et. al, 2002). In chronic cases of dysphagia, it can lead to pneumonia, which is a lung infection (Cichero, 2006). Perlman and Schulze-Delirieu (1998) describe aspiration pneumonia as an infection of the lung following aspiration. Pneumonia is important to manage and prevent because complications of pneumonia can be asthma attacks, chronic coughing, lung abscesses or even death (Brockett, 2007). Ellis et. al. (2002) reported that patients who aspirate suffer from more frequent chest infections than those who do not aspirate. A patient can aspirate either before, during or after the pharyngeal phase (Cichero, 2006). A patient can aspirate before the pharyngeal phase begins as the food spills over the tongue before the swallow is initiated. Aspiration can also occur during the pharyngeal phase when the food enters the trachea. Lastly, aspiration can occur after the swallow when the patient aspirates on their reflux (Cichero, 2006). Based on the above, all the possible risks and complications of aspiration have been highlighted and it is therefore one of the key areas that a speech therapist needs to assess and manage appropriately.

Patients who do not display a cough reflex are also at risk of developing aspiration pneumonia. It can occur as the patient will not be able to 'cough up' the bolus that is in the airway (Halvorsen, et. al, 2003). As HIV/AIDS affects the central nervous system, this can result in the decreased functioning of the nerves and musculature that are involved in the swallow. This decreased functioning or neurodisability presents as weakness, inco-ordination, paralysis and decreased sensation of the pharyngeal and laryngeal musculature and this can lead to weak or absent cough reflex, followed by aspiration. Patients who have a decreased level of consciousness will be at risk of aspiration as the patient is often unaware of the food in their mouth. They will therefore be unable to control the bolus and thus initiate the swallow reflex adequately (Miller & Schultze-Delirieu, 1997). In addition, patients who have a CNS infection (such as dementia or meningitis) may have a decreased level of consciousness. This can also cause aspiration (Cichero, 2006). Patients can aspirate on their own oral bacteria which will also lead to pneumonia as the bacteria from the saliva that enters the lungs will create an infection (Scannapieco, 1999). Odynophagia (painful swallow) can occur possibly as a result of various opportunistic infections which may lead to difficulty

swallowing. In summary, a patient who presents with a neurodisability is at increased risk of developing a dysphagia and that can lead to possible aspiration.

Other medical consequences of dysphagia include anaemia, weight loss and dehydration (Stevens, 2005). A person is considered to be anaemic when there is insufficient iron in their blood. The HI virus can result in an individual developing anaemia as the virus causes various haematological complications which prevent the iron from remaining in the body as well as through various opportunistic infections (Moyle, 2002). Anaemia in the patient who is living with HIV/AIDS can have serious medical side effects as anaemia can lead to increased mortality, especially in patients in the advanced stages of the disease (Munderi, Ssali, & Reid, 2006). Anaemia can also lead to a decrease in a patient's quality of life because it results in fatigue (Moyle, 2002). HAART has been shown to prevent the progression of anaemia except in the case of d4T which can result in anaemia developing (Moyle, 2002). However, if a patient is dysphagic as well, it can exacerbate the problem. If a patient is either eating food or drinking liquids that do not contain vital nutrients due to the dysphagia, this can also lead to anaemia. This is of the utmost importance in the HIV population because adequate nutrition is vital in maintaining a good immune system (Hussey, Kossew, Maartens & Visser, 2003). Adequate intake of vitamins and minerals will assist the immune system with producing anti-bodies (T-lymphocytes) which will strengthen the immune system (Hussey, et. al, 2003). In HIV/AIDS patients, the number of T-lymphocytes are decreased which results in the immune system not functioning optimally. It is therefore, of vital importance that the patient receives adequate nutrition in order to assist in maintaining a strong immune system (Cohan, Gregg, Murreheim, Rudenstein & Turner, 1993).This is crucial because having an infection will decrease a patient's nutritional status and having a decrease in proteins and micronutrients will lead to a decrease in antibody formations. Illness decreases the appetite and therefore the patient will not want to eat (Scrimshaw, 2007). Cohan, et al, (1993) reported that a patients' nutritional status influences survival independent of the patients' CD4 count. Scrimshaw (2007) highlights that in patients with HIV/AIDS, as the disease progresses rapidly, that this progression will lead to vitamin deficiencies also due to patients not eating regularly.

The majority of HIV patients suffer from weight loss and malnutrition as a side effect of the disease (Klotz, Ngo, Nguyen, Nguyen & Vu, 2007). The HI virus may result in weight loss

because of increased energy usage, due to the response to opportunistic infections (Parker, Waters & Williams, 1999). Profound weight loss in the HIV population is associated with rapid disease progression and increased mortality (Parker, et al. 1999). It is mentioned that weight loss in patients who are living with HIV/AIDS is multifactoral and that early identification and management is essential as it can promote survival and improvement in daily functioning (Parker et. al, 1999). Apart from the HI virus itself, during the time of an active infection, nutrition levels may decrease due to poor food intake (Hussey et. al, 2003). Various gastrointestinal complications have been associated with weight loss such as: oral and oesophageal candida, xerostomia and Kaposi sarcoma (Parker, et. al. 1999). These opportunistic infections have also been associated with a dysphagia (Besige, et. al, 2003). Patients who are suffering from tuberculosis (which is common in HIV/AIDS) may experience a decrease in appetite (Brew, 2007). In addition, a dysphagia can lead to malnutrition and weight loss because the patient is unable to eat a wide variety of foods or any food at all (Anteyi, et. al., 2003). However, HAART has been associated with a reduced prevalence in weight loss (Parker, et. al, 1999).

Dehydration can also occur as a side effect of dysphagia either because the patient refuses to drink liquids or because the patient is unable to tolerate liquids and thin liquids have been removed from their diet in order to prevent aspiration (Langley, 1993). It is important to manage the patient correctly as dehydration can lead to kidney failure and ultimately death (Brew, 2007).

It is therefore of great importance that a dysphagia in the HIV/AIDS population is managed correctly in order to avoid some or all of the above-mentioned consequences, as these can have significant implications on the patient's quality of life and health. Ellis et. al. (2002) states that therapists and other clinical professionals need to manage these feeding difficulties effectively, hence the importance of this study.

2.11. Multidisciplinary Team management of dysphagia

In order to assess and manage a patient correctly numerous team members are required to be involved (Langley, 1993). The assessment requires the speech therapist to screen and conduct a full bedside assessment. Once it has been established that a dysphagia is present it may be necessary to conduct further radiological examinations. Ear, nose and throat (ENT) doctors as well as radiologists are often called to conduct assessments such as Fiberoptic Endoscopic Evaluation of Swallowing (FEES) and modified barium swallows (Dziewas, Hamacher & Oelenberg, 2009). Once a thorough assessment has been conducted and a diagnosis has been made, it is important to develop a treatment plan. As the swallowing mechanism consists of numerous nerves and muscles it is important to note that the management of the HIV/AIDS dysphagic patient requires numerous medical professionals to be involved. Langley (1993) states that the following medical professionals need to be involved in the care of these patients: Medial staff (neurologists, ENT, etc), nurses, dieticians, physiotherapists, occupational therapists, radiographers/ radiologists. The neurologists and ENT surgeons are involved for the medical and surgical treatment of the neurological and structural cause of the dysphagia (Langley, 1993). Nurses are responsible for the monitoring of patient's vital signs before, during and after the swallow as well as oral care which is important to prevent infections (Kalra, Ramsey & Smithard, 2006). Dieticians are essential in deciding what types of food the patient can eat as well as monitoring the patient's nutritional status (Langley, 1993). Occupational therapists are important to establish independence during activities of daily living, such as eating (Langley, 1993). If a patient is able to eat independently it can improve their confidence and therefore their quality of life (Druck & Ross, 2002). Physiotherapists are experts in the area of muscle physiology and function and can therefore assess and treat the muscles involved in the swallowing mechanism (Langley, 1993). The principal team member in managing the dysphagic patient is the speech therapist as the SLP has specialised training in the head and neck anatomy and physiology and is the only member who can perform swallowing assessments, differential diagnosis and the appropriate management of the dysphagia (Pettigrew & O' Toole, 2007).

2.12. Assessment of dysphagia

As described above, it is important to accurately assess a patient with a dysphagia in order to ascertain where the difficulty lies. When assessing a patient, it is important to remember that

swallowing can be seen as a hydrodynamic system in which the bolus is transferred through a series of in-line chambers that are separated by valves at the entry and exit points (Carrau & Simental, 2004). There are different methods for assessing the swallowing mechanism in patients. These assessments can be divided into clinical and objective assessments methods.

Initially, the SLP should utilise clinical methods. The SLP will begin by screening the patients for a dysphagia. Screenings are important to identify whether an oropharyngeal dysphagia is present or not, through reading patient files, asking patients and taking adequate histories from the medical professionals (Sheppard in Cichero, 2006).

Once a patient has been screened and found to present with a possible dysphagia, a clinical bedside assessment is done. The clinical bedside assessment provides a preliminary assessment of the patient's current medical status, their needs for nutrition and alertness (Carrau & Murray, 2006). As the bedside assessment requires the patient to follow instructions, not all patients are able to have a full assessment, for example, if the patient has a cognitive impairment or is not alert (Carrau & Murray, 2006). When a full assessment is applicable, it is usually simple, repeatable and highly sensitive to detecting a dysphagia (Hinds & Wiles, 1998). The patient should be seated between 45^{o} and 90^{o} in order to optimise safe swallowing (Kalra, Ramsey & Smithard, 2006).

The assessment should begin with a thorough examination of the oral cavity for masses, deficits of tongue strength and range of motion, status of the oral mucosa, neurological deficits and salivation (Carrau & Simental, 2004). This assessment informs the therapist whether there are difficulties in the functioning of the oral musculature that could affect the patient's swallowing ability (Carrau & Murray, 2006). The clinical bedside assessment entails the therapist giving different volumes and consistencies of food, assessment of dribbling, laryngeal movement, productiveness of a cough, voice changes and the time taken to swallow (Broker, 2009). The SLP assesses the swallow using various food consistencies ranging from liquid, thick liquid, puree, semi-solid and solid. While the patient is swallowing the SLP is evaluating the oral and pharyngeal phases of the swallow (Carrau & Murray, 2006). During the assessment, the SLP should also evaluate the adequacy of the velopalatine

sphincter and pharyngeal contraction (Carrau & Simental, 2004). This is because velopalatine sphincter inadequacy can lead to nasal regurgitation in some patients and pharyngeal contraction is important in order to prevent pooling of the bolus in the valleculae which can lead to later possible aspiration (Bass, 2006). The cranial nerves IX and X should be assessed to determine palatal elevation and sensation because if a patient has decreased oral sensation, then this can lead to nasal regurgitation and over the top spill. This occurs when the bolus flows over the base of the tongue without the patient actively swallowing and this in turn can lead to aspiration (Carrau & Simental, 2004). A physical examination of the larynx during the swallow may also identify the presence of masses, deep muscle fixation of the tongue base or surgical changes that may interfere with the transfer of the bolus in the pharyngeal phase (Carrau & Simental, 2004). The advantages of a clinical assessment are that it is quick, various consistencies can be used, it does not rely on electricity or technology and it is less expensive (Broker, 2009). Due to these advantages, it is convenient to use this assessment method in the South African context as there are often budget constraints and lack of equipment to assess patients. The bedside assessment also assesses the signs and symptoms of dysphagia. The disadvantage of a clinical assessment is that the interpretation of the findings is subjective and it is sometimes difficult to accurately assess the pharyngeal phase (Langley, 1993).

For this research, the Mann Assessment of Swallowing Ability (MASA) (Mann, 2002) which is a clinical bedside assessment was used. The MASA was developed because there was a lack of standardised assessment measures that SLP's could use for bedside assessments. This is important for the SLP community as most patients who present with a dysphagia have a poor prognosis and the chance of them developing serious complications are high (Mann, 2002). The MASA is a recently developed psychometric swallowing assessment that was standardised on hospitalised stroke patients in Australia (Mann, 2002). This tool was deemed appropriate to use in the research because it assessed all phases of the swallow reflex and has already been standardised, although not on the South African population. It has been well documented that HIV is able to cross the blood barrier and enter the CNS where it can cause neurologically based problems such as dysphagia.

The bedside assessment has also been shown to be less sensitive and specific to showing a dysphagia (Dziewas, Hamacher & Warnecke, 2009). This subjectivity in the interpretation of

the bedside assessment can often require an objective assessment in order to confirm the findings of the SLP. This usually occurs when the patient presents with possible pharyngeal difficulties. This assessment includes evaluating the swallow from the oropharynx to the level of the oesophageal sphincter (Logemann, 1997). There are different methods in which an objective assessment can be done, such as Videofluroscopy (VFS) or modified barium swallow, Fiberoptic Endoscopic Evaluation (FEES) and cervical auscultation (Burrell et al, 1998) and oesophograms to name a few (Halvorsen et al, 2003).

FEES is performed by an endoscope being passed through a patient's nostril allowing the pharynx, larynx and oesophageal sphincter to be visualised (Dziewas, et. al. 2009). FEES has been proven to be equal to, or better than the MBS in the detection of aspiration and severity of residues (Dziewas, et al. 2009). Current research also concludes that dietary and behavioural guided management by FEES has proven to have better patient outcomes in stroke patients (Dziewas, et. al, 2009). The advantage of FEES is that it can be utilised at the patient's bedside and is repeatable (Dziewas, et. al., 2009). If a patient requires numerous evaluations for pre and post rehabilitation assessments, FEES can be used as it is repeatable due to the lack of radiation. FEES also allows for the evaluation of the motor and sensory components of the swallowing mechanism and permits the assessment of the protection of the patient's airway (Dziewas, et. al, 2009). Studies that have been conducted using FEES as an assessment measure on patients with various underlying causes of dysphagia have concluded that FEES is a safe method of assessment (Dziewas, et. al. 2009). Various studies that have used FEES as an assessment measure have also used a bedside assessment in conjunction with the FEES (Dziewas, et al. 2009).

