

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND INFORMATION

Lumbar puncture (LP) is a clinical procedure in which a needle is applied to withdraw cerebral spinal fluid (CSF) from the subarachnoid space in the lumbar region of the spinal cord. Lumbar refers to the five vertebrae which are situated below the thoracic vertebrae and above the sacral vertebrae in the spinal column. The procedure involves inserting a needle between the third and fourth lumbar vertebrae (Leach 2005), or in the interspaces of the fourth and fifth lumbar vertebrae (Sucholeiki and Waldman 2006, Lewis et al. 2004). The needle does not enter the spinal cord or nerves because it is inserted below the level where the spinal cord ends. It can be performed on an in patient or out patient basis within minutes (Leach 2005). LP is sometimes referred to as spinal puncture, spinal tap, thecal puncture and rachiocentesis (Andreoli et al. 2003).

In a nutshell, LP is a standard procedure that is performed in order to collect a sample of cerebral spinal fluid from the spinal canal for microscopy and cytological examination (Kumar and Clark 2005). It is also performed as a therapeutic procedure for the release of increased intracranial pressure (Leach 2005), and administration of therapeutic and diagnostic agents.

LP is an essential procedure in the diagnosis of many Central Nervous System (CNS) pathologies. Most of these clinically present as Meningitis or Encephalitis (Mandel et al. 2005). Samples of CSF are needed to confirm the diagnosis of meningitis and other infective CNS pathological processes, which are examined for signs of infection.

Normal CSF is the clear, watery liquid that protects and lubricates the CNS from injury and cushions it from the surrounding bone structure. It contains a variety of substances, particularly glucose (sugar), protein and white blood cells.

CSF is used in arriving at a diagnosis by looking at a number of critical and vital parameters:

➤ **Colour.**

This is observed by the personnel performing the LP, and equally so by the laboratory staff (macroscopic examination). Normal CSF is crystal clear. A cloudy CSF may indicate infection. A turbid or cloudy CSF is seen in patients with increased concentrations of white blood cells ($>200/\text{mm}^3$), red blood cells ($>400/\text{mm}^3$), bacteria ($>10^5$ colony forming units [CFU]/ml), or protein in the fluid (Mandel et al. 2005). A bloody tap may be due to trauma to a blood vessel or as a consequence of haemorrhage.

➤ **Pressure.**

The doctor performing the LP measures the CSF pressure by connecting a manometer to the LP needle. Normal CSF opening pressure is 50-195 mm of H_2O . It rises and falls with respiration and the heart beat (Mandel et al. 2005).

➤ **Microscopy, culture and sensitivity.**

Cell count of the type and number of the red and white blood cells is done by the laboratory personnel. The presence of an increased number of white blood cells (leucocytosis) may indicate meningitis. In certain pathological conditions, you might have red blood cells. CSF is later stained and examined under a microscope to look for pathogenic organisms such as bacteria or fungi. CSF culture is also absolutely necessary to determine type of microorganisms and effective antibiotics.

➤ **Biochemistry.**

An increase in the amount of protein suggests an infection or a disease. It indicates irritation of the meninges. Glucose levels are low in bacterial infections because bacteria use the host's glucose for their nutrition. Serologic tests may also be used to help identify presence of pathogenic Organisms. LP helps to determine the pathogenic cause (Lichten 2004).

This diagnostic tool is uniquely crucial in arriving at an accurate diagnosis of meningitis. This is one of the most reliable tools for the diagnosis of CNS afflictions. LP is necessary where there is

a differential diagnosis of Cerebral Malaria in infants, since this cannot be differentiated from meningitis clinically because of the absence of meningeal signs in this age group (Riodarn and Cant 2002). Some CSF results are available within 30-60 minutes, where as bacterial culture results are available within 48 hours. It is nonetheless good practice to commence an antibiotic while awaiting results, especially that the appearance of CSF (turbidity) may often indicate a bacterial infection. This may be altered based on the results received.

Other conditions where LP is indicated are: Multiple Sclerosis (chronic, disabling disease caused by inflammation, destruction and scarring of the sheath that covers the nerve fibers in the brain and spinal cord), Guillain -Barre Syndrome (inflammation of the nerves outside the brain and spinal cord), Neuro syphilis (CNS syphilis), Lymphoma, Leukemia or other cancers involving the brain or CNS, certain forms of hydrocephalus (water in the cranium), and any disorder affecting the nervous system (Leach 2005). LP may also be performed for the diagnosis of subarachnoid haemorrhage, a lethal bleed into the CSF resulting from rupture of an abnormal blood vessel such as an aneurysm. It is worth noting that in this particular circumstance, LP is very sensitive in the detection of subarachnoid haemorrhage, perhaps surpassing Computed Tomographic (CT) scan (Cordingley 2005).

It is a recognized fact that the use of CT scan is beyond the reach of most Zambians as at present the cost ranges between \$225 to \$300 (K900, 000 to K1, 200,000) which is way beyond the reach of most Zambians, with poverty levels estimated at 67 percent (NHSP 2006-2010). Moreover there are only two hospitals where CT scan services are available in the country (*Sinozam* and University Teaching Hospital), while Magnetic Resonance Imaging (MRI) services are unavailable in the country.

Apart from being a diagnostic tool, LP can be performed for therapeutic purposes such as removal of fluid to relieve Increased Intracranial Pressure (ICP) in certain types of headache such as in cryptococcal meningitis and in idiopathic intracranial hypertension. It is also used to administer spinal anesthesia and for the introduction of antibiotics, steroids and other chemotherapeutic agents. Furthermore, it facilitates the introduction of radiopaque contrast media directly into the spinal canal necessary for diagnostic imaging studies (Sucholeiki and Waldman 2006).

The decision to perform a LP should be undertaken only after an accurate history, careful neurological examination and fundoscopy of the patient, because despite being a safe procedure, it is also associated with some complications such as herniation of the brain. Complications following LP are rare, if it is performed properly. However, complications may range from minor discomfort to life threatening and some could even be fatal. In the rare instance that complications occur, they may include the following:

- Headache commonly referred to as post-spinal headache. This is the commonest complication and it is experienced when the patient stands up and is relieved by lying down. This is as a result of leakage of the CSF from the LP site due to tear in the dura mater. It occurs in 25 percent of patients within 24-72 hours of LP, and lasts two to eight days (Warrel et al. 2003).
- Local bleeding can occur if a small blood vessel is nicked during the procedure. This occurs in about 20 percent of patients and may be serious in patients with coagulation disorders (Mandel et al. 2005).
- Backache, which may occur due to trauma of the LP needle (Roberts and Hedges 2004).
- Other complications as reported by Sucholeiki and Waldman (2006) are: nerve root trauma; CNS infection especially in immunocompromised patients; cranial, cervical, and lumbar subdural haematomas which are common in patients on anticoagulation therapy.
- Brain herniation is the most serious and can be fatal. It may occur in patients with increased ICP (Mandel et al. 2005). Quick reduction in ICP produced by removal of CSF causes the brain structures to herniate into the foramen magnum, which puts pressure on the cardio respiratory center in the medulla and might cause cardio respiratory arrest causing sudden death.

There are instances when LP is contraindicated so as to prevent complications.

According to Shlamovitz (2006) and Friendlander (2005), there are relative and absolute contraindications of LP. Relative contraindications include: increased ICP as evidenced by papilloedema (oedema of the optic disc), coagulopathy (bleeding disorder) or thrombocytopenia and brain abscess, while infection of the skin near the LP site is an absolute contraindication because it increases the risk of introducing infection into the CSF.

In order to avoid these potential complications cited above, “LP should be performed only after clinical and thorough examination of the patient weighing the potential value against hazards of the procedure,” (Warrell et al. 2003).

According to Lawrence (2005), “all complications except post lumbar headache are rare. When appropriate assessments are made of the indications and risks, LP is a relatively safe procedure with high diagnostic yield”. It can therefore be concluded that serious complications of a properly performed LP are extremely rare.

HMIS records of 2006 at Arthur Davison Hospital, Kitwe and Ndola Central Hospitals show that the common indications of LP are:

1) In neonates

- a) Neonatal Septicaemia
- b) Convulsions
- c) Electrolyte imbalance
- d) Unexplained unconsciousness

2) In children

a) Therapeutic:-

- i) Reduction of increased intracranial pressure
- ii) For administration of drugs and anaesthesia

b) Infections:-

- i) Meningitis
- ii) Encephalitis

c) Subarachnoid haemorrhage

d) Injection of contrast media for diagnosis of suspected Medical Pathologies

3) In adults

a) Diagnostic

i) Infections in the CNS e.g.

- Meningitis
- Encephalitis
- Trypanosomiasis

ii) Inflammatory

- Multiple sclerosis

b) Therapeutic

i) For administration of spinal anesthesia, antibiotics, analgesia, chemotherapeutic agents and contrast media.

ii) For release of increased intracranial pressure.

1.2 DISEASE BURDEN

Meningitis is a growing health problem in Zambia. It is evident from Ministry of Health (MoH) statistics (Table 1), that meningitis contributes to high morbidity and mortality in most health institutions in Zambia (MoH, HMIS 2006). It is endemic in both rural and urban areas of the country.

TABLE 1.

NATIONAL MENINGITIS TRENDS 2000-2006, ALL QUARTERS

| YEAR | DEATHS TOTAL | CASES TOTAL | INCIDENCE TOTAL | CFR TOTAL |
|------|--------------|-------------|-----------------|-----------|
| 2000 | 1,089 | 7,449 | 0.756 | 275 |
| 2001 | 976 | 4,970 | 0.486 | 292 |
| 2002 | 1,080 | 5,107 | 0.483 | 291 |
| 2003 | 1,278 | 4,656 | 0.426 | 308 |
| 2004 | 1,430 | 4,693 | 0.415 | 328 |
| 2005 | 1,495 | 5,268 | 0.451 | 319 |
| 2006 | 1,186 | 3,945 | 0.327 | 310 |

SOURCE: MoH HMIS, 2006.

Table 1 shows total meningitis cases, total deaths, total incidence and Case Fatality Rates (CFRs) at national level during the period 2000 to 2006. The case fatality rate has increased over the years, from 275 in 2000 to 310 in 2006.

Zambia is one of the developing countries in the Sub Saharan region with an area of 752,614 square kilometers. It is a landlocked country and shares borders with the Democratic Republic of Congo and Tanzania in the North, Malawi and Mozambique in the East, Zimbabwe and Botswana in the South, Angola in the West, and Namibia in the South West. The country is divided into nine provinces and seventy two districts, with an estimated population of 12,357,498 (CSO 2003). Out of this population, 42 percent live in the urban areas while 58 percent live in the rural areas (CSO 2004).

Copperbelt Province, one of the nine provinces is about 4.2 percent of the total area of Zambia and covers an area of 31,328 square kilometers. Administratively, it is divided into ten districts, namely: *Chingola, Chililabombwe, Kalulushi, Kitwe, Lufwanyama, Luanshya, Masaiti, Mpongwe, Mufulira* and *Ndola*. *Ndola* is the provincial headquarters of the province (CSO 2004).

According to the CSO (2004) summary report on the Zambia 2000 Census of Population and Housing, Copperbelt has the largest population in Zambia, estimated at 1,581,221 people with an annual growth rate of 0.8 percent, the highest population density occurring in *Kitwe* and *Ndola*. The population of *Ndola*, according to the *Ndola* District Health Management Board (NDHMB) Action Plan and Budget (2007-2009), is 462,459 with an annual growth rate of 1.6 percent. The population of *Kitwe* is estimated at 460, 255, with a growth rate of 2.2 percent (*Kitwe* District Health Board, HMIS 2006).

The province has a number of hospitals, mini- hospitals and health centers run by government, mines, missions, non government organizations and private individuals respectively. Tertiary services are located in *Ndola* and *Kitwe*. In addition Arthur Davison Children's Hospital (ADH) is located in *Ndola*. Meningitis is among the top ten causes of morbidity and mortality in the three hospitals.

Public hospitals in Zambia are organised at three levels. These levels comprise of district (first referral level) hospitals, general hospitals (second referral level) and tertiary/specialised (central or third referral level). Each level is supported by a higher level to which the patient is referred

At *Ndola* Central Hospital (NCH) in 2006, meningitis ranked as the 9th cause of death in the 1st quarter, it was the 5th cause of mortality in the 2nd quarter, ranked as 10th cause of death in the 3rd quarter, and was the 6th cause of death in the fourth quarter (NCH HMIS 2006). While at Arthur Davison Hospital, it was the 9th, 7th, 10th and 7th cause of death in quarters 1 to 4th respectively (ADH HMIS 2006). At *Kitwe* Central Hospital (KCH HMIS 2006) it was 8th, 5th, 9th and 7th cause of death in first to fourth quarters of 2006.

Statistics indicate that mortality due to meningitis ranks high. Undoubtedly, examination of cerebral spinal fluid collected by way of a lumbar puncture allows for definitive diagnosis and facilitates appropriate medical care.

1.3 STATEMENT OF THE PROBLEM

HMIS records from the three hospitals show that out of 1,306 patients diagnosed with meningitis in 2006, only 33 consented to the procedure. For the remaining 1,273, the doctors requested for both LP and Cryptococcal Antigen Test (CAT) in blood sample, CAT only, or no request was made at all. It is worth of note that where both LP and CAT tests were requested for, patients opted for CAT. In certain situations, this might have compromised medical care. Comparatively there were more patients in 2003 consenting to the procedure as out of 1,044 meningitis patients, 275 LP's were done.