Cervical auscultation is an assessment method where the SLP listens to the sounds of the swallow with a stethoscope during the pharyngeal phase in order to detect a dysphagia (Borr, Hielsher- Fatabend & Lucking, 2007). The stethoscope is placed on the lateral aspects of the neck above the cricoid cartilage in front of the sternocleidomastoid muscle and the large blood vessels in the neck (Borr, et. al, 2007). The SLP is required to listen to the sounds of the pre, during and post swallow (Coyle, Drinnan, Ford & Leslie, 2007). The advantages of cervical auscultation are that it is inexpensive, non-invasive and it can be done with minimal co-operation (Coyle, et, al. 2007). The disadvantages are that there is a lack of research

proving it's reliability and validity and relies solely on individual interpretation of the results. It should only be used in conjunction with other assessment measures and the SLP requires previous experience in interpreting the sounds (Coyle, et. al, 2007). However, there are other measures of assessment that are more reliable.

The Modified Barium Swallow (MBS) is said to be the gold standard in terms of objective radiographic assessments (Broker, 2009). Halvorsen (2003) states that MBS increases the understanding of the swallow physiology and can identify the dysfunction of the swallowing mechanism. The MBS is used to analyse the anatomy and physiology of the oropharyngeal swallow and to examine the effectiveness of the selected rehabilitation strategies that are designed to eliminate aspiration or excess oral or pharyngeal residue (Logemann, 1997). The MBS is also important in order to analyse the entire upper digestive system and it's periodic nature which can lead to missed aspiration, pooling or discrete mucosal masses as well as to evaluate the propulsive mechanism velopalatine closure and upper oesophageal sphincter closure (Carrau & Simelante, 2004). The MBS is a multidisciplinary evaluation of the swallowing mechanism between the radiologist, radiographer and the SLP (Carrau & Murray, 2006). In the MBS, the patient is seated or standing in an upright posture and ingests a barium-coated bolus or has liquid barium of various consistencies which is used at the discretion of the SLP (Carrau & Murray, 2006). The radiologist mostly views the images in a lateral position from the teeth to the posterior pharyngeal wall (Kalra, et. al, 2006). The MBS usually starts off with thin liquids and then becomes gradually thicker (Carrau & Murray, 2006). The MBS is of most relevance to this study as the majority of South African government hospitals have access to this equipment. This is because the equipment is available in South Africa and therefore the costs of running this equipment is kept to a minimum.

There are advantages and disadvantages to this assessment method as well. The advantages of an instrumental assessment are that it is objective and it is more accurate (Langley, 1993). As the swallowing process is rapid, the MBS is capable of capturing the salient components of the process over time thereby analysing the physiological components of the swallowing mechanism while evaluating the flow of the bolus in relation to the structural movements (Logemann, Martin-Harris & McMahon, 2000). The disadvantages of the objective assessments are that it is expensive, the patient is exposed to radiation and a limited number

of consistencies can be used (Langley, 1993). The SLP must be aware of the signs and symptoms of a dysphagia as well as the signs and symptoms of aspiration during the assessment. The SLP also requires an adequate knowledge of the anatomy and physiology of the swallowing mechanism and how to identify these on an x-ray (Logeman, 1997).

It is therefore important that an accurate assessment be conducted in order for appropriate management of the patient to be done. A study conducted by Atwood, Gross & Ross (2008) showed that in 25 patients who were diagnosed with Parkinson's disease the MBS was shown to be highly sensitive in accurately diagnosing swallowing difficulties (Atwood, et. al, 2008). The MBS has also been proven to be a powerful tool in the management of the dysphagic patient (Logemann, Martin Harris, McMahon, Sandidge & Schleicher, 2000).

There have been some studies that have looked at HIV/AIDS and these studies have been summarised below:

Table 3: Research conducted in the area of HIV/AIDS

Author	**Country**	**Sample**	**Measure**	**HAART**	**Findings**
Halvorsen, Kearney & Moelleken	USA	17 out patients	Videofluroscopy and barium esophograms	Not stated	Dysphagia present
Mangannini, Olmos, Piskorz & Zalar	Argentina	18 out patients	Videofluroscopy	Not known	Aspiration noted
Daly	RSA	80 out patients	Questionnaire	Not all were on HAART	Dysphagia was reported

The above table highlighted that research was being conducted in both developed and developing countries. The study that was conducted in South Africa was done by a speech therapist but it was carried out utilising a questionnaire. It is noted that these research studies

only used objective measures or subjective questionnaires. This research study is different as it utilised clinical and objective measures. It is also noted that HAART was not a variable that was analysed whereas in this study, HAART was specifically analysed as an independent variable. Another significant difference is that these research studies utilized out-patients and this study used in-patients. This study therefore took a different methodological approach when compared to the other studies that have been conducted in this area.

The table below is a summary of different articles that highlight what assessment methods are being used in dysphagia research in various countries.

Table 4: Current research trends in dysphagia

Author	**Country**	**Sample**	**Condition**	**Measure**
Hinds & Wiles	UK	115	CVA	Questionnaires and the timed water swallow test
Brainin, Dauchenhausen, Enderele, Nowotony, Teuschel & Trapl	Austria	50	CVA	Gugging Swallow Screen and FEES
Roth	Brazil	26	CVA	Standard bedside swallow assessment
Asimos, Peebles, Price, Singh & Turner – Lawrence	USA	103	CVA	Screening
Burrel,,. Leder, & Sasaki	USA	400	Neurological, medical and surgical	FEES

Author	Country	Sample	Condition	Measure
Corti & Martin	Argentina		HIV/AIDS	Endoscopy
Corlew &Martin	USA	9	Dysphagia	Videofluroscopy
Gefter, Laufer, Levine, Katzka, Pikus, Rubesin & Yang.	USA	381	Dysphagia	Videofluroscopy
Terre & Merin	Spain	64	CVA	Clinical bedside and videofluroscopy
Alonso, Chavarri, Gomez Senet & Lucendo Villarin.	Spain	9	Oesophagitis	Endoscopy
Ellis Milford, Morton & Piunnington	UK	12	Dysphagia	Videofluroscopy
Hoshino , Kobayahi, Okayama, Sasaki & Sekizawa	Japan	30	CVA	Clinical (water only)
Kalra, Ramsey & Smithard	UK	Not mentioned	CVA	Comparison between videofluroscopy, FEES and bedside

As is evident from the above table, most studies are being conducted by only one measure, either clinical or objective. The majority of the studies have also used a sample size of smaller than 100 participants. The studies that have utilised larger populations have used an objective method for assessing. Most of these studies have only been conducted in first world

countries and none in Africa, therefore showing the need for research to be conducted in this area in South Africa. This study therefore utilised both subjective and objective measures with a large sample size in order to adequately describe a patient's dysphagia. The subjective assessment that the researcher used was a bedside assessment as this provided the researcher with more clinically relevant information in terms of the patient's signs and symptoms as opposed to only a questionnaire. The MBS allowed the researcher to confirm the clinical findings.

2.13. Treatment of dysphagia

After a thorough bedside assessment has been conducted with a possible instrumental assessment having been utilised, it is the role of the SLP to treat the swallowing disorder (Langley, 1993). There are two methods of treatment that can be used: compensatory or rehabilitative (Stevens, 1994). Compensatory techniques are used to compensate for the difficulties/symptoms that a patient is experiencing e.g. swallowing manoeuvers and diet modifications (Stevens, 1994). Rehabilitative techniques attempt to rehabilitate the swallowing anatomy in order for the patient to attempt to swallow normally (Stevens, 1994). This study set out to identify the signs and symptoms of dysphagia in HIV/AIDS and that can only be established through assessments. Therefore the discussion on treatment is not extensive since that is outside the scope of this study.

2.14. Rationale for the study

For the SLP practicing in South Africa, it is noted that there is little data on how HIV/AIDS affects a person's swallowing ability. Incorrect management of dysphagia can lead to increased hospitalisations, aspiration, aspiration pneumonia and ultimately a decreased quality of life (Stevens, 1994).Dysphagia can affect quality of life in the following areas based upon the International Classification of Functioning, Disability & Health (ICF) model: general health, psychological, social and financial well being (Carrau & Murray, 2006). In terms of general health, as the patient is unable to swallow, it can increase how the progression of the primary disease (HIV/AIDS) occurs (Carrau & Murray, 2006). If a patient is unable to eat and becomes malnourished, this can lead to the faster progression of the disease i.e. AIDS (Moyle, 2002). Dysphagia can affect a patient psychologically and socially

because eating is a social function as well as for nutrition. Due to the dysphagia affecting how and what a person may eat this will therefore cause limits in social functions involving eating for example eating at a restaurant (Carrau & Murray, 2006). The financial impact of a dysphagia can be significant because there are special foods that are required with special equipment to prepare the food (e.g. a blender to feed patients through a percutaneous endoscopic gastrotomy (Carrau & Murray, 2006). Based on this model, it is therefore of great importance that the SLP be involved in the management of dysphagic patients as it has serious side effects which can affect a person's overall quality of life.

As summarised above, the current research is only focusing on one method of assessment with smaller sample sizes. This research has utilised both clinical and objective measures in order to achieve accurate results. There is also little research being done in this area in South Africa. This study is therefore filling a definite void in current research practices. More research will yield more valuable information and therefore better patient management and quality of life.

This research hypothesised that participants who had a neurological disorder would experience more severe signs and symptoms of dysphagia as swallowing is a complex neurological process. It was also hypothesized that participants who had a lower CD4 count would experience more severe signs and symptoms of dysphagia as their viral load would be higher. The researcher also hypothesized that age would not make a significant difference in terms of swallowing ability.

Methodology

3. METHODOLOGY

3.1. Research Aims:

The primary aim of this research was to describe the swallowing function in a group of adult in-patients with HIV/AIDS.

The specific questions of this research were:

3.1.1. What were the clinical signs and symptoms of dysphagia in a group of adult in-patients living with HIV/AIDS?

3.1.2. Was there a difference between the obtained signs and symptoms of the patients with neurological versus opportunistic infections?

3.1.3. Did a relationship exist between the presentation of the dysphagia and the participants' CD4 count, age and HAART regimen?

3.1.4. Did the results of the Mann Assessment of Swallowing Ability (MASA) (Mann, 2002) significantly correlate with the results of the Modified Barium Swallow (MBS)?

The null hypothesis was that the swallowing abilities of participants would remain unchanged when compared to all of the above variables. The alternative hypothesis was that the swallowing abilities of the participants would be affected by one of the above mentioned variables.

3.2. Research Design

This study was a descriptive, cross-sectional, quasi non-experimental design. Descriptive designs are aimed at describing a phenomenon (Durrheim et. al, 2006). The study was descriptive in nature as it described a particular behaviour, namely, the signs and symptoms of dysphagia in patients who are living with HIV/AIDS (Punch, 2005). The advantages of a descriptive design are that a lot of information can be acquired through description and it is useful in identifying possible variables as well as developing a hypothesis (Punch, 2005). This research was a non-experimental design because in these designs there are no

comparative groups and a variable will not be manipulated (Punch, 2005). This research intended to observe a behaviour, describe the phenomena and establish whether certain relationships exist. The advantages of a non-experimental research design are that it is easy to implement, cost and time effective and used for descriptive purposes (Punch, 2005). The disadvantage of this design is that there is no control group and it therefore does not allow for causal inference (Punch, 2005). This study was a cross-sectional design as it describes a population at one point in time (Clarke & Cooke, 1998). Cross-sectional studies are considered to be a form of observational research (Punch, 2005). As this research is describing a phenomenon and patients are being observed, it was therefore appropriate to use a cross-sectional design. Cross-sectional research is used to assess the prevalence of acute or chronic conditions or to answer questions about the causes of disease or the results of medical intervention (Durrheim, et. al, 2006).

3.3. Sample and Sampling Method

Patients were recruited from a regional public hospital in Gauteng, South Africa. The sampling method that was used for this research was non-probability sampling (Durrheim, et. al, 2006). The specific type of non-probability sampling method that was used is termed convenience sampling as the sample was being drawn from the part of the population that is close at hand (Durrheim, et. al, 2006). An advantage of convenience sampling is that it is readily available and convenient (Punch, 2005). Non-probability sampling can be further divided into accidental or purposive (Punch, 2005). The sampling method that was used in the study was purposive because the data was collected with a specific plan in mind within a predefined group that needed to be analysed (Durrheim, et. al, 2006). The advantages of purposive non-probability sampling methods are that it is economical and convenient. However, the disadvantage of this method is that it cannot be ensured that each element of the sample can be included (Punch, 2005). Some researchers suggest that non-probability sampling may not be entirely representative of the population (Durrheim, et. al, 2006).

A sample of 106 participants was used in the study. The sample for this study was adult in-patients living with HIV/AIDS at a regional public hospital in Gauteng. These patients were

referred to the speech therapy and audiology department from various multidisciplinary team members for dysphagia assessments.

As the sample for this research was very specific, there was a need for exclusion and inclusion criteria in order to get appropriate samples (Punch, 2005). The inclusion and exclusion criteria were as follows:

3.3.1. Inclusion criteria for the bedside assessment (Mann Assessment of Swallowing Ability- MASA) and modified barium swallow:

- The patients were required to be in-patients: This is because as a therapist in the hospital, the ward patients were seen daily. This allowed for accessibility to the sample. As per hospital policy, the doctors were required to run a recent CD4 count test, therefore in-patients would have had more reliable CD4 counts as opposed to out- patients.

- The patients needed to be over 18 years of age. The reason for this requirement was because this study focused on adults. In addition, the regional hospital only caters for adults as well.

- The patient must have been diagnosed as having HIV/AIDS with a recent CD4 count and medical history. The CD4 count needed to be tested recently so that an accurate relationship between CD4 count and presenting dysphagia symptoms could be established. A recent CD4 count was important in order to prevent threats to the reliability and validity of the results. If a patient had an incorrect CD4 count, this would result in the patient being categorised in the incorrect stage of HIV/AIDS rendering the results of the study invalid and therefore unreliable. Patients at all stages of HIV/AIDS were included in this study because HIV/AIDS as a disease was being studied, not only patients at a particular stage of the disease.