It has also been observed from available records that many doctors now opt for CAT because of the high rate of refusal by caregivers and patients who have imbedded beliefs in the fatal outcome associated with LP. CAT is preferable among patients and caregivers since it involves a simple collection of a blood sample usually from the arm. 231 CAT tests were done at the three hospitals in 2006 compared to 7 in 2003. In some instances patients were not given an option of LP as some doctors were ordering both CAT and LP, which facilitated patients or caregivers to opt for CAT. CAT merely confirms presence of *Cryptococcus Neoformans* and is insensitive to any

other pathogens with serious consequences. LP therefore remains an important and specific diagnostic test.

Despite a rise in morbidity and mortality, it is evident that progressively fewer LPs are being performed because of the negative reputation that the procedure has acquired. However, CAT seems to be gaining popularity among patients and relatives, despite the fact that CAT only helps in diagnosing the presence of *Cryptococcus Neoformans* infection, especially in patients with a depressed immunity such as that due to AIDS (Medical Encyclopedia 2006).

TABLE 2:
CAT TESTS DONE AMONG PATIENTS AT ADH, KCH AND NCH, 2003-2006

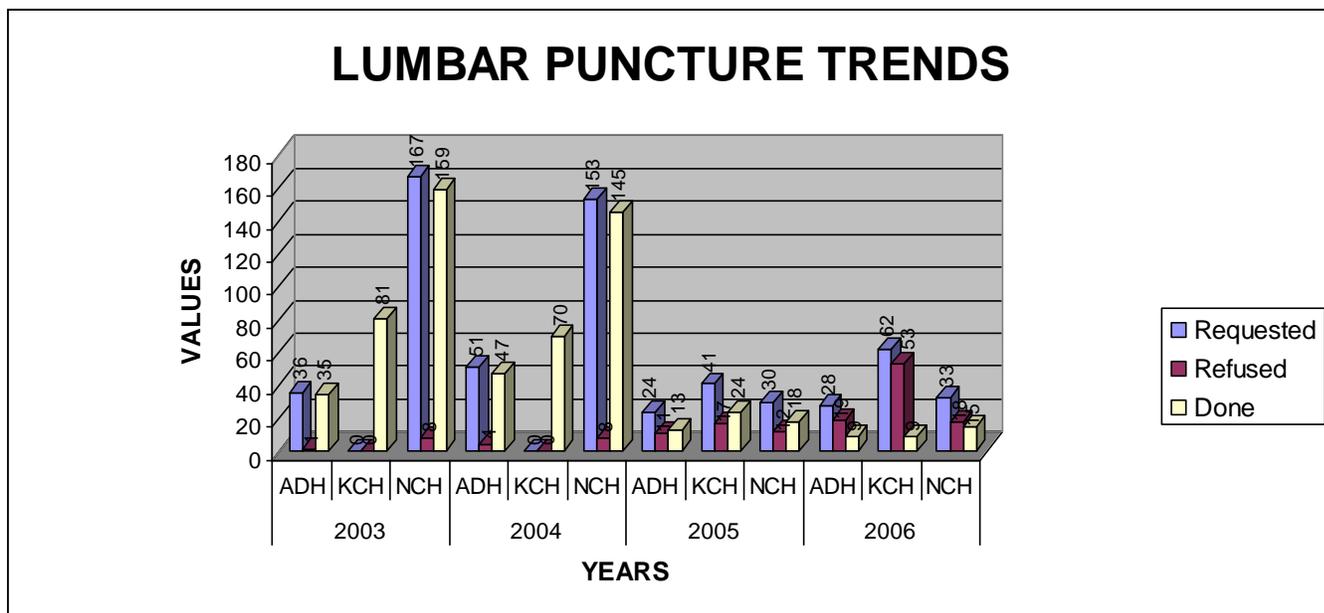
| HOSPITAL | 2003 | 2004 | 2005 | 2006 |
|-------------------------|----------|-----------|-----------|------------|
| ARTHUR DAVISON HOSPITAL | - | - | - | 6 |
| KITWE CENTRAL HOSPITAL | 3 | 7 | 8 | 9 |
| NDOLA CENTRAL HOSPITAL | 4 | 22 | 35 | 216 |
| TOTAL | 7 | 29 | 43 | 231 |

SOURCE: HMIS ADH, KCH AND NCH, 2003-2006.

Table 2 shows that more patients are progressively opting for CAT tests in blood sample at the three institutions on the Copperbelt. Basing on the statistics that were available, CAT is not popular among children as it is for adults. Prior to 2005, the three hospitals had no facilities for conducting CAT; hence samples were referred to a private hospital in *Kitwe* for this investigation.

Although obtaining CSF by LP for microscopic examination is an essential procedure in the diagnosis of CNS infections and inflammatory conditions such as meningitis (Sucholeiki and Waldman 2006), it has been reported that many caregivers and patients at *Ndola* Central Hospital, Arthur Davison Hospital and *Kitwe* Central Hospital have been declining this procedure.

FIGURE 1: LUMBAR PUNCTURE TRENDS AT THREE HOSPITALS



SOURCE: HMIS ADH, KCH and NCH 2003-2006

It should be noted that there is a growing trend of refusals for LP as evidenced in Figure 1. Figures are based on the statistics that were available. However, some records could not be traced for instance records for 2003 and 2004 for KCH could not be located. Some of the data could equally not be traced at NCH and ADH. This is against the background that LP can only be performed subsequent to written consent by the patient or caregiver. The Figure also shows that there has been a decline in the number of LPs performed from 159, 81, and 35 in 2003 for NCH, KCH and ADH respectively to 15 for NCH and 9 for both ADH and KCH in 2006.

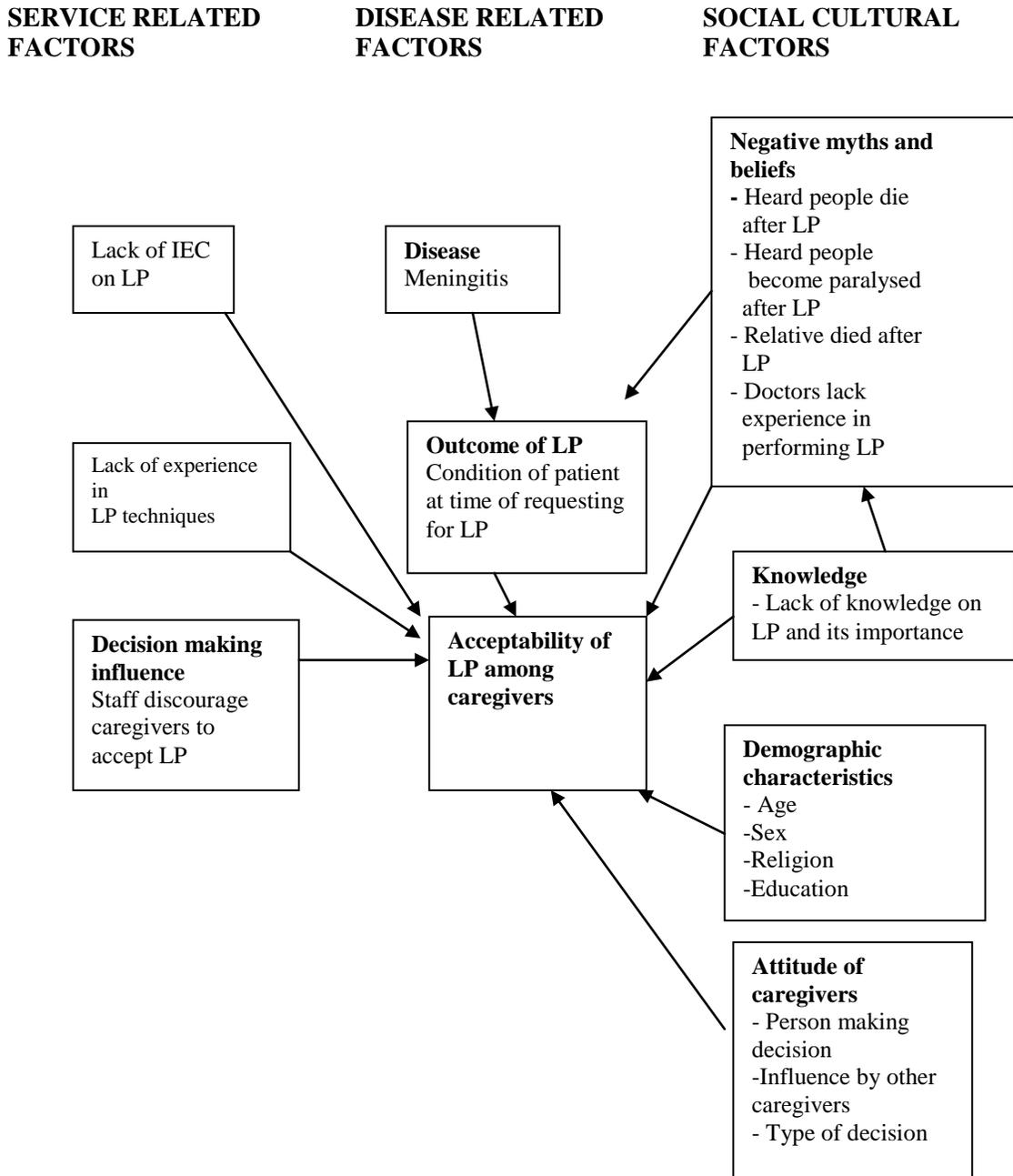
Clearly, the statistics given indicate that there is a growing problem in acceptance of LP. If consent for LP is denied, it makes it extremely difficult to make a correct diagnosis and manage the patient properly.

According to Goldman and Ausiello (2004), even if presumptive diagnosis is made from the clinical presentation and the patient is commenced on treatment “sampling of CSF via LP is crucial for accurate diagnosis and management”. Caregivers’ or client’s refusal of this important diagnostic test could jeopardize prompt and adequate treatment resulting in serious consequences including death.

1.4 ANALYTICAL FRAMEWORK

FIGURE 2:
CONCEPTUAL FRAMEWORK TO EXPLORE ATTITUDES AND DETERMINANTS OF LUMBAR PUNCTURE ACCEPTABILITY AT THREE HOSPITALS IN ZAMBIA

In order to guide this study, a conceptual framework has been developed and is summarized below:



Since a study has not been done in Zambia, only assumptions have been given as tabulated in the diagram on the previous page, which need to be verified or dispelled. Some of the assumptions are as follows:

- It is assumed that decision making in the acceptance of LP may be influenced by hospital staff thereby contributing to the low numbers of patients that undergo LP. It has been observed and reported that some health care providers discourage patients or caregivers to consent to LP. This could be due to the fact they believe that LP may have fatal consequences or they may have either witnessed patients dying following LP or could have lost a relative after the procedure.
- It is further assumed that lack and inadequate explanation of the importance of the procedure by health care providers could be another contributory factor. If the importance of LP is not adequately explained, caregivers or patients themselves are not likely to consent to the procedure.
- It is assumed that decline to consent to LP could be associated with the caregiver's perceived belief that the patient might be paralysed after LP.
- Further assumptions are lack of Information Education and Communication (IEC) in many health facilities on LP and other procedures has had a negative effect on most procedures including LP. Most health care providers do not give information to patients and clients on procedures performed and what is expected of them. It is also assumed that there are no protocols either to guide medical staff. There is a possibility that refusal is due to lack of knowledge on the importance of this procedure
- Other assumptions to LP acceptability could be due to people having perceptions and negative myths and beliefs that patients die after LP regardless of the patient's condition prior to the procedure. Further assumptions are that non acceptability of LP could be due to the fact that either a relative died after LP or that they have heard that people die after LP.

Others could have actually witnessed or seen a very sick relative die after the procedure.

There is a possibility that death could have been associated with the patient's poor general condition especially since most are brought to hospital in a critical condition due to late presentation for admission or that consent was delayed.

- It is further assumed that LP acceptability could be related to the patient's general condition. Caregivers might refuse to consent to LP if the patient is critically ill and believe that the patient is dying. This is because they do not want the patient to suffer unnecessary pain when death is imminent.
- Other assumptions are that age, sex, religion and education level of the person making the decision on whether a LP should be performed on the patient might influence decision making.
- It is assumed that attitudes of care givers might influence decision making on LP acceptability. Influence from others such as relatives, fellow caregivers and other people might influence decision on whether to accept LP procedure.
- Finally it is assumed that lack of experience in performing LP by doctors could be a contributory factor to LP acceptability. Deaths occurring after LP have always been associated to lack of experience by clinicians who perform the procedure.

1.5 DEFINITION OF TERMS AS USED IN THIS RESEARCH

It is important that terms used in the study are defined to avoid misinterpretation of their meanings.

Attitude - A manner of acting, feeling and thinking that influences one's disposition or opinion.

Belief - One's mental acceptance of something as true, although absolute certainty may be absent.

Caregiver - A family member looking after a patient in hospital

Knowledge - Awareness or understanding of something

1.6 RESEARCH QUESTIONS

1.6.1 What are the attitudes and determinants of LP acceptability among caregivers at Arthur Davison Childrens' Hospital, *Kitwe* and *Ndola* Central Hospitals?

1.6.2. Is there a relationship between LP acceptability and level of education?

1.7 OBJECTIVES.

i) **General Objective.**

To determine attitudes and determinants of LP acceptability among caregivers at Arthur Davison Children's Hospital', Ndola and Kitwe Central Hospitals.

ii) **Specific Objectives.**

1. To establish the level of knowledge of L.P among caregivers.
2. To establish attitudes towards LP among caregivers.
3. To assess perceived beliefs towards LP among caregivers.
4. To assess level of LP acceptability of caregivers.
5. To make recommendations to policy makers.

1.8 JUSTIFICATION OF THE STUDY

Between 2003 and 2006, a total number of 625 LPs were done by physicians from Arthur Davison Hospital, Ndola Central and Kitwe Central hospitals as a diagnostic procedure for serious illnesses like meningitis, encephalitis and Trypanosomiasis. 151 refusals took place.

Case records show that those who underwent LP were immediately subjected to treatment resulting in a recovery rate of about 60 percent. It is not clearly known what happened to those numbers of patients or their caregivers who refused LP. 40 percent of LPs were requested for meningitis. This is a very serious disease and if it is not attended to can result in very high mortality. LP is a life saving procedure.

In this study, the researcher is focusing on the causes and the contributions made by caregivers towards refusals of LPs. Therefore, there is need to conduct the study in order to collect necessary information to strengthen the use of LP in hospitals as a diagnostic procedure.

The next chapter provides literature review. Following this is the third chapter which spells out methodology which was used during the research process. Findings of the study are presented in the fourth chapter, and the fifth chapter analyses the themes that emerged from the findings of the study. The sixth chapter concludes the study by providing a conclusion and some recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

The first part of this chapter focuses on disease burden of meningitis and the second part focuses on history of lumbar puncture and attitudes of caregivers. Sources of reviewed literature include books, articles, and the internet.

Most of the studies were conducted in Europe, America and Asian countries, whose health settings are different from those of Africa and Zambia in particular. This review is aimed at establishing what is already known about the topic and to identify gaps in the existing literature.

2.2 MENINGITIS

Meningitis is inflammation of the meninges, the membranous outer covering of the brain and the spinal cord. It is a serious medical problem and can occur in all age groups including infants, children and adults. It is commonly caused by micro organisms such as viruses, bacteria, fungi or parasites that usually invade the blood and into the cerebral spinal fluid. It can also be caused by bleeding into the meninges, inflammatory response to chemical agents and diseases of the immune system (Tran and Frey 2007).

Meningitis is a dangerous disease with high mortality if left untreated, if the diagnosis is delayed or if lumbar puncture is not performed, but it is highly treatable when diagnosed early and appropriate treatment instituted. Lumbar puncture is the most reliable procedure in reaching a definite diagnosis. According to Laberge (2005), “meningitis is a dangerous infection because of the delicate nature of the brain cells, once killed, they will not regenerate themselves. Therefore, if a considerable amount of brain tissue is damaged, then serious lifelong handicaps will remain”.

Viral Meningitis (caused by viruses) is generally less severe than bacterial meningitis. Bacterial meningitis is a global public health problem (Park 2005). Park (2005) further states that “small out breaks occur sporadically world wide in both developed and developing countries. Without epidemics, 1 million cases of bacterial meningitis are estimated to occur every year and at least 200,000 deaths”. Frequent epidemics of bacterial meningitis occur in an area in the Sub-Saharan Africa which lies 5 and 15 degrees North of the equator called the “meningitis belt” (Park 2005). The meningitis belt stretches from Senegal in the west to Ethiopia in the east, with an estimated

population of 400 million people (Perea 2007). It accounts for more than 90 percent of bacterial meningitis cases in Africa” (Perea 2007). Epidemics have also occurred in tropical and temperate climates outside the meningitis belt.

Bacterial meningitis is the most common and easy to diagnose by lumbar puncture. “10 to 15 percent of cases of bacterial meningitis are fatal within 24 to 48 hours, and 11 to 19 percent of those who recover end up with permanent hearing loss and other serious complications” (Spector 2008).

Bacterial meningitis is described as a medical emergency by Beek et al. (2006) and for this reason they further state that, lumbar puncture is mandatory in patients in whom bacterial meningitis is suspected. The onset of bacterial meningitis may be described as acute, sub acute and chronic. The signs and symptoms of acute bacterial meningitis develop in 24 to 48 hours but may vary with the patient’s age (Lazoff 2007). Patients who present with clinical features of bacterial meningitis are usually very ill and require prompt diagnosis and early commencement of appropriate antibiotics because delay in initiating appropriate antibiotic therapy can result “in poor outcome of the disease”, (Beek et al. 2006).

According to Scarborough and Twaites (2008), acute bacterial meningitis is ten times more common in developing countries and is almost always fatal without treatment. The most common causative organisms of bacterial meningitis worldwide are *Streptococcus Pneumoniae*, *Neisseria Meningitidis* and *Haemophilus Influanzae* (Scarborough and Twaites 2008).

Bacterial meningitis may result in complications such as brain damage, hearing loss, learning disabilities in children and death (Laberge 2005). For this reason, lumbar puncture is performed as an invariable diagnostic tool in the course of routine investigations in young infants with fever of unknown origin, because they have a much higher risk of meningitis than older persons. Infants also do not show signs of irritation of the meninges because their immune system has not yet developed (Tran and Frey 2005).

Presentation of meningitis may vary depending on the age of the patient and other underlying conditions such as immunosuppression (Mandel et al. 2005). According to Kumar and Clark (2005), the signs and symptoms of meningitis include: headache usually throbbing in nature, fever, neck stiffness, photophobia (light sensitivity), and nausea and vomiting. Patients remain

conscious in uncomplicated cases, but may become delirious, drowsy or even unconscious depending on the severity of meningitis. Although a diagnosis may be made from the clinical picture with the presence of neck stiffness and a positive kernig's sign, and treatment commenced; a lumbar puncture is still necessary to confirm the causative agent or organism by examination of the cerebral spinal fluid. This ensures specific treatment is given. It is one of the most reliable ways to diagnosing meningitis.

2.3 HISTORY OF LUMBAR PUNCTURE

The history of LP goes as far back as 1885, when “Corning punctured the subarachnoid space to introduce cocaine anaesthesia into a living patient” (Roberts and Hedges, 2004). While it is also documented by Lawrence (2005) and Cordingley (2005) that Heinrick Quincke of Kiel, Germany pioneered the procedure in 1891 by removing CSF as a therapeutic manoeuvre to treat hydrocephalus. Lawrence (2005) further states that LP “is now a clinical procedure fundamental to the management of infection, inflammation and other pathological processes”. He adds that LP “is critical for the diagnosis of bacterial, viral or fungal meningitis, and may provide clinically valuable information in encephalitis, other inflammatory CNS diseases, and some cases of intracerebral haemorrhage”. Obtaining and analyzing samples of CSF through performance of LP provides the physician with the most effective means of diagnosing and providing the most cost effective treatment. “The primary use of LP in both Quincke’s time and ours has been to diagnose meningitis” Cordingley (2005).

Different reasons have been given as to why the first LP was performed. It is documented by Kneen et al. (2002) that Quincke performed the first LP in 1891 to relieve ICP in children with TB Meningitis, while the aforementioned give hydrocephalus as the intent for Quincke’s initial LP.

Since its introduction in 1891, LP has been used intensively in the investigation of many neurological conditions. CSF analysis is the definitive method of diagnosing CNS infections. Since then, all or most patients admitted with suspected CNS infection underwent LP. In Zambia, this remains the practice. Until now, no problems have been associated with this procedure, whose advantages are accurate diagnosis, reduced use of antibiotics and shorter hospital stays, especially in resource constrained countries like Zambia.

2.4 ATTITUDES TOWARDS LUMBAR PUNCTURE

2.4.1 GLOBAL PERSPECTIVE

Deng (1994) carried out a study in Malaysia Kuala Lumpur to “ascertain the views of parents regarding the performance of LPs on their children admitted for febrile seizures”. One hundred and seventeen (117) children with febrile seizures were recruited over a period of nine months. Lumbar punctures were requested in only 28 (23.9%) patients. Parents of (8) of them refused. The study revealed that the request for LPs in febrile seizures was low. The main reasons for refusal were: “fears that the child might be paralysed, advice from relatives and fear that the child might die from the procedure, or might find it painful”. All the parents who refused were from one ethnic group, Malays. A LP was also more refused in a girl patient. The study further revealed that in only 85 percent of the cases were the reasons of the LP explained to the parent. They concluded that LP refusal was a hindrance to the proper management of patients with fever and seizures.

Ling and Boey (2000) carried out a similar study on “LP refusal in children with febrile convulsions” in Malaysia. Theirs was a descriptive study whose aim was to determine rate of LP refusal, factors associated with LP refusal and outcome of such patients. Out of the 77 patients indicated for and requested for LP, 19 (25%) refused the procedure. Patients who refused LP were 8.5 times more likely to discharge themselves compared to other patients with febrile convulsions. Refusal was significant among the Malay ethnic group, but there was no association to age or gender.

A study from the United States on Lymes disease as seen in Ling and Boey (2000), revealed that only 1 out of 20 (5%) refused LP, while another Danish study on Isolated Optic Neuritis; as seen by the same authors showed that 5 out of 68 (7%) patients declined LP.

A survey done in Edmonton, Alberta, Canada by Matthey et al. (2000) on the “Public’s attitudes towards preoperative assessment and commonly perceived fears about general anaesthesia”, revealed that there was fear of brain damage (20%), death (12%) and postoperative pain (9%). This was a telephone survey involving 1,216 participants. Participants in the survey did not express any preference between regional or spinal

anaesthesia. It was concluded that the concerns of patients should be targeted during education preoperatively.

Matthey et al. (2004) conducted another telephone survey in Alberta, Canada on, “The Public’s Fears About and Perceptions of Regional Anaesthesia”. Again 1,216 participants were drawn from both rural and urban settings. The study revealed that approximately 27 percent of the participants were worried about permanent paralysis, back injury and pain.

A study done by Choi (2009) on, “Analysis of factors related to patient refusal of spinal anaesthesia” revealed that factors associated with patient refusal to spinal anaesthesia were low back pain and tingling sensation in the lower extremities after spinal anaesthesia.

2.4.2 REGIONAL PERSPECTIVE

In many African countries *Cryptococcus meningitis* is the commonest and fatal opportunistic infection of the CNS in HIV infected patients. LP is necessary to obtain CSF for laboratory diagnosis but many African patients will not accept this invasive procedure (Egwang 2008).

2.4.3 NATIONAL PERSPECTIVE

Refusal of lumbar puncture is a new and compromising trend in Zambia. The rate of LP performance is low due to high numbers of refusals among clients and caregivers (HMIS, ADH, KCH and NCH, 2003-2006).

It has been observed that fewer LPs are being done in Zambian hospitals over the years, as revealed by records of patients admitted with meningitis on the medical wards of the three institutions over a four-year period (2003-2006). This confirms the observation of (Kneen et al. 2002) that “what was previously considered to be a routine, important and relatively safe investigation is now becoming almost obsolete. Whereas most doctors learnt how to perform LPs as medical students, there are now many interns and house officers who have never performed an LP during their practice” This also applies to the Zambian setting.

2.5 CONCLUSION

From the reviewed literature, it has been realized that LP performance and acceptance is generally low. However, since no study has been done in Zambia on LP refusal, only assumptions have been given as discussed earlier which need to either be verified or dispelled.

CHAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

This was an explorative study because little is known about this problem. The study determined attitudes and determinants of lumbar puncture acceptability among caregivers at three hospitals in Zambia.

3.2 VARIABLES OF INTEREST.

3.2.1 Dependent variable.

The dependent variable in the study was acceptability of lumbar puncture.

3.2.2. Independent variables.

Independent variables in this study were:

- Knowledge of LP.
- Demographic characteristics
- Attitudes towards LP.
- Disease (meningitis).
- Perceived beliefs of caregivers.
- Duration of hospital stay.
- Outcome of LP.
- Denial of LP.

3.2.3 VARIABLES, INDICATORS AND SCALE OF MEASUREMENT

| VARIABLE | INDICATOR | SCALE OF MEASUREMENT |
|---------------------------|-------------------------|---|
| DEPENDENT | | |
| Acceptability of LP. | Yes | If one scores 1-2 points on LP acceptability |
| | No | If one scores 0 on LP acceptability |
| INDEPENDENT | | |
| Knowledge of LP | High | If one scores 5 or more correct answers |
| | Average | If one scores 3-4 correct answers |
| | Low | If one scores 0-2 correct answers. |
| Attitudes towards LP | Positive | 6-8 Positive Statements |
| | Negative | 1-5 Negative Statements |
| Beliefs | Supportive | Belief that LP is essential |
| | Negative | Belief that LP is harmful or kills |
| Duration of hospital stay | Average length of stay | 6 days or less |
| | Prolonged hospital stay | Longer than 6 days |
| Outcome of LP | Diagnostic | Responses stating proper diagnosis and treatment or recovery. |
| | Negative | Responses indicating death, complications as outcome of LP. |

3.3 STUDY DESIGN

An explorative study design was used. Both qualitative and quantitative data were collected. A structured interview schedule was used to collect data from caregivers. The total number of respondents was 584 caregivers.

3.4 STUDY SETTING

The study was conducted at *Ndola* Central, *Kitwe* Central and Arthur Davison Hospitals, in *Ndola* and *Kitwe* Districts, on the Copperbelt Province of Zambia.