- The patients had to be alert and responsive in order to follow instructions and to give consent. Patients who were unable to give consent must have a family member to sign the consent on the patient's behalf for ethical purposes. Only patients who had signed a

consent form would be allowed to participate. If a patient was rendered unresponsive or not alert, then this can negatively affect their ability to swallow (Logemann, 1997). This is because swallowing is a voluntary process and if the patient is no longer aware, then the swallowing mechanism is either ineffective or non-existent therefore leading to the risk of aspiration (Logemann, 1997). If the swallow was not able to be assessed adequately therefore resulting in inadequate data and invalid results.

- Patients who were on Highly Active Anti Retroviral Therapy (HAART) were also included in this study. The majority of in-patients who are living with HIV/AIDS are on HAART, hence the inclusion of these patients in this study ensured that the sample was representative of the population (Arivieux & Michelet, 1998; Bourne & Bradshaw, 2005). Having patients who were on HAART, ensured that the findings were relevant to the context. It was also one of the variables that were analysed.

3.3.2. Exclusion criteria for the bedside assessment (MASA) and modified barium swallow:

- Patients who were under eighteen years of age as these patients are not yet considered adults.

- Patients who exhibited a dysphagia but did not have HIV/AIDS. This is because the researcher would be unable to describe the effects HIV/AIDS had on the swallowing process.

- Patients who did not have a recent CD4 count or up-to-date medical information. A recent CD4 count was when the result was achieved during the current hospital stay. An incorrect CD4 count would have yielded invalid and unreliable results and patients could have erroneously been categorised as being in the wrong stages of HIV/AIDS.

- Patients who had a decreased level of consciousness or impaired cognition as the swallowing mechanism could not be analysed. This condition would result in inadequate data because patients who are unresponsive will not swallow adequately or perhaps not

swallow at all (Logeman, 1997).

- Patients who were unable to follow instructions. The reason for this was because the patients would have been unable to follow the necessary instructions in order to perform the assessments.

- Patients who had previous head or neck surgeries or conditions that could affect their swallowing ability. The reason for this is because the dysphagia would not purely be related to HIV/AIDS as the swallowing physiology would have possibly been altered as a result of the surgery (Logemann, 1997).

3.3.3. Description of participants

In total, 106 participants were assessed. 80 had undergone the MASA alone and 26 underwent the MASA (Mann, 2002)and the MBS.

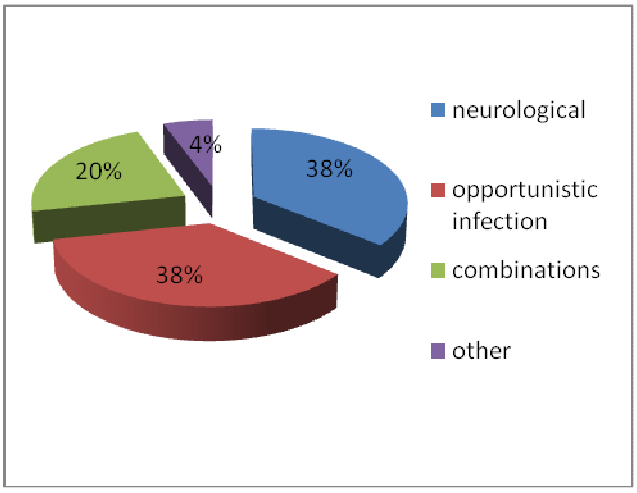
Table 5: Frequency and percentage of participants

n / 106	Frequency	%
Male	83	78
Female	23	22
Age		
20- 30	64	60
31-40	41	37
41+	1	3
CD4 count		
<250	87	82
>250 - <500	16	15
500 – 800	2	2
>800	1	1
HAART	**22**	**21**
1a	13	59
1b	6	27
Other	3	14

The above table reveals that the majority of participants were between the ages of 30 – 40 years. The largest portion of the participants had a CD4 count that placed them in the advanced stage of AIDS. There were only 22 participants who were on a HAART regimen and the most common regimen that participants were on is 1a.

3.3.4. Description of the different conditions seen in the data

Figure 1: Frequency and percentages of the conditions in the data (n/ 106)



The above figure reveals that there was an equal distribution of neurological and opportunistic infections that was seen among participants. There were a further 20% of participants that had numerous combinations of conditions. Please see Appendix F for the detailed table of the different combinations of conditions that were seen. Only 4% of participants had a condition that was not neurological or opportunistic in nature.

3.4. Methods and Material

3.4.1. Instruments

The Mann Assessment of Swallowing Ability (MASA) (Mann, 2002) was used in this study. The MASA (Mann, 2002) was developed on neurologically impaired adult patients (e.g. stroke and Parkinson's disease) in an acute hospital setting (Mann, 2002). The MASA (Mann, 2002) was developed as there was a lack of standardised assessment tools in the area of adult dysphagia. The test was developed from the researcher using information from the standard bedside assessment and current literature at the time (Mann, 2002).

The MASA (Mann, 2002) consisted of 24 items that were divided into of the following subsections:

Table 6: MASA subsections

Area	**Section**	**Rationale**
Demographics	**Age**	**For the inclusion criteria**
Medical History	CD4 count and diagnosis, level of alertness and respiratory status	This information is necessary for the assessment procedure (Logemann, 1998).
Patient Functioning	Alertness, Co-operation, auditory comprehension, respiration	These areas are important to establish the assessment procedure (Mann, 2002).
Evaluation of the Oromotor/ Sensory Components	Aphasia, apraxia, dysarthria, saliva, lip seal, tongue movement, strength and co-ordination and oral preparation	These areas are important to assess because they provide information pertaining to oral motor functioning, pre oral phase and whether the patient is at risk for possible aspiration (Perlman & Schulze – Delrieu, 1997).
Functional Assessment of the Swallow	Gag, palate, bolus clearance, oral transit, cough reflex, voluntary cough, voice, trachea, pharyngeal phase and response	These areas assess the pharyngeal phase of the swallow (Mann, 2002). These areas will inform the therapist about the mode of feeding and whether a MBS is indicated (Cichero, 2006).
Dietary/ Fluid Recommendations	Consistencies the patient should eat	The above information informs the therapist as to how to manage the patient according to the consistencies the patient can tolerate (Mann, 2002).

All items are arranged from the pre-oral phase to the pharyngeal phase (Mann, 2002). All items have been chosen based on literature and clinical skills (Mann, 2002). The MASA can be conducted within 15-20 minutes and requires the use of a tongue depressor, torch, gloves and the following food consistencies: thin liquid, thick liquid, soft, semi – solid and solid.

For the barium swallow the following apparatuses were be used: ultravist, barium, spoons, gloves, cups, straws, yoghurt and biscuits.

3.4.2. Modified Barium Swallow Protocol

The machine used for the barium swallows at the Helen Joseph Hospital was the Shimatusu Fluroscopy UD150L – 30F.

Table 7: MBS protocol

Area	**Materials**	**Rationale**
Oral Phase	Ultravist and barium	This section looks at whether the patient is at risk for aspiration (Logemann, 1997).
Pharyngeal Phase	Ultravist and barium	This area is analysed to establish whether the patient is aspirating and if so, on what consistencies (Logemann, 1997).
Oesophageal Phase	Ultravist and barium	This area analyses whether the patient has any anatomical or physiological difficulties in the area of the oesophagus (Langley, 1997).
Reflux		This is important to assess as the patient can aspirate on

Area	Materials	Rationale
		their reflux when in supine (Cichero, 2006).

3.5. Procedure

Description of the site

The regional hospital treats acute adult patients only (above 12 years of age) and consists of 10 medical wards, two of which are admission wards, 4 surgical wards and 1 psychiatric ward. The hospital caters for approximately 570 in-patients. The average medical intake is 45 patients daily. The regional hospital has specialised units for in patients such as Intensive Care Unit (ICU) (intensive care unit), renal, cardiology, respiratory, palliative care and infectious control units. This regional hospital also has numerous out-patient departments such as ophthalmology, ear, nose and throat, orthopeadics, plastic surgery and family medicine as well as an HIV and TB focal points.

The in-patients (sample) were referred to the speech therapy and audiology department from any member of the multidisciplinary team which included the doctors, physiotherapists, dieticians and occupational therapists. From the period of when ethical clearance was obtained the researcher began to assess all patients with the MASA (Mann, 2002).

The researcher approached the patient at the bed, greeted the patient and informed them about the study. If the patient was not competent in English, the researcher utilised a trained research assistant to help the patient illicit appropriate responses to the questions. The nurses in the ward were informed about the study and the researcher trained them on what was required of them during the assessment. The nurses were requested to interpret exactly what the researcher said to the patient and exactly what the patient said to the researcher. The nurses interpreted into IsiZulu, IsiXhosa and SeSotho. Once the patient had signed the consent form then the researcher began assessing with the MASA (Phase 1). The researcher was the only person present during the assessment unless the interpreter was required. If the

therapist determined that the patient was able to follow instructions and had a dysphagia and/or was at risk for aspiration as per the results from the MASA, the patient was referred for a barium swallow in the radiology department and this is when phase 2 of the study commenced. The patient was informed about the barium swallow and what it entailed. The treating doctor would fill out an x-ray form. The patient was then taken from the ward to the x-ray department. The patient was required to stand in front of the x-ray equipment in a lateral position. A lateral position was best as it allows the radiologist to assess the oral cavity to the oesophagus clearly (Logemann, 1997). The radiologist analysed the images at two frames per second. The radiologist asked the patient to initially hold the 15ml of ultravist in their mouth, which is a water based soluble that can be detected on x-ray and to swallow on the radiologists command. The radiologist then requested and anterior-posterior view if it was deemed necessary which assessed whether pooling in the valleculae was present (Logemann, 1997). The radiologist performed the barium swallow and the results were interpreted by both the researcher and the radiologist. The radiologist interpreted the control x-rays and looked for anatomical or physiological abnormalities in all phases of the swallow. The radiologists then asked the patient to lie in the supine position and would then look for reflux. If it was determined by the radiologist and the researcher that the patient tolerated the ultravist as there were no signs of aspiration, then the patient was asked to swallow 20ml of barium which could be made into different consistencies, if necessary, for therapeutic reasons. Different consistencies were assessed if the researcher felt there was a need to assess a particular consistency as based on the results from the bedside evaluation.

Once the assessment had been completed, the researcher devised an appropriate treatment plan that best addressed the signs and symptoms of dysphagia displayed by the patient. The patient was placed on an appropriate diet and if seen to be tolerating the diet, the researcher informed the patient and/or their family about the research.

3.6. Data Analysis

The data was analysed using both inferential and descriptive statistical methods. Descriptive statistics summarise and describe data quantitatively (Punch, 2005). Descriptive statistics

simply describe what the data shows (Durrheim, et. al, 2006). The descriptive statistics that the researcher for this study employed were means and standard deviations.

The inferential statistics that were used in this research study was Spearman Rho, Wilcoxon Rank Sum test, non-parametric ANOVA and independent sample t-test. Spearman Rho is a test that is used to find an association between two sets of ranks (Kaplan, 1997). This test was therefore used to calculate inter-rater reliability for the MASA (Mann, 2002) as well as to compare the results obtained on the MASA (Mann, 2002)and MBS. The Wilcoxon signed rank test was used when comparing two independent samples (Howell, 2002). It was used to analyse the difference between the participants' conditions and the severity of the dysphagia. The Kruskal-Wallis Test which is the non-parametric test of ANOVA was used to analyse if there were any significant relationships between the different levels of CD4 counts of the participants and the signs and symptoms of dysphagia. The purpose of the Kruskal-Wallis test was to evaluate three or more sampling distributions of ranked data (Kaplan, 1997). The Kruskal-Wallis test was appropriate for question 3 as there were 4 groups of different CD4 count levels. The last question was addressed using The Mann-Whitney U test which is the non parametric counter part of the *t*-test. This test is used to determine if there is a statistical difference of the mean between two groups (Kaplan, 1997). This test was used to analyse if there was a significant difference between the signs and symptoms of dysphagia between the participants who were on a HAART regimen and those who were not.

3.7. Ethical clearance

Ethical clearance number: M091165

Once ethical clearance had been obtained from the Human Research Ethics Committee, the University of the Witwatersrand and the regional hospital, then the data collection commenced. Please see Appendix C for the ethical clearance certificate.

The researcher was required to follow the under mentioned ethical principles, as set out by the Health Professions Council of South Africa, while this research was conducted:

1. Autonomy: is the patient's right to independent actions and choices. In this study the patient and/or family will be involved in all the decisions regarding assessment and

treatment. The patient will be allowed not to participate in the research or to withdraw their participation at any point.

2. Beneficence: the obligation to act in the patient's best interest. The patients in this study will be assessed and managed accordingly by the relevant multidisciplinary team members. All patients were managed whether or not they choose to participate in the study. As this population is considered to vulnerable because the patients are ill, it is important that the patient is managed prior to being asked to be included in this study (Bigatello, George & Hurford, 2003).
3. Non-maleficence: this is the obligation not to inflict harm on the patient. As per the beneficence topic, the decisions will be made within the team and in the patient's best interest. The patient will not be sent for a barium swallow if the patient does not meet the inclusion criteria.
4. Justice: refers to the lifting and assisting those in the team with their work load. The decisions will be made accordingly to the patient's best interest with their or their families' involvement.
5. Confidentiality: refers to any information that is given by the patient will remain confidential. In this study, the information will only be shared amongst relevant team members to help with the assessment and management of the patient. The patient's name will not be used in the study as the patients will be assigned a number in the data. The data was locked in a cabinet after the analysis was conducted.

3.8. Reliability & Validity

3.8.1. Reliability

Reliability is defined as the consistency with which a measuring instrument yields a certain result when the entity being measured has not changed (Leedy & Ormrod, 2005). Due to the nature of the MASA (Mann, 2002) being an ordinal scale, internal consistency could not be analysed. When the researcher assessed the assumptions of normality, the null hypothesis was rejected as the results were skew and this also contributed to the internal consistency of the MASA not being able to be determined. The researcher therefore conducted an inter-rater reliability test. For this a Spearman Rho test was conducted. This statistical measure is used to find an association between two sets of ranks (Kaplan, 1997).