3.4.1 PROFILE OF THE THREE INSTITUTIONS:

3.4.1.1 ARTHUR DAVISON CHILDREN'S HOSPITAL (ADH)

Arthur Davison Hospital is a specialized third level referral institution and the only Paediatric institution in the country, with a bed capacity of 250. It caters for patients on the Copperbelt Province, North western and Central Provinces of Zambia.

3.4.1.2 KITWE CENTRAL HOSPITAL (KCH)

Kitwe Central Hospital is a tertiary hospital which offers health care services to patients of all age groups. It serves as a referral centre to surrounding towns such as Kalulushi. It has a bed capacity of 604 and 60 cots. *Kitwe* town shares boundaries with *Ndola* 59Km, *Mufulira* 42 Km, *Chingola* 52Km, *Luanshya* 50Km and *Kalulushi* 19Km.

3.4.1.3 NDOLA CENTRAL HOSPITAL (NCH)

Ndola Central Hospital is the second largest health institution in Zambia. It provides secondary and tertiary care to adults only and also serves as a referral facility for Northern, *Luapula*, Central and Northwestern Provinces. It has a bed capacity of 408 beds. The city of *Ndola* is 340 Km from the capital city, *Lusaka*.

The sites were chosen as they were easily accessible to the researcher and have relatively large numbers of care givers to comprise a study population compared to other institutions on the Copperbelt.

3.5 STUDY POPULATION.

The study population was drawn from caregivers at ADH, KCH and NCH from the medical wards.

INCLUSION CRITERIA

- Caregivers above 18 years who were nursing patients admitted with meningitis or suspected meningitis. Only caregivers above the age of 18 years were included because 18 is the age of informed consent for medical procedures.

EXCLUSION CRITERIA

- Caregivers below 18 years because they cannot make decisions or consent to medical procedures.
- Caregivers with patients whose diagnosis was not meningitis.

3.6 SAMPLE SIZE.

The study involved caregivers from ADH, NCH and KCH. The sample size was arrived at using the formula below:

$$n = \frac{z^2 PQ}{d^2}$$

z being 1.96 at alpha 0.05

d being the error level

P being the target population under study

Q being 100-p

Confidence level is 95 percent

Response rate of 90 percent

Sample Size was calculated based on the bed capacity for each hospital.

Sample size for ADH.

Using Epi Info calculation, sample size n=151 based on the bed capacity 250 Calculated at:

expected frequency 50%

: worst acceptable result 45%

Sample size for KCH

Using Epi Info calculation, sample size $n=235$ based on the bed capacity 604 Calculated at:

expected frequency 50%

: worst acceptable result 45%

Sample size for NCH

Using Epi Info calculation, sample size $n=198$ based on the bed capacity 408 Calculated at:

expected frequency 50%

: worst acceptable result 45%

Sample size for the three hospitals was 584.

3.7 SAMPLE SELECTION.

Convenience sampling was done from the medical wards, to ensure that all wards were represented. This method was chosen among others because of the special situation outlined below, which makes purposive sampling the most suitable:

- Only caregivers above the age of 18 years were interviewed, as they were the group designed to give consent for a clinical procedure. This group would have heard or witnessed LP being done on their patient or others. Caregivers are the ones who make decisions on the patient's behalf and can either agree or refuse to give consent to medical procedures without consulting the patient. Doctors also usually talk to caregivers before obtaining consent for LP.

3.8 DATA COLLECTION.

The research involved collection of data from both primary and secondary sources in *Ndola* and *Kitwe* based hospitals.

- a) **Primary data**; was collected using closed and open ended questions in a structured interview schedule. This was selected:
 - (i) To enable respondents make unlimited responses so as to enable them qualify their attitudes in detail.
 - (ii) To make room for the researcher to elicit any unanticipated findings, this may be a reality in a social world.
- b) **Secondary data** was obtained from documents and other published materials such as books, reports, internet and seminal papers.

Data collection was carried out over a period of 6 months, from November 2008 to April 2009.

The study was conducted by administering structured interview schedules with both open and closed ended questions among the sampled respondents. The language used was Bemba and English. The research assistants were nurses from the three institutions who were trained by the Principal Investigator for a period of two days.

3.9 VALIDITY

To ensure validity, the data collection tool was adapted from a recognized research institution, Mwengu Health and Research Centre in Ndola. It was modified as the items in the structured interview schedule were different.

During data collection at the end of each day, the researcher went through the filled structured interview schedules to ensure that the information was properly collected and recorded.

3.10 RELIABILITY

Reliability of the instrument was measured by pre testing it. During the pretest, ambiguous questions and problems with comprehension, content, clarity, and sequencing were identified and where necessary adjustments were made. Open ended questions in the interview schedule provided an opportunity to clients to bring out in-depth information and add their own ideas

thereby bringing out issues not thought of when designing the interview schedule. This gave an opportunity to discuss issues and challenges relating to LP.

The pre test also helped to determine how much time was needed to administer the interview schedules. The lessons learnt from the pre test helped the researcher to develop a reliable and modified interview schedules.

3.11 DATA PROCESSING, ANALYSIS AND PRESENTATION OF FINDINGS

Quantitative data was entered and analyzed using Statistical Package for Social Sciences (SPSS) version 11.5 and EPI INFO version 6 soft wares. Raw data was edited for completeness and accuracy. Open ended questions were categorized and suitable items were formulated to bring all related data together which were coded like closed ended questions and were analyzed like the former. Each day all interview schedules were sorted out and edited to ensure consistency and completeness whilst in the field.

Pearson's Chi square test was used to determine associations for contingency tables higher than two by two tables. For two by two tables with expected frequency greater than five, the Yates' corrected chi square test was used. The cut off point for statistical significance was set at five percent. Data was summarized and presented in the form of tables such as two by two tables, pie charts, and bar charts to facilitate understanding.

3.12 ETHICAL CONSIDERATION

Ethical clearance was obtained from the University of Zambia Biomedical Research Ethics Committee. Directors of the three institutions also gave written permission to conduct the study. The purpose and nature of the study was explained to the study participants. Participants were assured anonymity and confidentiality by interviewing them individually and in privacy. Participants' names were not written on the interview schedules and no other person apart from the researcher was allowed to have access to the research data. All questionnaires were locked after each interview schedule.

Participants were not subjected to any physical harm as the research did not involve any invasive procedures. However, information on LP was given to participants after interviews.

The freedom to opt out at any point without consequences or effects on medical care provided was clearly stated to those who declined to participate. Those who agreed to take part in the study were requested to sign a consent form, and they were not remunerated in any way.

3.13 PRE TESTING

Pre testing of tools was done at Thompson Hospital in Luanshya, before use in the field to test the validity and reliability of the tools to be used. Thompson Hospital was chosen because it has similar characteristics to the other three institutions in the study. The hospital attends to clients with similar characteristics as those at ADH, KCH and NCH. This means participants for the pre-test live under similar circumstances as those in the main study.

Participants of the pre test were selected using convenient sampling. 58 participants were selected for the pre test, which is 10% of the sample. The purpose of the pre-test was to test the data collection tool, detect flaws such as ambiguous and illogically sequenced questions and make revision to strengthen the methodology. The pre-test also helped assess whether the variables were realistic, measurable and attainable.

3.14 LIMITATIONS OF THE STUDY.

Qualitative study cannot be inferred to the general population because probability method of sampling was not done. This represents a convenience sample rather than a random sample.

Another limitation was that this study was conducted at three institutions and the extent to which these findings can be generalized to other settings (the external validity of the study) is assumed. The ideal situation would have been to collect data from all hospitals on the Copperbelt. This was hindered by time and financial limitations.

It would have been good to carry out the study over a longer period than 6 months. Copperbelt was chosen for the convenience of the researcher.

3.15 STAFFING AND WORK PLAN

Three research assistants were recruited to assist with data collection. These were trained to equip them with skills and knowledge needed for the exercise. The principal investigator provided technical guidance to ensure the smooth running of the study. Technical input was sought from a competent statistician to provide the needed competency in data processing and analysis.

CHAPTER FOUR: FINDINGS

4.1 INTRODUCTION

A total of 584 respondents were interviewed as follows: -

Arthur Davison Children's Hospital - 151 (26%),
Kitwe Central Hospital - 235 (40%) and
Ndola Central Hospital - 198 (34%).

There was a 100% response rate.

4.2 DEMOGRAPHIC DATA

The ages of the respondents were from 18 years and above, who were found at the bedside of a patient admitted with meningitis or suspected meningitis. The mean age was 29 years.

➤ SEX AND AGE DISTRIBUTION

Table 4.2.1: Sex and Age of respondents

| Age group | Male | | Female | | Total | |
|--------------|------|------|--------|------|-------|-------|
| | f | % | f | % | f | % |
| 18-24 | 18 | 10.1 | 52 | 12.8 | 70 | 12.0 |
| 25-29 | 24 | 13.5 | 101 | 24.9 | 125 | 21.4 |
| 30-34 | 24 | 13.5 | 67 | 16.5 | 91 | 15.6 |
| 35-39 | 47 | 26.4 | 76 | 18.7 | 123 | 21.1 |
| 40+ | 65 | 36.5 | 110 | 27.1 | 175 | 30.0 |
| Total | 178 | 100 | 406 | 100 | 584 | 100.0 |

Table 4.2.1 shows that out of 175 respondents in the age group 40 years and above, 62.9 % (110) of the respondents were female, while 37.1 % (65) were male, which is an indication that majority of the caregivers are female. There was a significant association between age and sex ($p=0.007$).

➤ **EDUCATION**

Table 4.2.2: Education level

| Education levels | Years in school | Frequency | Percent |
|------------------|-----------------|-----------|---------|
| Primary | 0 – 7 | 195 | 33.4 |
| Secondary | 8 – 12 | 229 | 39.2 |
| Tertiary | 13 + | 160 | 27.4 |
| Total | | 584 | 100.0 |

Table 4.2.2 shows that less than half of the respondents 39.2 % (229) had secondary education, while 33.4 % (195) had primary education.

➤ **RELIGION**

Table 4.2.3: Denomination

| Denomination | Frequency | Percent |
|--------------|-----------|---------|
| Catholic | 124 | 21.2 |
| *Protestants | 395 | 67.7 |
| *Others | 65 | 11.1 |
| Total | 584 | 100.0 |

* Protestants: United Church of Zambia, Seventh Day Adventist, Reformed Methodist, Bread of Life, Baptist, Salvation Army

*Others: Jehovah's Witnesses

Table 4.2.3 results show that majority of the respondents 67.7% (395) were Protestants, while 11.1% (65) were those in the category of others.

➤ **LENGTH OF HOSPITAL STAY**

Figure 3: Duration of stay on the ward

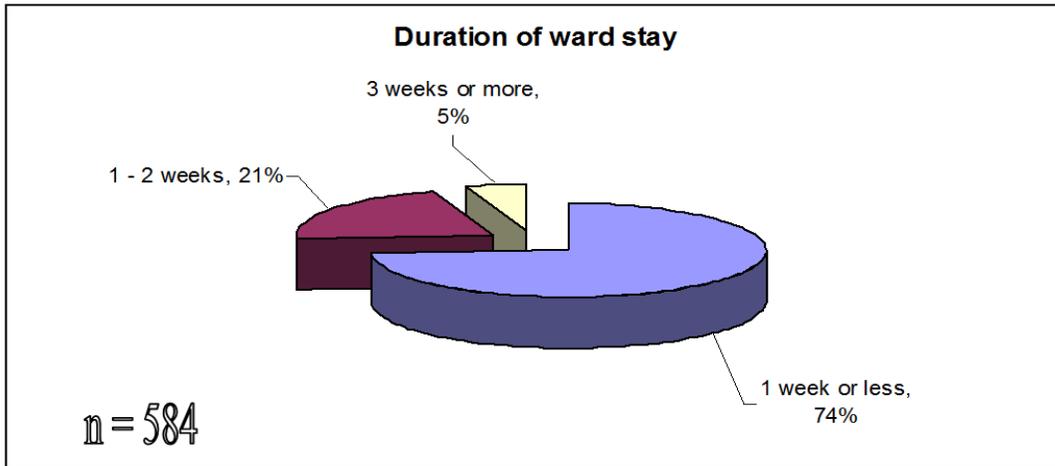


Figure 3. Shows that majority of the respondents 74 % (432) had stayed on the ward for 1 week or less, while only 5% (29) had been on the ward for 3 weeks or more.

4.3 LEVEL OF KNOWLEDGE

Table 4.3.1: Conditions considered serious requiring referral to hospital

| Condition | Frequency | Percent |
|------------------------------------|-----------|---------|
| Cerebral malaria, Meningitis, AIDS | 481 | 82.4 |
| Diabetes, stroke | 69 | 11.8 |
| TB, Pneumonia | 34 | 5.8 |
| Total | 584 | 100.0 |

Table 4.3.1 shows that 82.4% (481) of the respondents said that Cerebral Malaria, Meningitis and AIDS are serious conditions for which patients are referred to hospital for further management. The least conditions stated are TB, and Pneumonia with a proportion of 5.8 percent, yet these are very common conditions.