Table 8: Inter – rater reliability

		Rater 1				
Rater 2	**Alertness**	**Aud Comp**	**Resp**	**Tong strength**	**Oral phase**	**Phary Phase**
Alertness	-	-	-	-	-	-
Aud comp	-	1 **<.0001**	-	-	-0.08 0.7867	-
Resp	-	-	-	-	-	-
Tong Strength	-	0.083 0.7867	-	-	-0.08 0.7867	-
Oral Phase	-	-	-	-	-0.123 0.6887	-
Pharyn Phase	-	-	-	-	-	-

Table key:

Aud comp – auditory comprehension

Resp – respiration

Tong strength – tongue strength

Pharyn phase – pharyngeal phase

The findings from this test indicated that the MASA (Mann, 2002) was a reliable tool to conduct a bedside dysphagia assessment as there was a high level of agreement between the two raters. The two raters only had 6 differences in scores on the MASA (Mann, 2002) out of a total of 25. The insignificant p-value (greater than 0.05) results implied that the levels did not differ significantly. This therefore concludes that the MASA had good inter rater-reliability.

3.8.1.1. Pilot Study

As the MASA (Mann, 2002)had not been assessed on a South African population, the researcher needed to conduct a pilot study. Haralambos & Holborn (2000) state that a pilot study is conducted prior to the main study in order to check the feasibility, therefore this pilot study was conducted to determine the suitability for HIV/AIDS patients or to improve on the

research design. A pilot study could also be used to check reliability and validity of the results (Haralambos & Holborn, 2000).

3.8.1.2. Questions of the pilot study:

1. Was the MASA (Mann, 2002) an appropriate assessment tool to be used on the HIV/AIDS population in an acute hospital setting in terms of the questions that were used.
2. Was the MASA (Mann, 2002) a reliable and valid assessment tool?

3.8.1.3. Research design

The pilot study followed the same research design as the main study which was a descriptive, cross-sectional, quasi non-experimental design.

3.8.1.4. Sample and sampling method

The pilot study utilised 20 in-patients that had been referred to the speech therapy & audiology department who had been diagnosed as living with HIV/AIDS. The pilot study followed the same sample and sampling method as used for the main study. The main study utilized a non-probability sampling method as the sample was not chosen randomly. This was due to the fact that the sample was a convenience/purposive sample selected on the basis of HIV patients who exhibit dysphagia in the ward. The same inclusion and exclusion criteria that were used for the main study was used in the pilot study.

3.8.1.5. Materials

The researcher utilised the MASA (Mann, 2002) for the bedside assessments in the pilot study as this was the tool that was being evaluated for its reliability and validity. The details for the MASA are seen under the main study.

3.8.1.6. Procedure

The researcher received the referral and assessed the patient within a 24 hour period. The researcher then enlisted the assistance of another therapist within the department to re-test 25% of the patients with the MASA (Mann, 2002), for inter-rater reliability (Rosnow & Rosenthal, 2002). The patients were re-tested 24 hours later. As patients with an advanced HIV/AIDS condition can change in a short period of time, it was important for the assessments to be close together to avoid different results being obtained (Arivieux & Michelet, 1998). The same procedure for assessing with the MASA (Mann, 2002), as described above for the main study, was utilised in the pilot study by both the researcher and the assistant therapist.

3.8.1.7. Threats to reliability and validity

Based on the results of the pilot study, the MASA (Mann, 2002) was an appropriate tool to use in an acute care setting in South Africa as there were no test items that are inappropriate. Therefore this rendered the results that were obtained by the MASA (Mann, 2002) valid.

The MASA (Mann, 2002) was an appropriate assessment tool for patients with and without a neurological disorder. Therefore the validity of the results was not affected. The researcher did not need to change the instructions of the MASA (Mann, 2002). While assessing the inter-rater reliability, the disagreements may be attributed to random error. As seen above, the Spearman Rho test revealed that the MASA (Mann, 2002) was a reliable tool to use.

3.8.1.8. Results

It was noted during the pilot study that the MASA (Mann, 2002) did not have a section which allows the speech therapist to assess the oesophageal phase of the swallow. The researcher therefore had to assess the oesophageal phase informally based on the patients' description of their signs and symptoms. For example: the patients that were diagnosed with candida often described odynophagia.

3.8.2. Validity

Validity is defined as the extent to which the instrument measures what it is supposed to measure (Leedy & Prmod, 2005). The MASA (Mann, 2002) possesses adequate content and face validity (Mann, 2002). Content validity refers to the test items representing the kinds of material that they are supposed to measure (Rosnow & Rosenthal, 2002). Face validity refers to whether the test measures what is relevant (Rosnow & Rosenthal, 2002). The MASA (Mann, 2002) was compared against other standardised tests and proved to have similar items in the test. Therefore the MASA (Mann, 2002) has good content validity (Mann, 2002).The MASA (Mann, 2002) was developed by asking experts in the area of dysphagia to identify items that were worthy of inclusion. These items were then adjusted accordingly by the experts (Mann, 2002). This implied that the MASA (Mann, 2002) had good face validity. The MASA also had good criterion and concurrent validity (Mann, 2002). Criterion validity refers to the degree to which the test correlates with one or more outcome criteria (Rosnow & Rosenthal, 2002). The good criterion was because the MASA (Mann, 2002) results were compared to the videofluroscopy results and shown to yield similar results. As videofluoroscopy is the gold standard in objective dysphagia assessments, it showed that the MASAhad good criterion validity (Mann, 2002).

Furthermore, when it was applicable, the results obtained from the MASA (Mann, 2002 were compared to the modified barium swallow findings to check the validity of the results. This improved the concurrent validity of the study. Concurrent validity refers to the degree to which the new measure is related to pre-existing measures of the construct (Punch, 2005).

As the MASA (Mann, 2002) was developed on neurologically impaired adult (stroke) patients in a hospital setting, this study should have good external validity as there are large numbers of patients who are living with HIV/AIDS that have a neurological impairment. External validity is defined as the ability for the sample outcomes to be generalised to the population outside the circumstances of the study.

Based on the results of the Spearman Rho test, when the results from the two raters were compared, the MASA (Mann, 2002) was deemed to be an appropriate tool to use in an acute care setting in South Africa.

Results

4. RESULTS

The main aim of the current study was to assess the effects that different medical conditions can have on dysphagia in adults who are living with HIV/AIDS.

The specific questions for this study were:

1. What were the signs and symptoms of dysphagia and odynophagia in adults who are living with HIV/AIDS?
2. Was there a difference between the obtained signs and symptoms of the patients with neurological versus opportunistic infections?
3. Was there a relationship between the variables of age, CD4 count and HAART regimens to the severity of the dysphagia?
4. Did the results of the Mann Assessment of Swallowing Ability (MASA) (Mann, 2002) significantly correlate with the results of the Modified Barium Swallow (MBS)?

Additionally, as stated above, the current study investigated the reliability of the MASA as an assessment tool because it was one of the measures adopted in the methodological section. In order to address these research questions the data was analysed using descriptive as well as inferential statistics.

The results have been discussed by firstly presenting data that offers a description of the sample, followed by the specific findings of the current research, in accordance with the specific questions. The researcher interrogates the nature of the data and suitability of the methods and the statistical methods adopted.

4.1. Inter- rater reliability results

As seen in the methodology section, an inter-rater reliability test was done and the results were analysed using the Spearman Rho test. The results from this test revealed that as the inter-rater reliability was strong, it can be concluded that the Mann Assessment of Swallowing Ability (MASA) (Mann, 2002) was therefore a reliable assessment tool that can be used on acute patients for a bedside assessment.

General description of the participants according to the conditions that were seen in the data

In total there were 106 participants that were assessed. 80 participants had a bedside assessment only and 26 participants underwent a bedside assessment as well as a modified barium swallow. The table below shows the participants according to age and gender.

Table 9**:** Frequency analysis of participants

n/106	**Age**	**F**	**%**
	20-29	32	33
	30-39	33	35
	40-49	39	41
	50-59	2	2
	60+	1	1
	Gender		
	Male	83	78
	Female	23	22

The above table revealed that there were more males seen in the data than females and most participants were between the ages of 40 - 49.

4.2. CD4 counts & HAART regimens of participants

As part of the inclusion criteria for this study, the participant was required to have a recent CD4 count and it was also noted whether the participant was on a HAART regimen.

Table 10: Distribution of CD4 counts among participants and numbers of participants on HAART

CD4 count	**n/ 106**	**F**	**%**	**HAART**	**n/22**	**F**	**%**
>800		1	0.8			0	0
<800 but >500		2	1.8			1	4
<500 but >250		16	15			5	23
<250		87	82			16	73

The data in table 10 revealed that the majority of participants were in the advanced stages (CD4 count of less than 250/mm^3) of the disease and only one participant was in the beginning (HIV +) stage (CD4 count of greater than 500/mm^3) of the disease. This table also highlights that out of the 106 participants, only 22 were on a HAART regimen and the majority of the participants who were on a regimen were in the advanced stages of AIDS. This was to be expected as the majority of the participants were in the advanced stages of the disease.

In HAART, there are different combinations of drugs called regimens. As stated in the literature, for regimen 1a and 1b the drug combination consists of 2 NRTI's (nucleoside reverse transcriptase inhibitors) with 1NNRTIs (non-necleoside reverse transcriptase inhibitors). There are numerous NRT's and NNRTIs available in South Africa. The table below reveals the different combinations of drugs seen in the different regimens as seen in the data.

Table 11: HAART regiment as seen in the data

HAART regimen n/22	F	%
1a	12	55
1b	6	27
Other	4	18

The above table revealed that the most common regimen was 1a. These results were unexpected in that it was anticipated that more participants would have been on a HAART regimen as the majority of the participants were in the advanced stages of HIV/AIDS. A detailed list of all the different combinations that were found in the data can be seen in Appendix F.

Table 12 below shows the participants according to the specific diagnosis with which they presented. Any condition that was bacterial in nature but had a neurological effect was considered to be a neurological condition e.g. tuberculosis meningitis or cryptococcal

meningitis. Any condition that did not have an effect on the CNS was considered to be either opportunistic, HAART side effects or other.

Table 12: Description of participants according to diagnosis

Conditions	**n/ 106**	**F**	**%**	**Conditions**	**F**	**%**
Neurological		**38**	**36**	**Opportunistic infections**	**38**	**36**
CVA		24	24	Pulmonary TB	16	16
Myelopathy		2	2	Oropharyngeal candida	11	11
Cryptoccal meningitis		8	8	Chest infections	66	
Tuberculosis meningitis		4	4	Gastroenteritis	5	5
Pontocerebellar syndrome		1	1	Vancellar zoster	1	1
				Kaposi sarcoma	1	1
Other		**3**		**Combinations**	**24**	

4.3. Research questions:

4.3.1. What were the signs & symptoms of dysphagia and odynophagia in adults who are living with HIV/AIDS.

4.3.1.1. Descriptive statistics

For this study, the researcher utilised means, ranges and standard deviations in order to draw conclusions from the data.

Table 13: Signs of dysphagia as seen on the MASA for neurological conditions and opportunistic infections

	Neurological conditions		Opportunistic infections	
n/106	**F**	**%**	**F**	**%**
Auditory Comprehension	15	14	5	5
Respiration	3	3	3	3
Oral Phase	45	42	21	20
Pharyngeal Phase	19	18	8	8
Oesophageal phase	7	7	6	5

The above table indicates that although all phases of swallowing seem to be affected in HIV/AIDS, the oral phase was the most commonly affected. The oral phase of swallowing was the most affected irrespective of diagnosis. Some participants had more than one symptom and therefore the total frequency is slightly more than 106.

Table 14: Symptoms of dysphagia as seen on the modified barium swallow results for neurological and opportunistic infections

	Neurological conditions		Opportunistic infections	
n/26	**F**	**%**	**F**	**%**
Oral Phase	**13**	**50**	**4**	**15.3**
Pharyngeal Phase	**17**	**65.3**	**3**	**11.5**
Oesophageal phase	**5**	**19.2**	**2**	**7.6**

This table highlights that participants who had a neurological condition displayed more symptoms of dysphagia at all phases as compared to participants who had an opportunistic infection. These results of the signs of dysphagia were similar to those observed on the MASA (Mann, 2002). However, the MBS results showed a slightly higher percentage of patients with pharyngeal phase difficulties than the MASA (Mann, 2002) which relies more heavily on subjective observation. Overall, participants with a neurological condition

displayed more signs and symptoms of dysphagia than the participants who had an opportunistic infection.

Table 15: Overall means and standard deviations of signs and symptoms of dysphagia for all participants in the data

Signs/Phase of swallow	**n/106**	**Total score**	***M***	***SD***
Alertness		349	90.80	0.85
Auditory Comprehension		341	90.25	1.49
Respiration		353	90.70	1.19
Dysarthria		4545	50.44	2.44
Oral Phase		7898	74.91	10.33
Lip movement		4660	54.19	0.91
Tongue movement		4693	52.25	2.3
Pharyngeal Phase		6115	57.88	7.40
Oesophageal Phase		303	20.92	0.26

From the results of table 15, it is evident that the majority of participants experienced difficulties in the oral phase, specifically with lip and tongue movement. It is also apparent that a significant proportion of the population has dysarthria. The weakness that results in the dysarthria could also cause oral phase difficulties. There are some participants who experienced bolus clearance and oral transit difficulties. There appear to be significantly fewer participants who experienced pharyngeal phase difficulties. Some participants presented with odynophagia or multiple swallows.

In summary, participants who are diagnosed with HIV/AIDS irrespective of co-morbid conditions present with signs or symptoms of dysphagia.