4.3.2 EDUCATIONAL LEVEL AND HAVING HEARD ABOUT MENINGITIS

Table 4.3.2 Education level and having heard of meningitis

| Educational level | Heard about meningitis? | | | | Total | | X ² | P-value |
|-------------------|-------------------------|-------|-----|-------|-------|-------|----------------|---------|
| | Yes | | No | | | | | |
| | F | % | f | % | F | % | | |
| Primary | 121 | 26.9 | 74 | 54.8 | 195 | 33.4 | 48.09 | <0.001 |
| Secondary | 179 | 39.9 | 50 | 37 | 229 | 39.2 | | |
| Tertiary | 149 | 33.2 | 11 | 8.1 | 160 | 27.4 | | |
| Total | 449 | 100.0 | 135 | 100.0 | 584 | 100.0 | | |

Table 4.3.2 shows that among those who had heard of meningitis, 39.9% (179) had secondary level of education, while majority of those who had not heard, 54.8% (74) had primary level of education. There was a significant association between education and having heard of meningitis. Chi square = 48.097, (p <0.001).

4.3.3 INDICATIONS OF LP

Table 4.3.3: Education levels and serious conditions for which the doctor would recommend LP.

| Educational level | Serious conditions for which the doctor would collect cerebral spinal fluid | | | | | | Total | | X ² | P-value |
|-------------------|---|-------|------|-------|------------|-------|-------|-------|----------------|---------|
| | Cerebral malaria and meningitis | | AIDS | | Don't know | | | | | |
| | f | % | f | % | f | % | f | % | | |
| Primary | 148 | 30.7 | 2 | 18.2 | 45 | 49.5 | 195 | 33.4 | 21.765 | <0.001 |
| Secondary | 186 | 38.6 | 7 | 63.6 | 36 | 39.6 | 229 | 39.2 | | |
| Tertiary | 148 | 30.7 | 2 | 18.2 | 10 | 10.9 | 160 | 27.4 | | |
| Total | 482 | 100.0 | 11 | 100.0 | 91 | 100.0 | 584 | 100.0 | | |

The above table shows that 75.9 % (148) out of 195 respondents with primary education said that cerebral malaria and meningitis were serious conditions for which the doctor would recommend LP, while 1.3 % (2) mentioned AIDS. Out of 229 respondents with

secondary education 81.2 % (186) said that cerebral malaria and meningitis were serious conditions for which the doctor would collect cerebral spinal fluid, while 3.1% (7) mentioned AIDS as an indication for collection of cerebral spinal fluid. Responses of respondents with tertiary education were similar to the ones mentioned above. There is a statistically significant association between educational level and knowledge of conditions where LP is indicated. Chi square =21.765, (p <0.001).

4.3.4 DEFINITION OF MENINGITIS

Table 4.3.4: Definition of Meningitis

| Definition | Frequency | Percent |
|--|-----------|---------|
| Disease of the brain, neck and Spinal cord | 284 | 63.3 |
| Untreated malaria causes meningitis | 94 | 20.9 |
| I do not know | 52 | 11.6 |
| Inflammation of the meninges | 19 | 4.2 |
| Total | 449 | 100.0 |

The study results in Table 4.3.4 show that 63.3% (284) of the respondents had a Lay person's understanding of what meningitis is; they defined it as a disease of the brain, neck and spinal cord. Only 4.2% (19) correctly defined meningitis as inflammation of the meninges.

4.3.5 FAMILY HISTORY OF MENINGITIS

Table 4.3.5: Are there any members of your family who have suffered from meningitis?

| History of meningitis in the family | Frequency | Percent |
|-------------------------------------|-----------|---------|
| Yes | 166 | 38.3 |
| No | 267 | 61.7 |
| Total | 433 | 100.0 |

Table 4.3.5 shows that most respondents, 61.7% (267) had no history of family members who had suffered from meningitis.

4.3.6 TESTS DONE TO CONFIRM DIAGNOSIS OF MENINGITIS

Table 4.3.6: Tests done to confirm meningitis

| Test done to confirm meningitis | Frequency | Percent |
|-----------------------------------|-----------|---------|
| Blood Tests, Physical Examination | 57 | 34.1 |
| Lumbar Puncture | 70 | 41.9 |
| Don't Know | 40 | 24 |
| Total | 167 | 100.0 |

The study results in Table 4.3.6 show that 41.9% (70) respondents said that Lumbar Puncture was done to confirm the diagnosis of meningitis.

4.3.7 IEC ON LP

Table 4.3.7: Information received from health care providers on LP since Patient's admission

| Information received | Frequency | Percent |
|-------------------------------------|-----------|---------|
| Lumbar puncture and it's importance | 259 | 44.3 |
| No education received | 325 | 55.7 |
| Total | 584 | 100.0 |

Table 4.3.7 results show that 55.7% (325) of the respondents revealed that they did not receive any education at all from health care providers since their patient's admission in the ward.

4.4 ATTITUDE

4.4.1 ATTITUDE TOWARDS LP

Figure 4: Beliefs and opinions on why patients may not be allowed to undergo LP

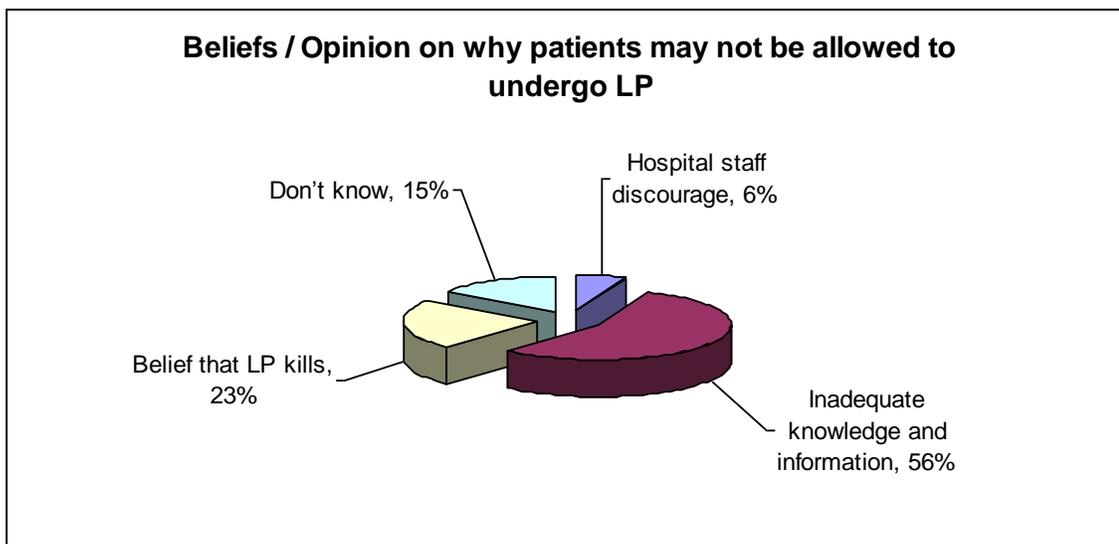


Figure 4 results show that majority of the respondents 56% (330) said that patients may not be allowed to undergo lumbar puncture by their relatives or caregiver due to lack of knowledge and information.

4.4.2 REACTION TO LP

Table 4.4.1: Did it worry you that your patient was about to undergo lumbar puncture?

| Worried | Frequency | Percent |
|---------|-----------|---------|
| Yes | 432 | 74.0 |
| No | 152 | 26.0 |
| Total | 584 | 100.0 |

Table 4.4.1 results show that majority of the respondents 74 % (432) were worried when their patient was about to undergo lumbar puncture.

4.4.3 REASONS FOR WORRYING WHEN LP WAS PRESCRIBED AND LENGTH OF HOSPITAL STAY

Table 4.4.2: Reasons for worrying about LP and duration of stay on the ward

| Duration of stay on the ward | Reasons for worrying | | | | | | | | | | X ² | P-value |
|------------------------------|-----------------------|-------|--------------------------------|-------|---------------------|-------|--|-------|-------|-------|----------------|---------|
| | Patients die after LP | | Did not know anything about LP | | Doctors incompetent | | Fear of pain, disability, insanity and condition worsening | | Total | | | |
| | F | % | f | % | f | % | f | % | f | % | | |
| 1 Week or less | 227 | 76.4 | 32 | 65.3 | 15 | 71.4 | 75 | 76.5 | 349 | 75.1 | 5.3 15 | 0.504 |
| 1-2 Weeks | 59 | 19.9 | 13 | 26.5 | 6 | 28.6 | 19 | 19.4 | 97 | 20.9 | | |
| 3 weeks or more | 11 | 3.7 | 4 | 8.2 | 0 | 0 | 4 | 4.1 | 19 | 4.1 | | |
| Total | 297 | 100.0 | 49 | 100.0 | 21 | 100.0 | 98 | 100.0 | 465 | 100.0 | | |

Table 4.4.2 shows that majority 65 % (227) out of 349 respondents who had been on the ward for 1 week or less, were worried when the doctor prescribed lumbar puncture for their patient because they heard that patients die after LP. While 21.1 % (4), were worried because they did not know anything on LP. A similar number of respondents 21.1 % (4) of those who had been on the ward longer than 3 weeks were worried because of fear of pain, disability and worsening of condition. There was no significant association between reasons for worrying about a patient about to undergo LP and duration the respondent had been on the ward with the patient. Chi-square = 5.315 (P=0.504).

4.4.4 REASONS FOR NOT ALLOWING PATIENT TO UNDERGO LP

Table 4.4.3: Reasons for not allowing patient to undergo LP

| Characteristics | Total 584 | Reasons for declining LP | | | | X ² | p-value |
|--|--------------|----------------------------|------------|-----------------------------------|------------|----------------|---------|
| | | Fear of death/complication | | Incompetence/ declined to consent | | | |
| | | f | % | f | % | | |
| Educational level | | | | | | | |
| Primary | | 145 | 31 | 50 | 43.1 | 11.72 | 0.002 |
| Secondary | | 181 | 38.7 | 48 | 41.4 | | |
| Tertiary | | 142 | 30.3 | 18 | 15.5 | | |
| Totals | | 468 | 100 | 116 | 100 | | |
| Family members(s) with past history of Meningitis | | | | | | | |
| Yes | | 148 | 42.8 | 18 | 20.7 | 14.34 | <0.001 |
| No | | 198 | 57.2 | 69 | 79.3 | | |
| Totals | | 346 | 100 | 87 | 100 | | |
| Information received | | | | | | | |
| LP and its importance | | 217 | 46.4 | 42 | 36.2 | 3.89 | 0.048 |
| No education received | | 251 | 53.6 | 74 | 63.8 | | |
| Totals | | 468 | 100 | 116 | 100 | | |

Table 4.4.3 results show that there was a significant association between reasons for not allowing patient to undergo LP and educational level (P=0.02). Furthermore, there was a significant association between reasons for not allowing a patient to undergo LP and caregivers who had a family member previously admitted for meningitis (P= <0.001). Similarly there was a significant association between reasons for not allowing a patient to undergo LP and respondents who had not received information from health care providers during their stay on the ward (P=0.048). Study results revealed that respondents with a secondary level education 38.7% (181), majority of caregivers with no family member who had suffered from Meningitis before 57.2% (198), and caregivers who had not received any education during their stay on ward, 53.6% (251) would not allow their patient to undergo LP for fear of complications or fear that their patient would die.

4.4.4 ADVISING A PATIENT TO UNDERGO LP IN FUTURE AND EDUCATIONAL LEVEL

Table 4.4.4: Advising a patient to undergo LP and level of education

| Possibility of advising a patient to undergo LP in future | Level of education | | | | | | | | X ² | p-value |
|---|--------------------|--------------|------------|--------------|------------|--------------|------------|--------------|----------------|---------|
| | Primary | | Secondary | | Tertiary | | Total | | | |
| | F | % | f | % | f | % | f | % | | |
| Yes | 60 | 30.8 | 62 | 27.0 | 49 | 30.6 | 171 | 29.3 | 0.887 | 0.642 |
| No | 135 | 69.2 | 167 | 73.0 | 111 | 69.4 | 413 | 70.7 | | |
| Total | 195 | 100.0 | 229 | 100.0 | 160 | 100.0 | 584 | 100.0 | | |

Table 4.4.4 results show that all levels of education were unlikely to advise their patient to undergo LP in future. There was no significant association between educational level and advising a patient to undergo LP in future. Chi square = 0.887, (p=0.642).

4.4.5 OUTCOME OF LP

FIGURE 5: Outcome of lumbar puncture

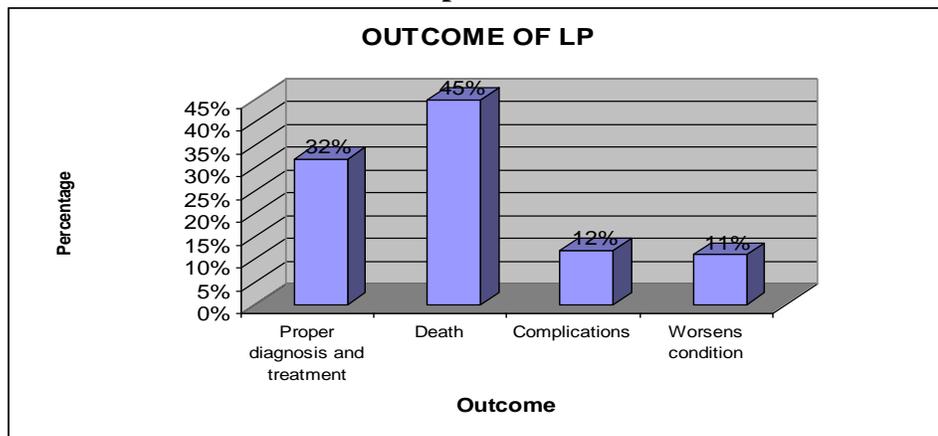


Figure 5 shows that almost half of the respondents 45% (263) said that outcome of lumbar puncture is death; while only 32% (188) said that the outcome of lumbar puncture is proper diagnosis and treatment.