4.3.1.2. Assumptions of normality

When assessing the null hypothesis, the p-value was significant (less than 0.05) and therefore the null hypothesis was rejected and it was concluded that the data was not normally

distributed. Due to this lack of normal distribution within the data, non-parametric tests were utilised for all the inferential data analysis procedures. The majority of the data appeared to be skewed in a positive manner. Please see histograms in Appendix E for data from the MASA (Mann, 2002). As the MASA presented data that was in an ordinal scale format, non-parametric tests also had to be used as this data type affected the assumptions of normality.

4.3.1.3. Inferential statistics

The inferential statistics test that was used to answer this question was the Wilcoxon rank sum test. This test is a non-parametric test used to measure two independent samples (Howell, 2002).

4.3.2. Was there a difference in the severity of the signs and symptoms of dysphagia on the MASA (Mann, 2002) and MBS according to the diagnosis (neurological or opportunistic infections) of the patient?

4.3.2.1. Inferential statistics

The Wilcoxon signed rank test was used when comparing two independent samples (Howell, 2002). It was used to analyse the difference between the participants' conditions and the severity of the dysphagia.

Table 16: Wilcoxon signed rank test for establishing a relationship between signs of dysphagia and the participants' condition (significance of 0.05)

n/ 106	Neurological Conditions			Opportunistic Infections		
	Mean of Ranks	**Z**	**p - value**	**Mean of Ranks**	**Z**	**P - value**
Auditory Comprehension	56.39	-3.4	**0.0009**	**-**	**-**	**-**
Dysarthria	39.44	-4.04	**0.0001**	**-**	**-**	**-**
Lip movement	44.48	-2.67	**0.0080**	**-**	**-**	**-**
Oral Preparation	45.55	-2.9	**0.0045**	**-**	**-**	**-**
Bolus Clearance	41.92	-4.2	**<0.0001**			
Voice	46.54	-2.5	**0.0120**	**-**	**-**	**-**
Pharyngeal Phase	42.38	-2.7	**0.006**	**-**	**-**	**-**
Poor laryngeal elevation	-	-	**-**	53.5	1.99	**0.0487**
Oesophageal phase	47	-2.20	**0.030**	-	-	-

The above table reveals that participants with a neurological condition experienced significantly more symptoms of dysphagia than those participants who had an opportunistic infection, except with laryngeal elevation. Based on the above statistics, the null hypothesis was therefore rejected.

4.3.3. Was there a difference between the variables of age, CD4 counts and being on a HAART regimen of the participants and the severity of the dysphagia on the MASA (Mann, 2002) and MBS?

4.3.3.1. Age

The Wilcoxon signed rank test was used to assess if there was a difference between the age of the participants and the signs of dysphagia. A p-value of 0.05 was taken as a significant result.

Table 17: Wilcoxon rank sum test for signs of dysphagia and age

	n/106	Mean Rank	Z	p- value
Aud Comprehension		9.250	-0.234	0.0353
Respiration		9.700	-0.11	0.317
Dysarthria		3.912	-0.41	**0.001**
Oral Phase		3.993	-0.23	**0.010**
Pharyngeal Phase		3.812	0.09	0.100
Oesophageal phase		2.925	-0.03	0.733

Table key:

Aud comprehension : auditory comprehension

The above table shows that the p-values were significant for dysarthria and the oral phase. These results imply that dysarthria and oral phase difficulties were more significant in participants who were older. Based on these results, the null hypothesis was therefore rejected.

4.3.3.2. CD4 count

For this variable, the Kruskal-Wallis test was used. This was because there were four CD4 count categories. The categories were as follows as stated in the literature review: 0 – less than 250/mm^3, 1 – more than 250/mm^3 but less than 500/mm^3, 2 – more than 500/mm^3 but less than 800mm^3, 3 – more than 800mm^3.

Table 18: Kruskal – Wallis Test for CD4 count and signs and symptoms of dysphagia

n/106	Sum of Squares	df	Mean Square	p – value
Aud comp	4610.00	3	53.60	0.120
Respiration	706.00	3	44.12	**0.030**
Dysarthria	4545.00	3	52.84	0.770
Oral phase	4647.50	3	54.04	0.190
Pharyngeal phase	4526.50	3	52.63	0.157
Voice	2.50	3	2.50	**0.002**
Oesophageal phase	4562.50	3	53.05	0.904

Table key:

Aud comprehension: auditory comprehension

The above table highlights that there was a significant relationship between respiration and voice for the variable of CD4 count. This implies that the lower the CD4 count is, the more significant the symptoms are for respiration and voice. Therefore, the null hypothesis was rejected.

4.3.3.3. HAART regimen

For this variable, a Mann-Whitney U test was used as there were only two groups, those participants who were on ARV's and those who were not.

Table 19: Mann – Whitney U for HAART regimen and signs and symptoms of dysphagia

n/106	Z	P – value
Aud comp	-1.55	0.11
Oral phase	-0.69	0.48
Pharyngeal phase	-1.95	**0.05**
Cough	-2.14	**0.01**
Laryngeal elevation	-0.77	0.42
Oesophageal phase	-0.77	0.43
Aspiration	-2.36	**0.01**

Table key:

Aud comp: auditory comprehension

Based on the above results, participants who were on a HAART regimen appeared to experience more significant pharyngeal phase symptoms, a more severe cough and aspirated more than those participants who were not on a HAART regimen. Based on these results the null hypothesis was rejected.

4.3.4. Did the results of the MASA significantly correlate with the results of the MBS?

For this question to be analyzed, the Spearman Rho test was used. This test is used to find an association between two sets of ranks (Kaplan, 1997). The closer the p-value is to 0, the stronger the correlation. A p-value was less than 0.05 therefore implied that there was a significant relationship between the following MASA (Mann, 2002) symptoms and modified barium swallow symptoms: Please see the Spearman Rho table on the next page

Table 20**:** Spearman Rho test for the MASA and MBS results

MBS / MASA	Delay oral onset	Bolus form	Bolus prop	Tongue mvt	Residue floor	Delay trig	Pooling	Aspiration	Reflux	Nasal regurg
Aud comp	0.190 0.357	-0.100 0.600	-0.100 0.060	-0.120 0.540	-0.080 0.679	-0.160 0.431	0.290 0.158	-0.200 0.332	-0.183 0.378	0.060 0.775
Resp	0.177 0.395	0.326 0.111	0.326 0.111	0.271 0.188	0.434 **0.030**	0.098 0.638	0.291 0.158	0.101 0.630	0.157 0.452	0.060 0.775
Dysarthria	0.137 0.512	0.483 **0.014**	0.483 **0.014**	0.374 0.065	0.084 0.687	0.073 0.725	-0.040 0.848	0.021 0.920	0.145 0.485	-0.267 0.1960
Lip Mvt	-0.005 0.979	-0.045 0.8290	-0.045 0.8290	-0.053 0.7990	0.380 0.068	0.165 0.428	0.273 0.185	-0.840 0.688	-0.328 0.109	0.025 0.905
Tong mvt	0.091 0.664	0.452 **0.023**	0.452 **0.023**	0.533 **0.006**	0.361 **0.076**	0.091 0.664	0.451 **0.023**	-0.210 0.313	-0.145 0.487	0.166 0.425
Tong strength	0.139 0.505	0.492 **0.012**	0.492 **0.012**	0.580 **0.002**	0.393 0.051	0.139 0.505	0.494 **0.012**	-0.157 0.453	-0.282 0.171	0.153 0.465
Tong co-ord	0.091 0.664	0.452 **0.023**	0.452 **0.023**	0.533 **0.006**	0.363 0.076	0.091 0.664	0.451 0.023	-0.210 0.313	-0.140 0.484	0.041 0.843
Multiple sw	-0.321 0.117	-0.621 **0.0009**	-0.621 **0.0009**	-0.535 **0.005**	0.108 0.604	-0.389 0.054	0.136 0.516	-0.010 0.960	-0.043 0.835	-0.075 0.720
Oesophageal	0.688 **0.0001**	0.242 0.24	0.242 0.243	0.187 0.369	0.344 0.091	0.619 **0.001**	0.211 0.309	0.538 **0.005**	0.318 0.121	0.075 0.720

Table key:

aud comp: auditory comprehension
resp: respiration

lip mvt: lip movement
tong mvt: tongue movement

tong strength: tongue strength
tong co – ord: tongue co – ordination

multiple sw: multiple swallows
oesophageal: oesophageal phase

bolus prop: bolus propulsion
nasal regurg: nasal regurgitation

This table shows that there were numerous significant correlations between the symptoms described on the MASA (Mann, 2002) and the symptoms that were obtained from the MBS. This implies that the MASA (Mann, 2002) was a reliable bedside tool for detecting signs and symptoms of dysphagia. It also indicated that the MASA (Mann, 2002) was just as reliable as a modified barium swallow in detecting a dysphagia.

4.4. Summary of findings

Based on the above results, patients who presented with a neurological complication appeared to present with more severe signs and symptoms of dysphagia especially in the areas of auditory comprehension, dysarthria, lip movement, oral preparation, bolus clearance, voice, pharyngeal phase and oesophageal phase. The participants' CD4 count did not appear to make a difference in terms of symptomotology except that respiration difficulties appeared to be more severe, which therefore affected their vocal quality. In terms of age, older participants had more severe symptoms for dysarthria and oral preparation. Interestingly, participants who were on a HAART regimen experienced increased difficulty in the pharyngeal phase and aspirated more frequently. Very importantly, the MASA (Mann, 2002) and the MBS results had a strong correlation for numerous symptoms and therefore the MASA (Mann, 2002) was a reliable tool that can be used for subjective and objective bedside dysphagia assessments.

Discussion

5. DISCUSSION

In summary, descriptively, the results revealed that participants with a neurological condition appeared to present with more severe signs and symptoms of dysphagia. The results from the Wilcoxon signed rank test showed that participants with a neurological disorder experienced more severe signs and symptoms of dysphagia, except with laryngeal elevation. The Wilcoxon signed rank test also showed that older participants experienced more dysarthria and oral transit difficulties. The results from the Kruskal-Wallis test highlighted that participants with a lower CD4 count had more significant respiration and voice difficulties. The results from the Mann-Whitney-U test showed that participants who were on a HAART regimen experienced increased difficulty in the pharyngeal phase and aspirated more frequently. The Spearman-Rho test results showed that the MASA (Mann, 2002) was seen as a valid bedside assessment tool for assessing adult dysphagia in an acute hospital setting.

The discussion section broadly discusses the general findings of the study and will then look at the specific findings of each research question.

5.1. Profile of the sample for the current study

5.1.1. Demographics

5.1.1.1. Gender

This study found that there were significantly more men than women. Statistics South Africa (2010) showed that 19,7% of the adults who are living with HIV/AIDS were female and therefore 80.3% were male. This emphasises the fact that the findings from this study are in agreement with the current statistics as the majority of people who are living with HIV/AIDS are male. These findings are in contrast to an audiological study that was conducted at another Johannesburg public hospital which had significantly more females in the study but the participants were out patients (Khoza, 2008). These findings could indicate that the females are more common in out-patient settings whereas, males are more common as in-patients.

5.1.1.2. Age

Statistics South Africa (2010) revealed that the largest age group of people who were infected with HIV/AIDS was between 15 and 49 years of age. This is in agreement with the findings of this study which highlighted that the majority of participants who were seen to be living with HIV/AIDS were between 30 and 39 years of age. This shows that the majority of people who are living with HIV/AIDS in South Africa are within child bearing years and are within the age group that could be employed..

5.1.1.3. HAART as seen in the demographics of the participants

The majority of participants in this study were in the advanced stages of AIDS. Only 22 (23%) participants were observed to be on HAART in this study. This is a true reflection of the South African HIV/AIDS population because in February 2011 the USAID team reported that out of the 50.4 million people who are infected with HIV/AIDS only 917 700 individuals are receiving HAART. It is unfortunate that the majority of people who are in the advanced stages of the disease were not on HAART as the latest South African policy declares that all people who have a CD4 count of below 350/mm3 should start on a HAART regimen (Barker, Leydon, Moleko, Osih, Venter & Webster, 2010). These results therefore imply that individuals are possibly not having check-ups and are only being initially diagnosed once they have entered into the final stages of the disease. The most common HAART regimen that was seen in the data was regime 1a (D4T/3TC/ EFV). There were also different combinations of drugs that were seen in the data that were not typically reported in the literature such as TENOFIVIR/3TC/NVP, TENOFIVIR/ 3TC/STAVUDINE, EFV/AZT/3TC and EFV/3TC. However, it should be noted that more people should be receiving HAART based on the CD4 counts seen in the data. The research discovered that most participants who were seen as in patients were newly diagnosed and therefore most of these patients have not yet started on a HAART regimen. It is also noted that these patients were in the advanced stages of the disease and possibly only sought help once they presented with symptoms.

In summary, the sample that was obtained for this study was representative of the South Africans who are living with HIV/AIDS.

5.1.2. Various diagnoses as seen in the sample

As based on the results from this study, there was an equal number of participants who suffered from a neurological impairment and different opportunistic infections. There was a mix of conditions of participants who experienced respiratory difficulties i.e. both neurological and opportunistic infections. There was only one respiratory condition that was seen in the data which was pulmonary TB. The neurological conditions such as CVA, cryptococcal meningitis and TB meningitis were seen to have some respiratory difficulties. There is a close association between adequate respiration and dysphagia (Logemann, 1997). Breathing is controlled by the brainstem and if there is a neurological impairment, it may lead to possible respiratory difficulties and these could lead to aspiration (Cichero, 2006). Kaposi sarcoma can lead to a possible airway obstruction (Federele, Sooy & Wall, 1986). Therefore, these results are accounted for in the literature.

This is in agreement with the literature because each phase of swallowing can be affected by both neurological deficits, opportunistic infections and as a result of the side effects of HAART.