4.4.5 CAREGIVER'S ACCEPTABILITY OF LP ON SELF AND ADVISING A PATIENT TO UNDERGO LP IN FUTURE

Table 4.4.5: Caregivers Acceptability of lumbar puncture on self and advising a patient to undergo lumbar puncture

| Accepting LP to be administered on self | Advising a patient to undergo LP in future | | | | | | X ² | P-value |
|---|--|--------------|------------|--------------|------------|--------------|----------------|---------|
| | Yes | | No | | Total | | | |
| | f | % | f | % | f | % | | |
| Yes | 114 | 66.7 | 27 | 6.5 | 141 | 24.1 | 238.730 | <0.001 |
| No | 57 | 33.3 | 386 | 93.5 | 443 | 75.7 | | |
| Total | 171 | 100.0 | 413 | 100.0 | 584 | 100.0 | | |

Table 4.4.5 results show that more than half 93.5% (386) of the respondents who would not accept LP to be administered on themselves would also not allow a patient to undergo lumbar puncture in future. There was a significant association between accepting LP to be administered on the caregiver and advising a patient to undergo LP. Chi square 238.730, (P= <0.001).

4.4.6 REASONS FOR RESPONDENT DECLINING LP ON SELF

FIGURE 6: Reasons for declining LP on self

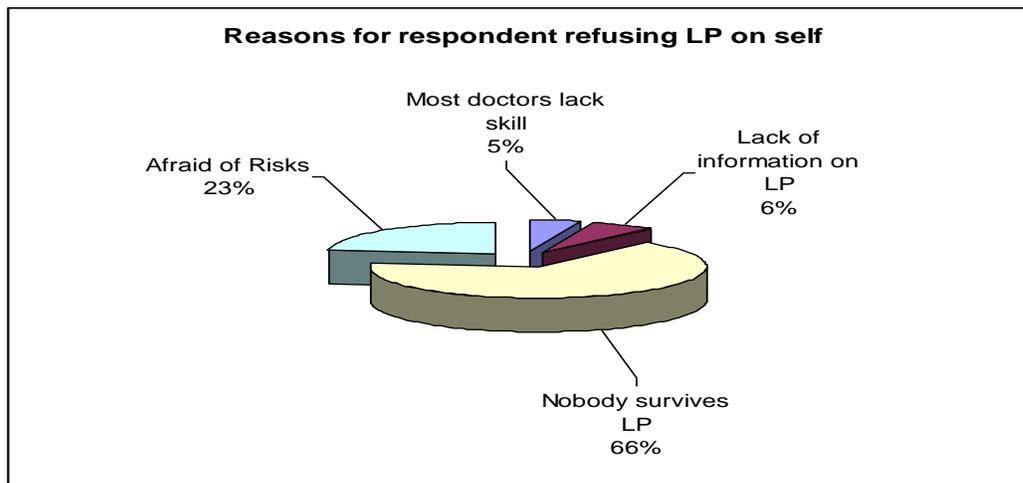


Figure 6 results show that majority of the respondents 66.0% (386) would not accept lumbar puncture to be performed on themselves because they don't want to die as they believe that nobody survives lumbar puncture.

4.4.8 ATTITUDES TOWARDS LP VERSUS EDUCATIONAL LEVEL

FIGURE 7 LP should be recommended for all patients with meningitis

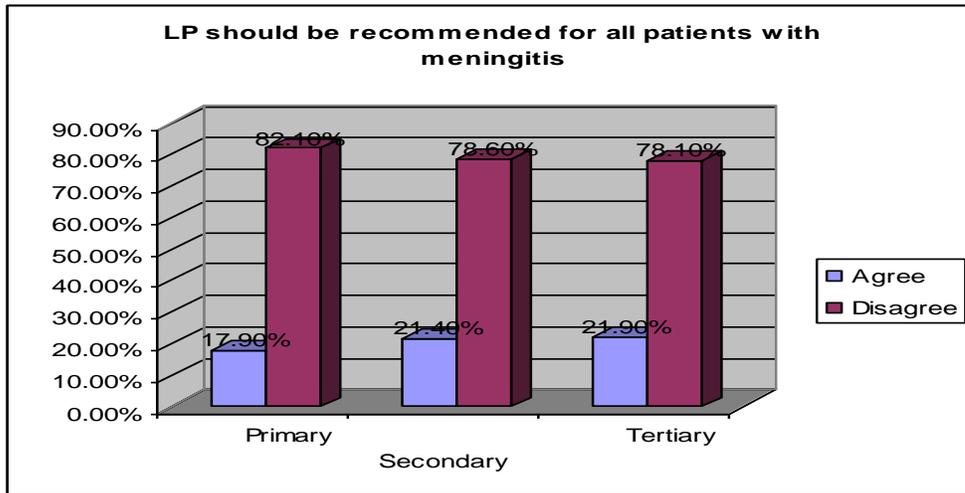


Figure 7 results show that majority of respondents with Primary 82.1% (195), Secondary 78.6% (229) and Tertiary 78.1% (160) levels of education disagree that LP should be recommended for all patients with meningitis, while only 17.9% (35) with primary, 21.4% (49) with secondary and 21.9% (35) with tertiary education agree to the statement, P=0.583.

FIGURE 8 LP is necessary for appropriate treatment of meningitis

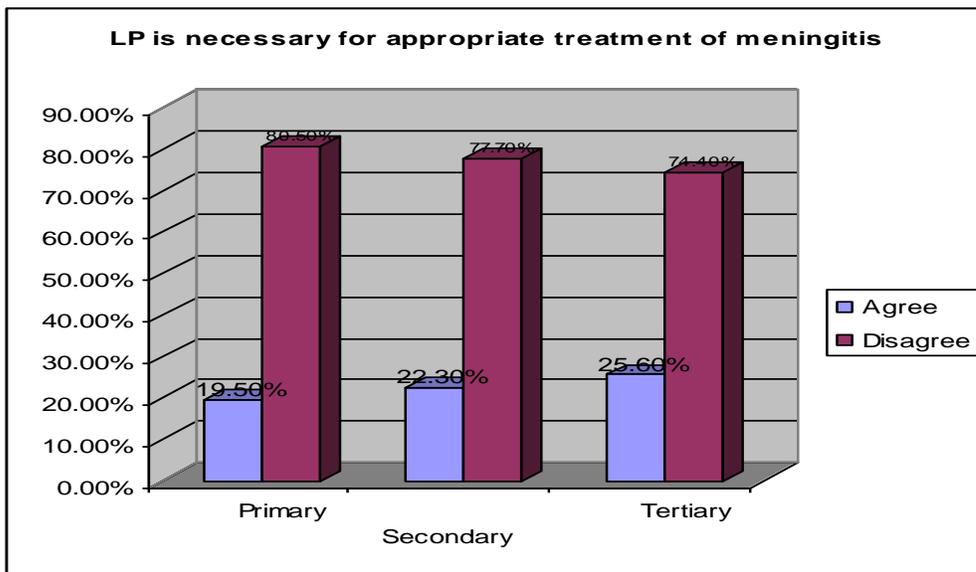


Figure 8 shows that majority of the respondents with Primary 80.5% (157), Secondary 77.7% (178) and tertiary 74.4% (119) levels of education disagree with the statement that LP is necessary for appropriate treatment of meningitis. P=0.384

FIGURE 9 LP is a very safe procedure

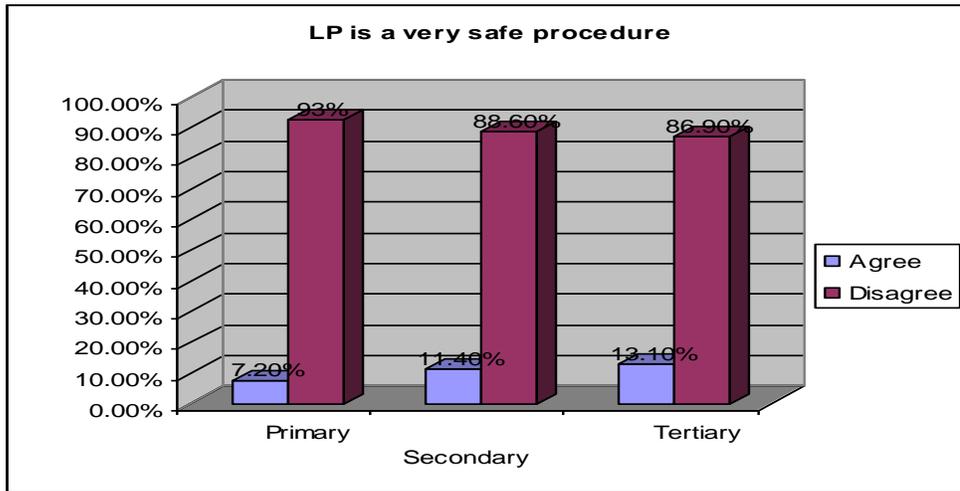


Figure 9 results give a similar picture as in figure 8. Again majority of the respondents in all the three levels of education do not agree that LP is a very safe procedure. $P = 0.161$

FIGURE 10 Complications of LP are rare.

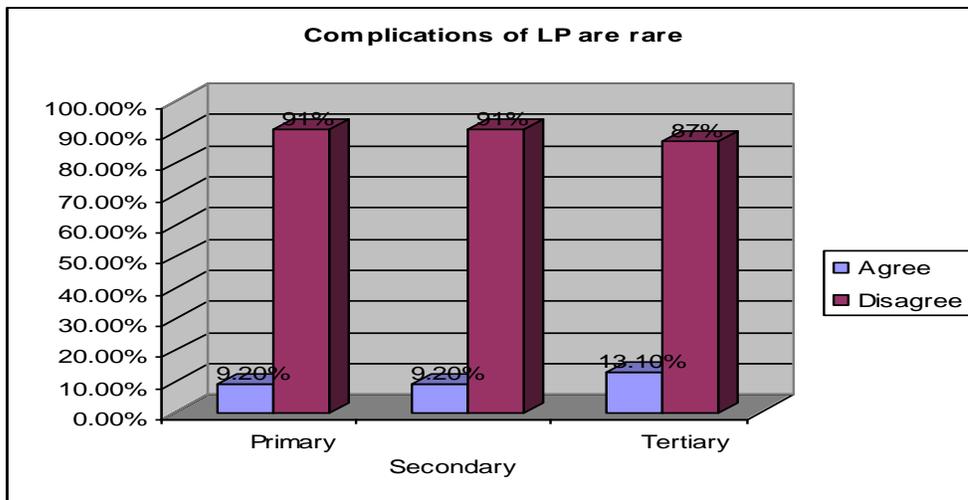


Figure 10 shows that 90.8% (195), 90.8% (229) and 86.9% (160) of the respondents with primary, Secondary and tertiary levels of education respectively disagree that complications of LP are rare, while 9.2% (177), 9.2% (208) 13.1% (139) with primary Secondary and tertiary levels of education agree. $P = 0.378$

FIGURE 11 LP should be performed in children

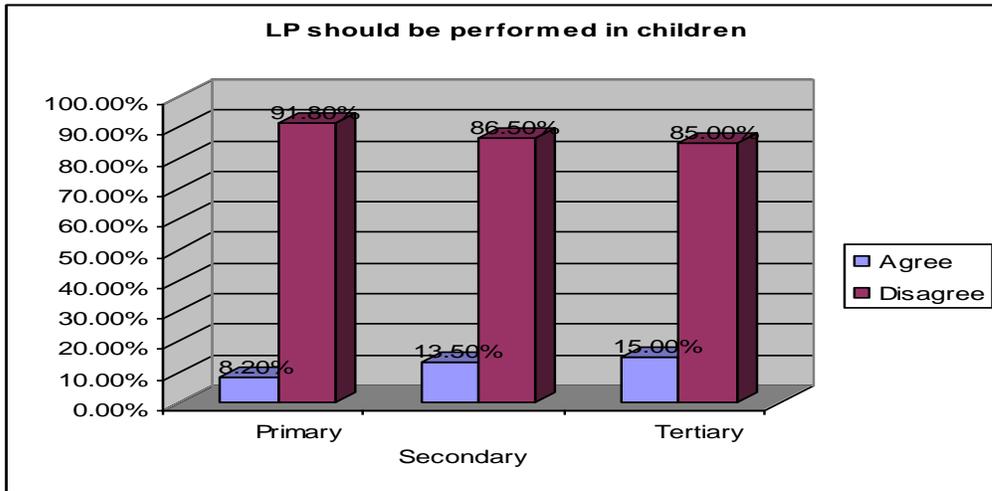


Figure 11 results shows that the majority of the respondents with primary, Secondary and tertiary levels of education do not agree to the statement that LP should be performed in children. Only 8.2% (16) 13.5% (31) and 15% (24) in all the three levels of education, primary, secondary and tertiary agree to the statement. $P = 0.107$.

Results of figures 7-11 show that there is no relationship between educational level and information on LP. This shows that regardless of educational level, attitudes towards LP are negative.