5.1.2.1. The effects on swallowing from neurological deficits

Berger &Cohen (2007) highlighted that the brain was the second most common organ to be affected by the HI virus, second only to the lungs. The virus is able to cross the blood brain barrier and can therefore lead to changes in white matter of the brain which can affect the functioning of the cranial nerves and blood vessels (Brew, 2007). This can result in dementia, stroke, meningitis and vasculopathies (Bryer, Candy, De Villiers, Tipping & Wainwright, 2007). As a result of these neurological conditions, a patient can have a dysphagia (Logemann, 1997). The results from this study revealed that CVA was the most common neurological condition seen among patients. This is in agreement with the findings from Mochan, Modi and Modi (2010) who conducted a study in South Africa and found that up to 40% of people who are living with HIV/AIDS had a CVA. As expected, as a result of the CVA, the majority of these patients did experience some form of dysphagia.

The CNS can also be affected by various opportunistic infections. Some bacterial infections include: meningitis, herpes simplex and toxoplasmosis. The most common bacterial infection found in patients who are living with HIV/AIDS is reported to be bacterial meningitis (Berger &Cohen, 2007). This is in support of the findings of the study as the most common infection of the CNS was seen to be bacterial meningitis followed by tuberculosis meningitis. These results reflect the conclusions made by Singh & Vaidyanathanl (2003) who stated that TB is the most common serious opportunistic infection in HIV positive patients and is the manifestation of AIDS in more than 50% of cases in developing countries.

5.1.2.2. The effects on swallowing from opportunistic infections

The most common fungal infection that can occur in a patient who is living with HIV/AIDS is candida (Anteyi et. al, 2003). The most common oral manifestation found in numerous studies done in both developed and developing countries was oral candida (Besige, et. al, 2003; Bhojwani & Prasad, 2006 & Gillespie, 1993). These studies have also stated that candida can lead to dysphagia and odynophagia. The results from this study are in agreement with the literature which shows that candida is common amongst people who are living with HIV/AIDS. The study that was conducted by Arendorf et. al. (1998) concluded that oral manifestations are common features in the South African HIV/AIDS population. It was shown to be the second most common infection after pulmonary tuberculosis. These results were to be expected because according to a study by Devi, Devi, Naorem, Prasad Singh and Singh (2010) up to 55% of their participants in India who were living with HIV/AIDS had pulmonary TB.

The numerous viral infections that can occur in a patient living with HIV/AIDS are: meningitis, Guillen-Barre syndrome, cytomegalovirus as well as viruses that can lead to encephalopathies and myopathies (Brew, 2007). The results reveal that meningitis is a more common occurrence in the HIV/AIDS population than myopathies. However, these results do support the findings as seen in the literature.

In some cases, opportunistic infections can become malignant such as in the case of Kaposi sarcoma and squamous cell carcinoma (Besige, et. al, 2003). There was only one case in the data where an individual suffered from Kaposi Sarcoma. This shows that malignancies do occur in this population but are infrequent. These malignancies can result in a dysphagia and need to be managed accordingly.

5.1.2.3. The effects on swallowing as a result of HAART

Most HAART regimens that patients with HIV/AIDS have to take have been known to have side effects that can lead to possible dysphagia (Daly, 2004). Some of these side effects include: nausea, vomiting, GI upsets, gastro-oesophageal reflux disease (GORD) and taste aversions (Van Dyk, 2008). The data revealed that there were no signs or symptoms of dysphagia seen as a result of the side effects from HAART.

5.2. Research questions

5.2.1. Signs & symptoms of dysphagia in people who are living with HIV/AIDS

In addressing the question of the signs and symptoms of dysphagia in people who are living with HIV/AIDS, the following results were found:

The majority of participants (22%) who displayed some form of dysarthria had a neurological condition such as CVA, meningitis, TB meningitis or pontocerebellar syndrome. This is in line with current literature because speech is controlled by various neurological pathways and numerous focal lesions can result in a speech disorder (Damasio, 2001). One participant with candida also experienced dysarthria and this could be as a result of pain during oral movement (Bhojwani, Chandra Prasad, Kishore Chandra Prasad & Shenoy, 2006).

5.2.1.1. Oral phase difficulties

The findings showed that difficulties with lip movement, tongue movement, strength and co-ordination, oral transit and bolus clearance were noted in participants who had experienced a neurological condition such as CVA, meningitis and dementia being the most common

conditions. As oral movement is controlled by nerves and musculature, if there is a disturbance neurologically as a result of CVA or meningitis this can result in difficulties with oral movement. This control involves the interplay of numerous sensory and/or motor cranial nerves as well as specific parts of the brain that are supplying information to the appropriate muscles of deglutition (Bass, 2006). Some participants who had oral manifestations such as candida and Steven Johnson Syndrome (SJS) also had difficulties with oral movement. Clayton and Kennedy (2007) reported that SJS can result in extreme pain and dysphagia and therefore reduced oral intake. This extreme pain can result in difficulty with oral movement. There is currently no literature that accounts for possible reasons as to why a participant with pulmonary TB could have oral phase difficulties. The findings from this study confirm the findings made in other studies such as Daly (2004) who states that oral phase difficulties are present in patients who are living with HIV/AIDS. This indicates that oral phase difficulties can arise from numerous causes in people who are living with HIV/AIDS.

5.2.1.2. Pharyngeal phase difficulties

The findings indicated that the majority of participants who experienced difficulties in the pharyngeal phase had a neurological condition. These findings are in agreement with literature. Langley (1993) and Logemann (1997) state that swallowing disorders occur in patients with numerous neuromuscular effects such as: CVA, head injuries, cranial nerve palsies, myopathies and degenerative diseases. The findings also revealed that participants who experienced odynophagia had candida and gastroenteritis. This is also similar to findings in other research ((Bhojwani, Chandra Prasad, Kishore Chandra Prasad & Shenoy, 2006).) which indicate that candida has been proven to lead to dysphagia and odynophagia in people who are living with HIV/AIDS.

5.2.2. Is there a relationship between the diagnosis (neurological or opportunistic infections) of the patient and the severity of signs and symptoms of the dysphagia?

In answering the question of whether there was a relationship between the participant's diagnosis and the severity of the signs and symptoms of dysphagia, the following results were found that there were significant p-values for participants with a neurological condition for both the MASA (Mann, 2002) and MBS results. Findings from this study are supported by

those found by Roth (2001) and Ellis, Milford, Morton and Pinnington (2002) who stated that dysphagia is present in participants who have suffered a CVA. Swallowing is a complex process that utilises 31 pairs of striated muscles (Bass, 2006). The most common neurological condition identified in this study was CVA and the majority of these patients did experience a dysphagia. This is supported by current literature which states that if the cortex (posterior cortex and brainstem) is affected it will affect the overall swallowing physiology especially on muscle functioning such as in the case of neurological deficits (Bass, 2006). Therefore, the results indicate and imply that participants with a neurological deficit may experience more severe signs and symptoms of dysphagia as compared to participants who only present with an opportunistic infection.

5.2.3. Is there a relationship between the variables of age, CD4 count & HAART regimen and the severity of the dysphagia?

5.2.3.1. CD4 count

In answering the above question, the following results were found: A significant relationship was found between a low CD4 count with respiration and voice quality. The results imply that the lower a participants CD4 count was, then the more severe their respiration and quality of voice were. As poor respiration from an upper respiratory tract infection can lead to a decrease in vocal quality and these results are therefore not unexpected (Hedge, 2001).This finding was interesting because literature states that in the final stages of the disease the patients are usually emaciated, with recurrent candida, herpes zoster as well as infections of the mouth, throat and oesophagus (Van Dyk, 2008). However, there were no studies that had found similar results. Based on these findings, it would be expected that these patients would have had more severe infections and therefore their swallowing ability would be more severely affected. This was however, not the case as seen in the data.

5.2.3.2. Age

There was a significant relationship found between age and dysarthria and the oral phase. From the spread of ages in the data, the majority of participants were in their thirties. This is in agreement with the demographics of the HIV/AIDS population in South Africa which states that the majority of people who are living with the disease are in the age group of people who are typically employed. . Currently, no studies have focused on the effects that age has on dysphagia in people who are living with HIV/AIDS. Therefore this fact has implications for future research in the area.

5.2.3.3. HAART regimen

There was a significant relationship between HAART and pharyngeal phase, cough reflex and aspiration. The results revealed that participants who were on HAART had more severe pharyngeal phase difficulties, cough more frequently and aspirate more often. These results were surprising and differ from literature because as a patient commences HAART treatment, the course of the disease is altered as the patients have less frequent opportunistic infections (Arvieux et. al, 1998). There were however, no studies that specifically stated similar findings. Therefore, the result from this particular question does not support literature and implies that more research should be done in this area.

5.2.4. Do the results of the MASA significantly correlate with the results of the MBS?

When addressing the question of whether the results of the MASA (Mann, 2002) correlate with the results of the MBS, the following results were found: the MASA (Mann, 2002) and modified barium swallow results yielded significant correlations when it came to some measures and therefore the MASA could be used as a clinical tool in assessing dysphagia in a South African hospital context. It has significant clinical implications in that the MASA (Mann, 2002) can be used to assess dysphagia even when objective measures cannot be used. It also has implications in that future research needs to be conducted in this area.

5.3. Summary

There have been numerous studies that have been conducted in the area of dysphagia but not specifically looking at the effects of HIV/AIDS, rather neurological disorders such as CVA (Hinds & Wiles, 1998; Bench, Perry & Scott, 1998; Burrel, et. al. (1998)). These authors have also only utilised one method of assessment for example a bedside assessment or an objective assessment such as FEES or VFS. This research has therefore focused on both methods of assessment in a developing country state hospital setting. The agreement that was reached between the MASA (Mann, 2002) and the MBS results highlight the fact that the MASA was a valid tool in assessing dysphagia accurately at a bedside level. The MBS results were able to accurately assess whether a dysphagia was present in this population. The results that were obtained for this study therefore agree with the other literature such as Halvorsen et. al (1998) who suggests that objective measures such as VFS are important in assessing dysphagia in the HIV/AIDS population.

However, as stated above, the majority of the research in this area has not been conducted by a SLP and a formal dysphagia assessment has not been performed. This research has been able to draw conclusions regarding dysphagia. A SLP can perform both bedside assessments as well as modified barium swallows in an assessment.

Limitations, Implications & Conclusions

6. LIMITATIONS, IMPLICATIONS & CONCLUSION

This research study has shown that dysphagia does occur in patients who are living with HIV/AIDS regardless of their co-morbid conditions, CD4 count, age and HAART regimen. It is therefore important that a SLP be involved in the assessment and management of these patients. However, it is also important that these patients need to be managed in a multidisciplinary team in order to improve patient management and their quality of life. Ideally, for a dysphagia assessment, both a subjective an objective test should be done. However, in developing countries it is not always possible for objective measures to be done. Therefore, this research has shown that the MASA can be performed as a bedside assessment because it will yield accurate results.

6.1. Limitations of the study

A random error can affect the reliability of the results of the study. Random error is considered to be random disturbances in the performance on the measure (Durrheim et. al, 2006). However, this was not evident in the Spearman Rho test that was performed. The pitfall of a cross-sectional research design is that it does not analyse the population over a longer period and therefore, the changes of the population cannot be observed (Rosnow & Rosenthal, 2002).This study managed to yield some important results. However, for future research, a longitudinal research design could possibly be used. Another limitation was that there were only 26 participants that underwent a modified barium swallow. This was due to difficulties with the hospital x-ray equipment. A small number of participants may not yield such reliable results as a larger sample size would yield.

6.2. Recommendations for future research

There needs to be more research conducted in the field of HIV/AIDS and dysphagia such as:

The specific effects of the different co-morbid conditions on dysphagia as compared to individuals who are HIV negative. In regards to the longitudinal effects of HAART on dysphagia, there is a need to compare the effects that the different HAART regimens have on dysphagia in people who are living with HIV/AIDS. Research is needed to conduct more

dysphagia assessments utilising both subjective and objective measures. More research needs to be done which looks at multidisciplinary team studies in the area of HIV/AIDS and dysphagia. This should include quality of life assessments in the area of dysphagia and HIV/AIDS. The ethical management of dysphagia in HIV/AIDS populations is also important. Based on the limitations of the study, longitudinal research needs to be conducted to evaluate the long term effects of HIV/AIDS on dysphagia in adults.

6.3. Further recommendations

It is recommended that perhaps the speech therapists who are working in the government sector need to create increased awareness of the role of the speech therapist in dysphagia in general as well as in dysphagia within the HIV/AIDS population. The MDT members that should be targeted are: doctors, dieticians, physiotherapists and occupational therapists. This is important in order to increase the number of referrals that are sent to speech therapists thereby improving patient management. As patient management improves, their quality of life will improve.

Speech therapists should form part of the medical team that manage in and out patients who are living with HIV/AIDS. As this research study has concluded, the speech therapist has a vital role to play in the assessment and management of these patients.

The effects of HIV/AIDS should be taught to undergraduate students. If the students have a good understanding of how HIV/AIDS can affect an individual, this would improve patient management when the students are in their community service year.

Speech therapists should form part of the research team to assess the effects that HAART regimens have on a patient's symptoms. South Africa has the largest population of people who are infected with the HI virus and therefore it is important that research be conducted in this environment.

6.4. Implications

This research has therefore yielded important clinical results for the SLP practicing in South Africa. Dysphagia does occur in participants who are living with HIV/AIDS regardless of co-morbid conditions, CD4 count, age and HAART regimen. The MASA (Mann, 2002) is a time effective and accurate bedside assessment tool for dysphagia and therefore it can be used in rural areas and in clinical settings where objective measures are unavailable. The SLP needs to be involved in the assessment and management of these patients in order to improve their quality of life. This study has also highlighted the importance of conducting future research in this area.

6.5. Conclusion

As stated previously, HIV/AIDS has become the world's most serious public health problem (UNAIDS, 2009). South Africa has the highest HIV/AIDS population in the world. Therefore it is important that these studies be conducted in South Africa because SLP's will be faced with these conditions as part of their everyday management. Based on the literature that was reviewed for this study, it can be seen that dysphagia is prevalent in this population. However, insufficient studies have been conducted that specifically assess dysphagia. The results from this study have concluded that dysphagia is present in this population irrespective of co-morbid conditions, CD4 count, HAART regimen and age. It is therefore of great importance that the SLP in South Africa be involved in the multidisciplinary management of these patients in order to improve their quality of life. The Mann Assessment of Swallowing Ability (MASA) (Mann, 2002) is a reliable assessment tool that the SLP in South Africa can utilise to assess dysphagia in their acute adult patients. As shown in this study, the area of HIV/AIDS is a significant topic for healthcare in South Africa and it is therefore vital that more research be conducted in order to improve our knowledge of how best to treat these patients.

References & Appendices

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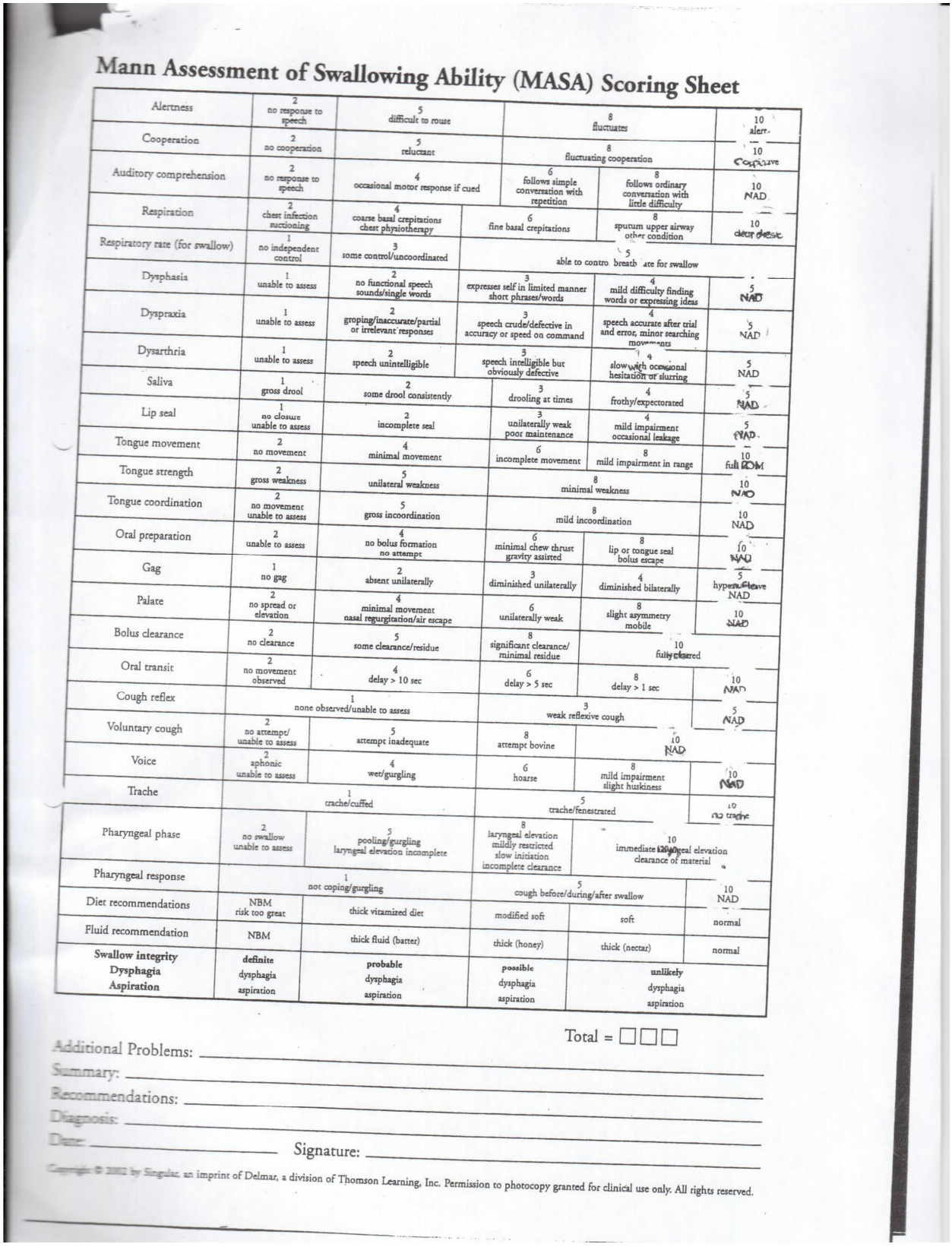
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Appendix A: MASA



Mann Assessment of Swallowing Ability (MASA) Scoring Sheet

Alertness	2 no response to speech	5 difficult to rouse	8 fluctuates		10 alert
Cooperation	2 no cooperation	5 reluctant	8 fluctuating cooperation		10 Cooperative
Auditory comprehension	2 no response to speech	4 occasional motor response if cued	6 follows simple conversation with repetition	8 follows ordinary conversation with little difficulty	10 NAD
Respiration	2 chest infection suctioning	4 coarse basal crepitations chest physiotherapy	6 fine basal crepitations	8 sputum upper airway other condition	10 clear chest
Respiratory rate (for swallow)	1 no independent control	3 some control/uncoordinated	5 able to contro breath ate for swallow		
Dysphasia	1 unable to assess	2 no functional speech sounds/single words	3 expresses self in limited manner short phrases/words	4 mild difficulty finding words or expressing ideas	5 NAD
Dyspraxia	1 unable to assess	2 groping/inaccurate/partial or irrelevant responses	3 speech crude/defective in accuracy or speed on command	4 speech accurate after trial and error, minor searching movements	5 NAD
Dysarthria	1 unable to assess	2 speech unintelligible	3 speech intelligible but obviously defective	4 slow with occasional hesitation or slurring	5 NAD
Saliva	1 gross drool	2 some drool consistently	3 drooling at times	4 frothy/expectorated	5 NAD
Lip seal	1 no closure unable to assess	2 incomplete seal	3 unilaterally weak poor maintenance	4 mild impairment occasional leakage	5 NAD
Tongue movement	2 no movement	4 minimal movement	6 incomplete movement	8 mild impairment in range	10 full ROM
Tongue strength	2 gross weakness	5 unilateral weakness	8 minimal weakness		10 NAD
Tongue coordination	2 no movement unable to assess	5 gross incoordination	8 mild incoordination		10 NAD
Oral preparation	2 unable to assess	4 no bolus formation no attempt	6 minimal chew thrust gravity assisted	8 lip or tongue seal bolus escape	10 NAD
Gag	1 no gag	2 absent unilaterally	3 diminished unilaterally	4 diminished bilaterally	5 hyperactive NAD
Palate	2 no spread or elevation	4 minimal movement nasal regurgitation/air escape	6 unilaterally weak	8 slight asymmetry mobile	10 NAD
Bolus clearance	2 no clearance	5 some clearance/residue	8 significant clearance/ minimal residue	10 fully cleared	
Oral transit	2 no movement observed	4 delay > 10 sec	6 delay > 5 sec	8 delay > 1 sec	10 NAD
Cough reflex	1 none observed/unable to assess		3 weak reflexive cough		5 NAD
Voluntary cough	2 no attempt/ unable to assess	5 attempt inadequate	8 attempt bovine	10 NAD	
Voice	2 aphonic unable to assess	4 wet/gurgling	6 hoarse	8 mild impairment slight huskiness	10 NAD
Trache	1 trache/cuffed		5 trache/fenestrated		10 no trache
Pharyngeal phase	2 no swallow unable to assess	5 pooling/gurgling laryngeal elevation incomplete	8 laryngeal elevation mildly restricted slow initiation incomplete clearance	10 immediate laryngeal elevation clearance of material	
Pharyngeal response	1 not coping/gurgling		5 cough before/during/after swallow		10 NAD
Diet recommendations	NBM risk too great	thick vitamized diet	modified soft	soft	normal
Fluid recommendation	NBM	thick fluid (batter)	thick (honey)	thick (nectar)	normal
Swallow integrity Dysphagia Aspiration	**definite** dysphagia aspiration	**probable** dysphagia aspiration	**possible** dysphagia aspiration	**unlikely** dysphagia aspiration	

Total = ☐☐☐

Additional Problems: _____

Summary: _____

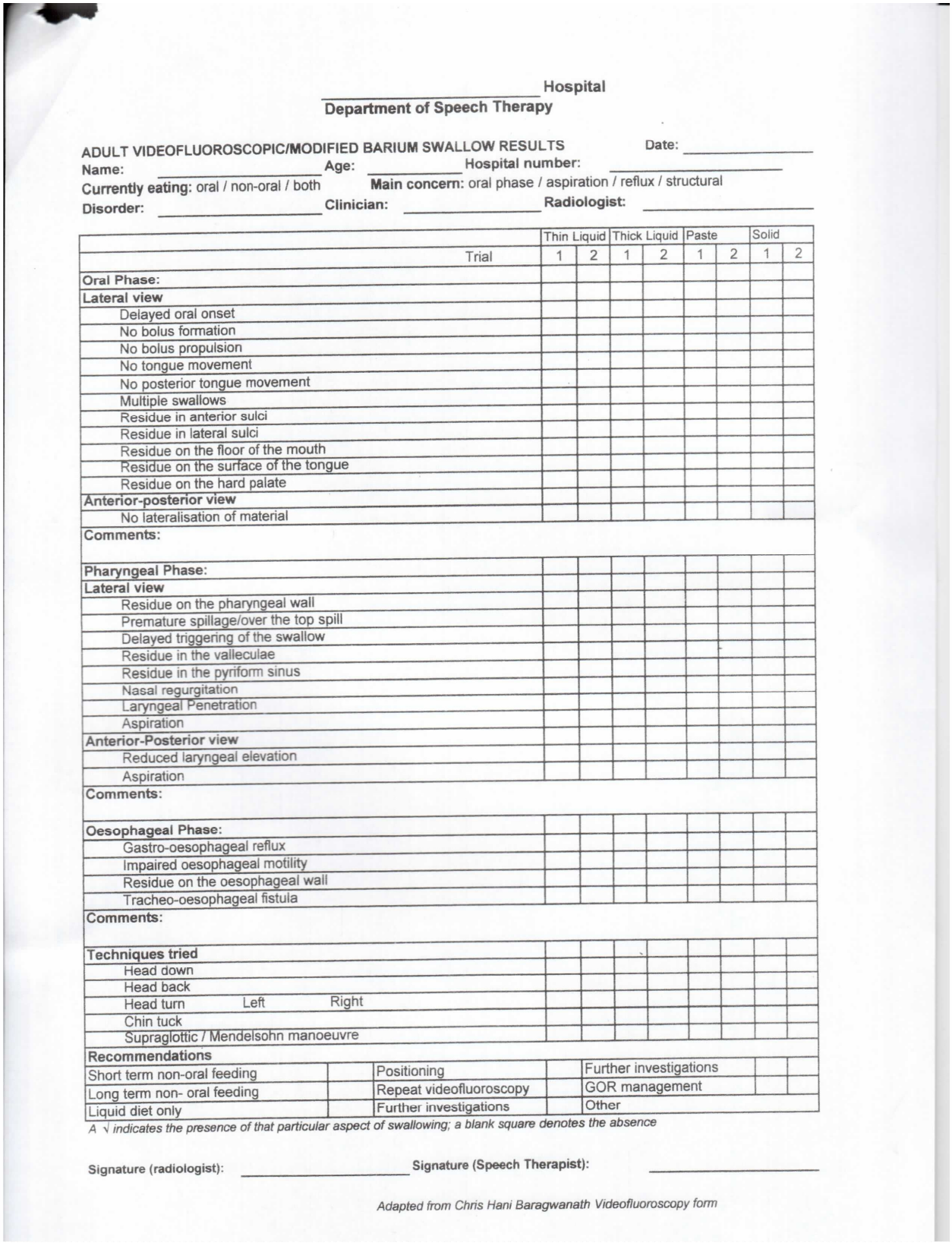
Recommendations: _____

Diagnosis: _____

Date: _____ Signature: _____

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Appendix B: Modified Barium Swallow



_____ Hospital

Department of Speech Therapy

ADULT VIDEOFLUOROSCOPIC/MODIFIED BARIUM SWALLOW RESULTS **Date:** _____

Name: _____ **Age:** _____ **Hospital number:** _____

Currently eating: oral / non-oral / both **Main concern:** oral phase / aspiration / reflux / structural

Disorder: _____ **Clinician:** _____ **Radiologist:** _____

	Thin Liquid		Thick Liquid		Paste		Solid	
Trial	1	2	1	2	1	2	1	2
Oral Phase:								
Lateral view								
Delayed oral onset								
No bolus formation								
No bolus propulsion								
No tongue movement								
No posterior tongue movement								
Multiple swallows								
Residue in anterior sulci								
Residue in lateral sulci								
Residue on the floor of the mouth								
Residue on the surface of the tongue								
Residue on the hard palate								
Anterior-posterior view								
No lateralisation of material								
Comments:								
Pharyngeal Phase:								
Lateral view								
Residue on the pharyngeal wall								
Premature spillage/over the top spill								
Delayed triggering of the swallow								
Residue in the valleculae								
Residue in the pyriform sinus								
Nasal regurgitation								
Laryngeal Penetration								
Aspiration								
Anterior-Posterior view								
Reduced laryngeal elevation								
Aspiration								
Comments:								
Oesophageal Phase:								
Gastro-oesophageal reflux								
Impaired oesophageal motility								
Residue on the oesophageal wall								
Tracheo-oesophageal fistula								
Comments:								
Techniques tried								
Head down								
Head back								
Head turn Left Right								
Chin tuck								
Supraglottic / Mendelsohn manoeuvre								

Recommendations					
Short term non-oral feeding		Positioning		Further investigations	
Long term non- oral feeding		Repeat videofluoroscopy		GOR management	
Liquid diet only		Further investigations		Other	

A √ indicates the presence of that particular aspect of swallowing; a blank square denotes the absence

Signature (radiologist): _____ **Signature (Speech Therapist):** _____

Adapted from Chris Hani Baragwanath Videofluoroscopy form

Appendix C: Ethics Certificate (to come)

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Ms Kim Alborough

CLEARANCE CERTIFICATE	**M091165**
PROJECT	Dysphagia in a Group of Adults in-Patients Living with HIV/AIDS in Gauteng South Africa
INVESTIGATORS	Ms Kim Alborough.
DEPARTMENT	Speech Pathology & Audiology
DATE CONSIDERED	2009/11/27
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 09/15/2009 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Ms A Mupawose

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Appendix D: Patient Information Sheet

Information Sheet for Informed Consent for Participation in Masters Research

Hello,

My name is Kim Alborough. I am doing my research for my Masters degree in Speech Pathology. I am interested in looking at the specific signs and symptoms of swallowing difficulties that people living with HIV/AIDS may experience. Hospital protocol is for me to do a bedside swallowing exam because the doctor has referred you to the speech therapy department. The bedside exam involves me assessing how you swallow with different types of food. If there is difficulty with your swallow, you will go for an x – ray where we watch how you swallow. I would need to use the results from these tests in the study.