4.4.6. DO YOU HAVE ANY OTHER COMMENTS?

Table 4.4.6: Comments

| Comments | Frequency | Percent |
|---|-----------|---------|
| There should be rigorous dissemination of information to the community on the importance of LP at health institutions and through the media e.g. Television, Newspapers and Radio like they have done for Malaria, TB and HIV/AIDS so that misconceptions are dispelled | 60 | 10.3 |
| Safer methods of investigating meningitis should be used. | 46 | 7.9 |
| Only doctors with experience should be allowed to perform lumbar puncture | 26 | 4.5 |
| It should be done on patients who have given consent. Those who refuse should not be forced or threatened | 16 | 2.7 |
| Lumbar puncture should be done after adequate explanation and counselling so that both patients and relatives understand the procedure, it's importance and outcome, like it is done in HIV. | 14 | 2.4 |
| Lumbar puncture should not be done in neonates and children | 12 | 2.1 |
| Lumbar puncture should not be done on critically ill patients and people with HIV because they are weak, the procedure finishes them off. | 11 | 1.9 |
| Lumbar Puncture should be phased out because it is dangerous and has claimed a lot of lives. | 10 | 1.7 |
| Lumbar puncture should be made less painful | 9 | 1.5 |
| Patients should be allowed to choose doctors they feel are competent to perform the procedure | 8 | 1.4 |
| If doctors think that it is the only way to help patients, it is better lumbar puncture is done on every patient suspected of meningitis | 5 | 0.9 |
| All suspected cases of meningitis should be treated as positive to avoid the procedure. | 3 | 0.5 |
| Society should be educated to take their patients to health centres and hospitals early. | 1 | 0.2 |
| No comments | 363 | 62.2 |
| Total | 584 | 100.0 |

Majority of the respondents 62.2% (363) did not give any comments or recommendation as shown in table 4.5, while 37.8% (221) gave varied comments. The emphasis 10.3% was that there should be rigorous dissemination of information to the community on the importance of LP at health institutions and through the media e.g. Television, Newspapers and the Radio like they have done for Malaria, TB and HIV/AIDS so that misconceptions are dispelled. The least suggestion 0.2% (1) was that society should be educated to take their patients to hospitals and health centres early.

7.9% (46) of the respondents strongly recommended that safer methods of investigating meningitis should be used as they believe that LP is not a safe procedure because it results in either death of the patient or patients end up with serious complications. Further, 4.5% (26) strongly felt that only experienced doctors should perform LP. There is a strong belief that majority of Zambian doctors do not know how to perform LP that is the reason why there is an adverse outcome after LP.

Respondents further recommended that LP should only be done on patients who have given consent. They pointed out that sometimes LP is performed without consent on unconscious patients. They strongly appealed that patients or caregivers who refuse LP should not be forced or threatened as is reportedly to be the practice.

CHAPTER FIVE: DISCUSSION OF FINDINGS

5.1 INTRODUCTION

Lumbar Puncture acceptability is a problem as evident from studies conducted in Malaysia, United States, Canada and Korea. It is an emerging problem in Zambia as has been observed and reported by many health care providers that there is a high rate of LP refusals. There have been various articles written in the print media and several radio programme discussions on the growing trend of LP refusals and its dreaded outcome. LP refusals have negatively impacted on management of patients suspected of meningitis because appropriate treatment is usually not commenced in good time due to inability to arrive at an accurate diagnosis through laboratory examination of CSF. Empirical treatment is however commenced without LP but may not be appropriate due to inability to positively identify the causative organism. It is documented by Scarborough and Twaites (2008) that omission of a lumbar puncture for fear of complications carries a greater risk of death due to inaccurate diagnosis. The growing trend of LP refusals are contributing to the increasing meningitis Case Fatality Rate in Zambia.

5.2 DEMOGRAPHIC PROFILE OF RESPONDENTS

The study population comprised of male and females in the age group 18 years and above. Majority of the respondents were female in the age group 40 years and above, while the majority of male respondents were in the same age group 40 as females. The mean age was 29 years. The finding further showed that there was a significant association between age and sex ($p=0.007$).

The difference in sex distribution could be attributed to the fact that the female population is estimated at 52% (NHSP 2005-2009). The other reason could be that women are the major providers of care to the sick. These findings are in line with Logsdon (2000), who documented that women frequently assume the role of care giver.

Previous studies concentrated on parents and patients, while this study focussed on a cross section of individuals, parents inclusive. The study revealed that 39.2% of the respondents had attained secondary educational level while only 33.4% had attained primary level of education.

Education is important because it reduces difficulties in communicating health related messages. The more educated one is the more receptive they are to health related issues. Educated people are expected to make informed decisions on issues such as accepting procedures such as LP to enable health care providers make accurate diagnosis in instances where meningitis cannot be clinically diagnosed due to lack of meningeal signs especially in infants.

The majority of the respondents revealed that they had been in the ward with their patient for one week or less, while 5% said they had been in the ward for three weeks or longer. The prolonged hospital stay could be due to the fact that patients are either brought to hospital late or could be as a result of reluctance of the caregiver to have LP done to confirm the diagnosis soon after admission so that appropriate treatment is commenced in good time. By the time consent is given, usually the condition of the patient would have deteriorated because collection of CSF allows for a definitive diagnosis and facilitates appropriate care. According to the Malaysian study of Ling et al. (2000), patients who refused LP were treated empirically and this is usually the practice in this country. This is likely to delay healing if the causative organism does not respond to treatment. CSF examination is absolutely necessary to determine the cause and effective medication. The duration of stay for 5% of the patients was in contradiction with the Ministry of Health Indicator of Hospital Average Length of stay recommended to be six days or lower (MOH, Annual Health statistical Bulletin, 2005). It has been stressed by Kneen et al. (2002) that the advantages of microbiological diagnosis by virtue of performing LP reduces the use of antibiotics and shortens the duration of hospital admission. In this study we did not assess why hospitalization period was longer for some patients.

5.3 KNOWLEDGE

The study revealed that 82.4 % of the respondents knew that Meningitis, Cerebral Malaria and AIDS are serious conditions which require that the patient is referred to a hospital for further management. However, Tuberculosis and Pneumonia were least considered as being serious and yet these are also very common conditions sometimes requiring hospital management. It was rather surprising that despite the knowledge that most respondents have on diseases requiring hospitalization, patients are usually taken to hospital late.

There was a statistically significant association between education and knowledge of serious conditions for which the doctor will collect cerebral spinal fluid ($P < 0.001$). The study further revealed that less than half (38.6%) of the respondents with secondary level of education said that Meningitis and Malaria are serious conditions for which the doctor will request for a specimen of cerebral spinal fluid, while both those with primary education and tertiary education mentioned AIDS as an indication for which the doctor will request collection of cerebral spinal fluid. It was noted that respondents did not know that Malaria and AIDS are not conditions that require a LP, except where cryptococcal meningitis is suspected. This revealed that there was lack of knowledge about the indications of LP even in people with secondary level of education. The lack of knowledge could be attributed to the reasons why caregivers decline LP. Irwin et al. (1998) in their study conducted in Hong Kong on patients' knowledge of and attitudes towards anaesthesia and anaesthetists identified that deficiency in knowledge and patients' attitude contributed to lack of knowledge on anaesthesia. This lack of knowledge could be the reason why health care providers are finding it difficult to convince patients to have LP done when indicated.

Of interest was the fact that respondents had a layman's understanding of what meningitis was. They defined it as a disease of the brain, neck and spinal cord. Some of them thought that delaying treatment of Malaria caused meningitis. It was surprising to find, though insignificant some respondents who correctly defined meningitis. To correct the misinformation on LP education and information was given to the respondents after interviewing them.

Revelations in my findings show that 41.9% of the respondents who had a family member who had previously suffered from meningitis said that lumbar puncture was done to confirm the diagnosis while 40% did not know what tests were done to confirm that their relative had meningitis. This lack of knowledge could explain why caregivers refuse LP. This study agrees with the study conducted at Yale University by Redlick et al. (1946) which also revealed that 40% of their respondents had never heard of LP and that 25% had vague ideas that the procedure was related to the spine, spinal cord and brain and that it was a diagnostic aid. The study further revealed that respondents had a good lay understanding of LP technique and purpose. In this

study more than 42% of the respondents lacked knowledge on the use of LP. Having such a big number of people not knowing the importance of this crucial procedure is of great concern.

From the findings, majority of the respondents did not receive any education at all related to LP from health care providers since admission of their patients in the ward. This could explain the caregivers' lack of knowledge in areas such as tests necessary to confirm meningitis and what the disease is all about. This was worrisome to the researchers because one of the roles of health care providers is to educate and increase awareness on health related issues each time they are with a patient or client. Health care providers should emphasize the importance of investigations such as LP during their health education sessions. It is important that service providers provide information to patients and care givers each time they are in contact with them. Health care providers rarely give information education and communication. This is usually attributed to inadequate manpower which should not be a scape goat.

Health care providers are accountable to give information and education to patients and caregivers in order to increase awareness on health related issues. This is in agreement with the study findings of Afhami et al. (2004), who stated that providing enough and appropriate information about a procedure increases its acceptance. Since some of the care givers interviewed had not received appropriate information whilst in the ward. The researcher and research assistants took up the responsibility of educating respondents on LP in order to empower them with knowledge to enable them make informed decisions in future. During discussions, it was revealed that the main source of information on health issues were relatives and friends which should not be the case because most times information tends to be distorted. Just as documented in Deng et al. (1994) the main sources of information for their respondents in the Malaysian study were relatives and or friends

Majority of the caregivers said that most of the relatives or caregivers decline to consent to LP because they are not given adequate information on the procedure. They further went on to say that the explanation given before consent is obtained is usually scanty. It was revealed that doctors do not take time to explain LP procedures, most of the time this assignment is left to nurses. This is in agreement with the study conducted by Deng et al. (1994) where they

discovered that in only 85% of the cases were the reasons of LP explained to parents, and in only 71.4% of the time was the explanation given by a doctor.

5.4 ATTITUDE

The study found that 56% of the respondents believed that patients may not be allowed to undergo lumbar puncture by the caregiver due to lack of knowledge and information on LP. This finding is in line with the finding of Mathey et al. (2004) which states that members of the public have not been successfully informed about regional anaesthesia. Just like in this study, caregivers were not adequately informed. Basic information is very important to our clients to enable them accept diagnostic procedures conducted in health institutions. Without the necessary information, decision making will be based on past experiences or hearsay. It is therefore equally important that members of the public are informed on LP in order to dispel some beliefs. Majority of the respondents said they were not aware of the beliefs and myths associated with LP. 6% said that hospital staff discourages caregivers to give consent to LP because of health care providers' belief that patients do not survive LP. Some of them attested to the fact that they had lost relatives to LP. It was baffling to hear that health care workers who should know better are in the fore front of discouraging caregivers to access this diagnostic tool. Care givers and other members of the community have a lot of respect for healthcare givers and hearing such in a hospital setting would usually be taken as the truth because health care workers are considered as experts by lay people. There is need to investigate this finding and appropriate action taken if it is true.

There was no significant association between reasons for worrying about patient about to undergo LP and duration the respondent had been in the ward with the patient ($p=0.504$). It was gathered from the interviews that majority of the respondents were worried about the fact that their patient was about to undergo lumbar puncture. Various reasons were advanced by care givers for worrying. The main reason was because they had heard that patients die after LP, while others said they had seen patients die after LP or they had been discouraged by other caregivers to consent to LP. The worry and anxiety in some of the caregivers was the fear that their patient might end up with an infection due to use of un-sterile instruments by health care providers. These fears were dispelled through explanation of how the procedure is done.

Regardless of education level and duration they had been in the ward, caregivers were scared of giving consent to an investigation that would kill their patients. This finding is in line with the study findings of Redlick et al. (1946) who documented that majority of their respondents thought that LP was a dangerous and painful experience. There was a lot of anxiety whenever the subject of LP was presented to caregivers. It is perceived as a fatal investigation.

There was a deeply imbedded belief that the outcome of LP is death. Very few said that the outcome of LP is proper diagnosis and treatment. This is worrying because very few respondents knew the benefits of LP. This is a serious matter that needs to be addressed. The findings in this study concur with the study findings of Deng et al. (1994) in Malaysia whose study revealed that the reasons for parent's refusal of LP to be performed on their children were fears that the child might die, might be paralyzed, or that the child might find the procedure too painful. Most caregivers were afraid of LP because they had heard stories of death and severe complications after LP. Some of the complications mentioned were that children perform poorly in school, development of psychiatric conditions such as insanity, chronic backache and paralysis of the legs. It is evident that most of the caregivers strongly believed that LP results in death. Remarkable is the fact that even some nurses who were found as caregivers during data collection confirmed that patients die after LP.

Findings further revealed that even respondents with secondary level of education openly declared that they would not advise their patient to undergo LP then or in future, because of earlier mentioned reasons. It was also brought out that most doctors lack skills in the performance of LP. They compared situations in the past where doctors who were attending to patients were elderly and felt that they were experienced. They equated age to experience implying that they want experienced doctors to perform the procedure. Respondents felt that this procedure should only be performed by very senior doctors. They strongly recommended that junior doctors should be closely supervised and monitored. Furthermore they explained that they declined to consent because they do not have confidence in the junior doctors.