The implications of this study will be to improve the knowledge and skills of speech therapists that is needed for assessing a person who is living with HIV/AIDS.

The information that will be used in the study will only be your age, diagnosis, CD4 count and the speech therapy assessment results.

It is your right to refuse your results to be used in the study. You are allowed to withdraw your results from the study at any point. If you choose to withdraw, there will be no penalties or consequences.

This knowledge that will be gained from this study will benefit the management of all future patients who are living with HIV/AIDS.

If you agree to participate in my study, please sign the consent form which will allow me to use the results.

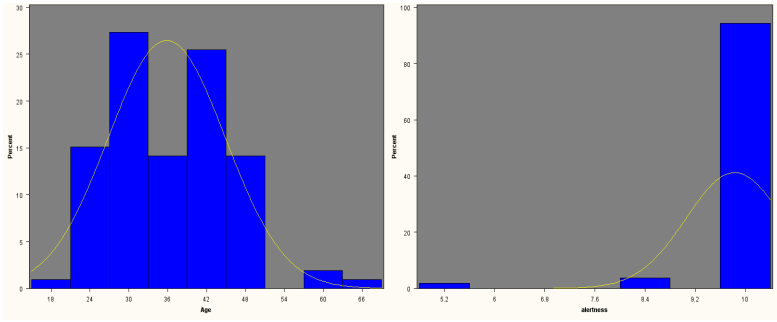
Kindly note that in order to ensure confidentiality of your status, this information sheet is for your use only unless you choose to share this information. Please be careful what you do with this form.

If you have any question, please do not hesitate to ask. My 24 hour contact details are (011) 489 0823. The Human Research Ethics Committee details are: (011) 717 1234.

Regards

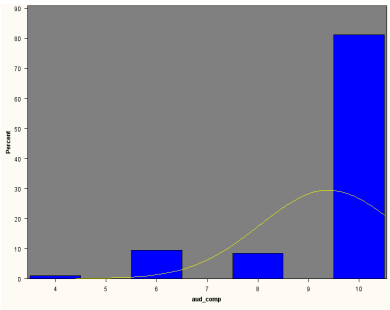
Kim Alborough

Appendix E: Stats assumptions of normality tables (to come)

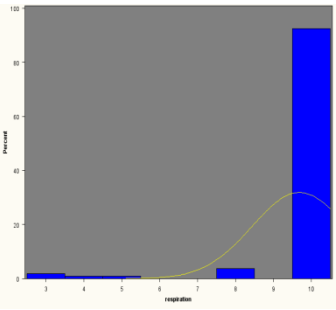


Age

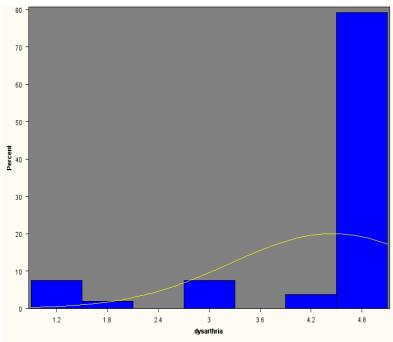
Alertness



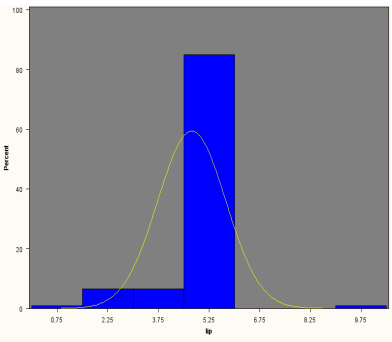
Auditory comprehension



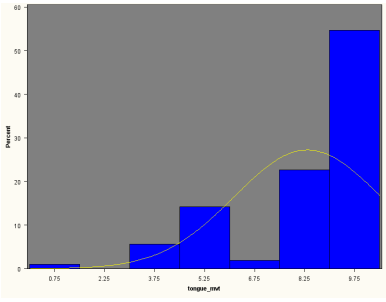
Respiration



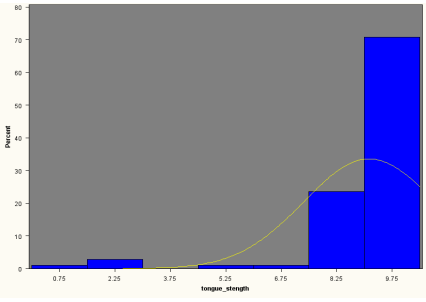
Dysarthria



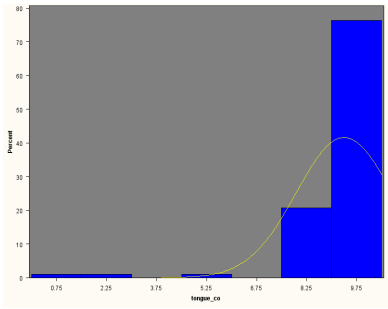
Lip



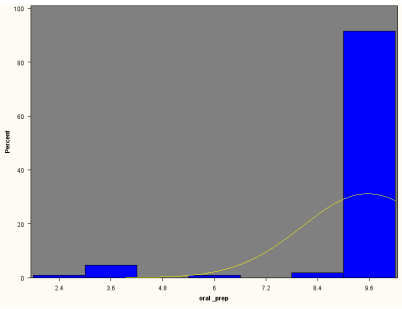
Tongue movement



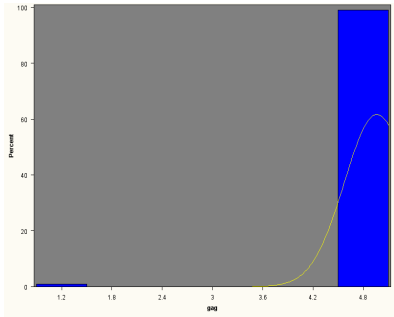
Tongue strength



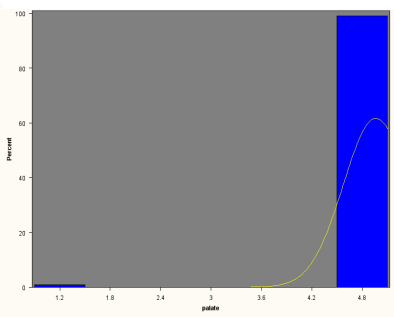
Tongue co-ordination



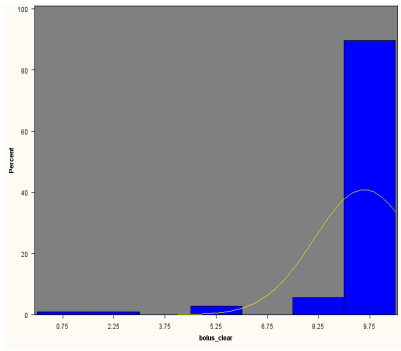
Oral preparation



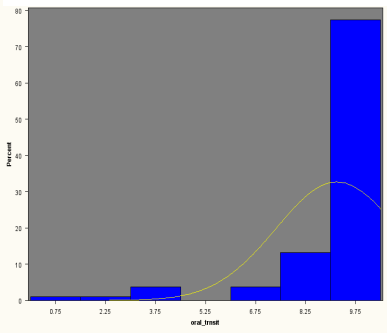
Gag



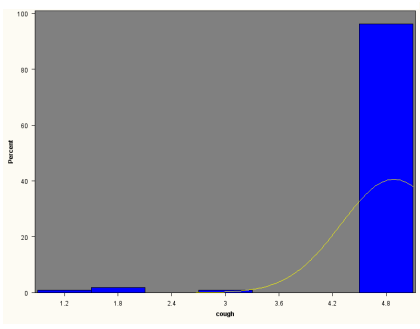
Palate



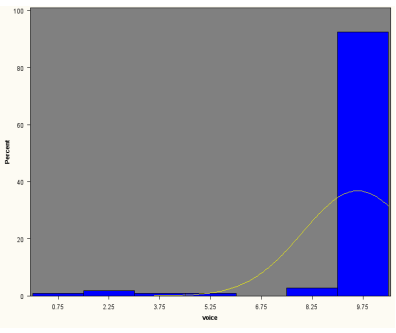
Bolus clearance



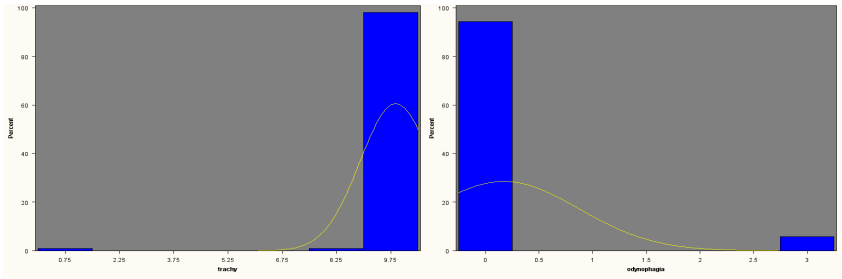
Oral transit



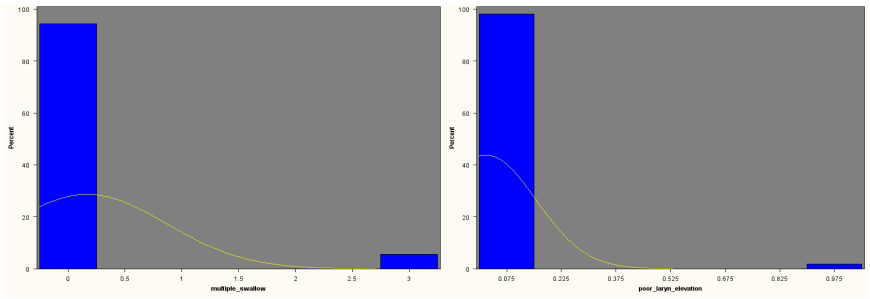
Cough



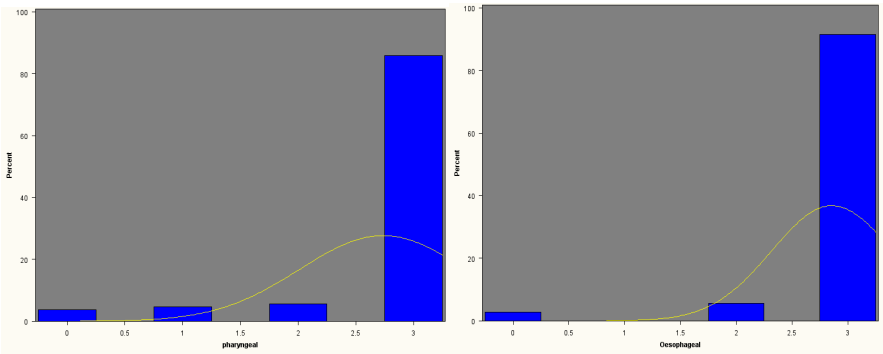
Voice



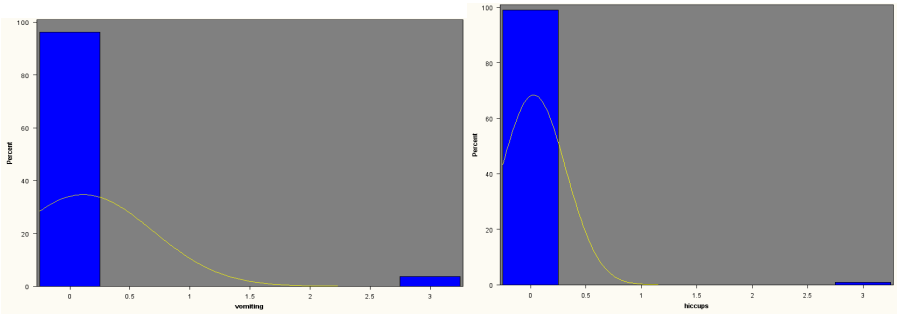
Tracheostomy Odynophagia



Multiple swallows Poor laryngeal elevation



Pharyngeal phase Oesophageal phase



Vomiting Hiccups

Appendix F: Tables of different combinations of diagnoses

Neurological condition with opportunistic infection	**n**
CVA & Pulmonary Tuberculosis (PTB)	4
Dementia and Candida	1
Cryptococcal meningitis & Candida	1
Confusion & liver dysfunction	1
Candida & TBM	1
Neurological condition with neurological condition	**n**
CVA & CCM	3
CCM & Tuberculosis meningitis (TBM)	1
TBM & CVA	1
Encephalitis & dementia	1
Neurosyphillis & TBM	1
Opportunistic infection with opportunistic infection	**n**
PTB & Candida	1
Gastro & TB	2
Kaposi sarcoma & PTB	1
Toxoplasmosis & TB	1
TB & Candida	
Opportunistic infection with renal dysfunction	**n**
Renal & TB	1
Pneumonia & renal	1
Gastro & renal	2

Appendix G: Tables of different HAART regimens

HAART medication	n	Regime	%
D4T/3TC/ EFV	6	1a	27
TENOFIVIR/EFV/3TC	5	1a (1*)	23
TENOFIVIR/3TC/NVP	6	1b (1^)	27
TENOFIVIR/ 3TC/STAVUDINE	3		14
EFV/AZT/3TC	1	1a (2*)	4.5
EFV/3TC	1		4.5

1* & 2*- different combinations of Regiment 1a

1^ - different combinations of Regiment 1b.