There was a statistical significant association between accepting LP to be administered on the caregiver and advising a patient to undergo LP ($P < 0.001$). The findings further showed that 93.5% of the respondents, who would not accept LP to be administered on themselves, would

also not allow a patient to undergo LP in future, while 33.3% would. The reasons given by majority (66%) of the caregivers for refusing LP on them was that they believed nobody survives. Caregivers openly expressed the belief that LP kills. These findings agree with the study conducted by Redlick et al. (1946) which revealed that many patients dread LP. Chakwe (2009) reported that Zambian patients refuse LP until the disease is irreversible and as a result this delay gives a false impression that lumbar punctures caused deaths. The report further stated that what actually causes death is the delay in performing LP which is regarded as a life saving procedure as it aids in initiation of appropriate treatment. Caregivers confirmed that sometimes patients are brought to the hospital late for fear that the doctor will prescribe LP. The decision to bring patients to hospital is made upon realisation that a patient has a 50/50% chance of survival and therefore consent for LP is given as a desperate measure and not whole heartedly.

The study revealed that there was no relationship between educational level and attitudes towards LP. Majority of the respondents had negative attitude towards LP. These findings show that regardless of educational level, attitudes towards LP are negative. This is a source of concern and something drastic needs to be done. It is also documented by Husain et al. (2007) that refusal of LP by many parents of infants and young children is due to concerns that the procedure will result in damage to the spinal cord and subsequent paralysis. Care givers had their own concerns from what they had heard.

Finally some of the respondents gave varied comments. The emphasis from 10.3% of the respondents was that there should be rigorous dissemination of information to the community on the importance of LP at health institutions and through the media such as Television, Newspapers and the Radio just as it is for Malaria and HIV/AIDS so that misconceptions are dispelled. This was an important observation because concentration on health matters has been in other areas other than meningitis and LP. The least suggestion was that society should be educated to take their patients to hospitals and health centres early. It has been observed that patients are brought to hospital late, and when LP is performed whatever the prognosis of the disease could be, it is usually attributed to investigations such as LP.

CHAPTER SIX : RECOMMENDATIONS AND CONCLUSION

6.1 CONCLUSIONS

Purposive sampling was employed in this study but random sampling would have been a better choice because many people are potential caregivers of meningitis patients. The method used can not be generalized to the general population. The period of study (six) months was a limitation to the study because more time was needed to do it on a large scale. It is therefore recommended that another study is done on a large scale over a period of time in order to generalize results. However, this study is the first one to be done in Zambia and has yielded valuable information which can be utilised to address the growing trend of LP refusals.

The study has identified a deficiency in knowledge on the usefulness and safety of LP. It is apparent from the study that health care providers do not spend time on educating patients and caregivers on LP as evident from the fact that majority of caregivers had not received any Information, Education and Communication while in the ward. Providing appropriate information about LP can increase its acceptance as can be seen in the way Voluntary Counselling and Testing on HIV is being accepted due to increased awareness. Overall, respondents who had received secondary school education had good knowledge of LP. Most caregivers considered the spine a very delicate area which they believe that once it is pricked by a needle, it would result in death or complications such as paralysis, insanity, brain damage and worsening of the patient's condition.

There was no relationship between education level and attitudes towards LP. Regardless of education level majority of care givers had negative attitude towards LP. Willingness to submit to LP does not correlate with educational level. It has a lot to do with fear of death due to lack of knowledge and confidence in health care practitioners who perform the dreaded LP. The study further revealed that there is a strong belief that the outcome of LP is death

LP refusal is an emerging problem in Zambia which hinders appropriate management of patients due to unfounded beliefs by members of the public. These beliefs have resulted in lack of proper diagnosis of meningitis which has economic implications of increased use of antibiotics, longer

hospital stay and increased workload on the already understaffed work force. Analysis of CSF is very important because it confirms the diagnosis of meningitis and determines the cause so that appropriate treatment is commenced. Currently, LP is not often done, and when it is done it is often delayed on a patient whose condition could have deteriorated to unsalvageable levels. Deaths from LP are rare as evident from patients who receive spinal anaesthesia. Deaths have been reported because of late presentation of patients to hospital compounded by refusing the most appropriate diagnostic tool.

Some health care workers are contributing to the problem under discussion. Health care institutions have a challenge of addressing this problem where it exists.

The general public's concern of fear of death, paralysis, pain and brain damage is prevalent. It is highly suggestive that this could be due to lack of knowledge. A better understanding and recognition of the importance that LP plays in diagnosis may help increase acceptability of this procedure. This entails that education on LP should address these concerns.

The study confirmed all the assumptions made except the assumption that age, sex and religion of a person might influence decision making. Another study would have to be done to disprove this assumption.

In order to address the above stated findings, it is recommended that the Ministry of Health should rigorously disseminate information to members of the public on the importance of LP through the media in order to strengthen its use in hospitals. Further, the Ministry of Health should bridge the gap between Resident Medical Doctors and consultants, in order to build capacities of the former so that they are able to perform LP. Health care providers at all levels should also endeavour to increase awareness of the role of LP in their institutions. The study must be conducted on a larger scale in order to allow for generalization of results.

6.2 RECOMMENDATIONS

- 6.2.1** The Ministry of Health should channel more resources to ensure rigorous dissemination of information on LP and its importance through the Mass Media such as Television, radio and Newspapers like they have done for HIV/AIDS, malaria and cholera.

- 6.2.2** Health care providers at all levels should also endeavour to increase awareness of the role of LP in their institutions.

- 6.2.3** There is need to improve on capacities in the professionals that perform LP. The Ministry of Health should bridge the supervisory gap between Resident Medical Doctors and their superiors (consultants). Due to inadequate staffing, there are very few Registrars in health institutions to monitor and mentor interns in the performance of procedures such as LP; as a result, most of the interns do not know how to perform this vital diagnostic procedure.

- 6.2.4** The study must be conducted on a larger scale in other geographical areas to enable generalization of results.

- 6.2.5** Hospitals to sensitize health care workers on the importance of LP.

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APPENDICES

APPENDIX 1

GHANT CHART

| NO | TASK TO BE PERFORMED | RESPONSIBLE PERSON | 2007 | 2008 | | | | | 2009 | | | | | | | | |
|----|----------------------------------|--------------------|------------|------|---------|--|-----------|--|------|---------|-----|-----|-----|-----|-----|-----|-----|
| | | | April-Dec. | Jan | Feb-Aug | | Sep – Nov | | Dec | Jan-Apr | May | Jun | Jul | Aug | Sep | Oct | Nov |
| 1 | Literature review | Researcher | | | | | | | | | | | | | | | |
| 2 | Proposal development | Researcher | | | | | | | | | | | | | | | |
| 3 | Presentation to graduate studies | Researcher | | | | | | | | | | | | | | | |
| 4 | Approval by REC | Researcher | | | | | | | | | | | | | | | |
| 5 | Data collection | Researcher | | | | | | | | | | | | | | | |
| 6 | Data analysis | Researcher | | | | | | | | | | | | | | | |
| 7 | Report writing | Researcher | | | | | | | | | | | | | | | |
| 8 | Submission of draft report | Researcher | | | | | | | | | | | | | | | |
| 9 | Submission of final report | Researcher | | | | | | | | | | | | | | | |

APPENDIX 2: BUDGET

| ITEM | UNIT COST (ZMK) | QUANTITY | TOTAL |
|--|-----------------|-------------|-------------------|
| 1. STATIONERY | | | |
| (a) Flash Disk | 250,000 | 1 | 250,000 |
| (b) Bond Paper | 25,000 | 4 Reams | 100,000 |
| (c) Toner for Printer | 600,000 | 1 | 600,000 |
| (d) Pens | 1,000 | 4 | 4,000 |
| (e) Pencils | 500 | 4 | 2,000 |
| (f) Eraser | 5,000 | 4 | 20,000 |
| (g) Note Books | 8,000 | 4 | 32,000 |
| (h) Tippex | 10,000 | 1 | 10,000 |
| (i) Staples | 10,000 | 1 box | 10,000 |
| (j) Stapler | 50,000 | 1 | 50,000 |
| (k) Folders | 12,000 | 4 | 48,000 |
| (l) Bag for Interview schedules | 150,000 | 1 | 150,000 |
| SUB TOTAL | | | 1,276,000 |
| 2. PERSONNEL | | | |
| (a) Lunch allowance | 50,000 | 4 x 42 days | 8,400,000 |
| (b) Transport allowance | 20,000 | 4 x 42 days | 3,360,000 |
| (c) Secretary | 300,000 | | 300,000 |
| (d) Statistical Consultant | 600,000 | | 600,000 |
| (e) Train Research Assistants | 150,000 | 1 | 150,000 |
| (f) Ethics Committee | 250,000 | | 250,000 |
| SUB TOTAL | | | 13,010,000 |
| 3. TRANSPORT | | | |
| (a) Transport to Lusaka To Researchers Supervisors | 350,000 | 4 | 1,400,000 |
| SUB TOTAL | | | 1,400,000 |

| | | | |
|---|--------|--------------------------|-------------------|
| 4. TYPING SERVICES | | | |
| Research Proposal Typing and Printing | 3,000 | 50 pages | 150,000 |
| Research proposal Photocopying | 200 | 50 pages x 5 copies | 50,000 |
| Research proposal binding | 10,000 | 5 copies | 50,000 |
| Typing and Printing Interview schedules | 3,000 | 13 pages | 39,000 |
| Photocopying Interview schedules | 200.00 | 13 pages x584 | 1,518,400 |
| Research Report typing | 3,000 | 84 pages x 5 x 5 copies. | 1,260,000 |
| Research Report Photocopying | 200 | x 5 copies | 97,000 |
| Research Report binding | 10,000 | | 50,000 |
| SUB TOTAL | | | 3,214,400 |
| Communication Facilities | | | 250,000 |
| TOTAL | | | 19,140,400 |
| Contingency Fund 10% | | | 1,914,400 |
| GRAND TOTAL | | | 21,054,800 |

JUSTIFICATION FOR THE BUDGET.

1. PERSONNEL.

These were required for pre testing the research instruments to refine the interview schedule and to ensure that questions were relevant and clear to be understood by the target group and also for data collection.

The secretary was required for typing, and the Stastician for highly technical data entry and analysis on the computer.

2. STATIONERY.

These were needed for printing and photocopying the interview schedules and also for the production of the proposals, the final report and copies for distribution.

3. COMMUNICATION FACILITIES.

K250, 000 was needed to purchase mobile phone credit for easy communication.

4. TRANSPORT.

This was needed for the researcher to travel to the sites for data collection and also from *Ndola* to *Lusaka* to the Supervisors for guidance.

5. MISCELLANEOUS.

10 percent of the total budget was needed for any shortcomings the researcher needed during the research.

APPENDIX 3

CONSENT FORM

ATTITUDES AND DETERMINANTS OF LUMBAR PUNCTURE ACCEPTABILITY AMONG CAREGIVERS AT THREE HOSPITALS IN ZAMBIA.

PROCEDURE

I want to explain to you that in major hospitals in Zambia, for serious infectious diseases, there are many diagnostic tools. However, in this study we are looking at caregivers (those who are found at the patient's bed side) as to how they feel about the use of lumbar puncture (LP) technique for diagnosis of diseases.

LP is a routine procedure to diagnose diseases of a serious nature. Upon obtaining the results, treatment can be started immediately. It is a life saving procedure. LP is insertion of a needle between the third and fourth lumbar intervertebral space. During this procedure, the patient only feels the prick of a needle which does not result in injury to the patient. There is no bleeding. About 2mls of cerebrospinal fluid is collected for diagnostic purposes to isolate the causative organism of the disease; bacteria or fungal element etc. Immediately after the results are obtained, the patient is commenced on treatment.

PURPOSE OF THE STUDY

The study will obtain information on caregivers' attitudes towards lumbar puncture and factors that make caregivers decline to consent to lumbar puncture. This is important as the information from the study will assist health care managers to find ways and means of helping the community understand the importance of lumbar puncture, and consequently increase acceptability of this procedure which assists in appropriate treatment of meningitis.

VOLUNTARY PARTICIPATION

This is to inform you that we will introduce a questionnaire to collect information about the said procedure (LP), whether you want the patient to accept the procedure or you think otherwise. Your participation in this project is purely voluntary. You are not being forced to participate in this study. You are free to decline. Your refusal will not affect the standard of care which you will receive since your participation is voluntary. You are free to withdraw from the study at any time.

RISKS

Your participation in the study will not involve any procedure or any other harmful procedures. You will only be asked certain questions which will not take more than ten minutes. Other than that, there are no risks involved.

BENEFITS

Your participation in this study will benefit the patient in the sense that if your attitude is positive, the patient will undergo LP and will benefit. If you may think otherwise, that is why we want you to understand the importance of this procedure. This will benefit the patients, the hospital and the physicians. There is no monetary gain but your opinion may indirectly benefit the patient who will undergo LP.

CONFIDENTIALITY

Your research records and any information you will give will be confidential to the extent permitted by law. You will be identified by a number, and personal information will not be released without your permission except when required by law. The ministry of health, the University of Zambia Research Ethics Committee or the School of Medicine may review your records again. This will be done with confidentiality.

INFORMATION AND CLARIFICATION

Please be notified that at any time you want clarifications or want to ask any questions about LP, the Sister in charge or the researcher will be pleased to offer you information or clarifications and answers to your questions.

If you wish to seek any further clarification, please contact:-

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The Chairperson
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CONSENT FORM

The purpose of this study has been explained to me and I understand the purpose, the benefits, risks and confidentiality of the study. I further understand that:

If I agree to take part in this study, I can withdraw at any time without having to give an explanation, and taking part in this study is purely voluntary.

I _____ (Name) Agree to take part
in the study.

Signed/Thumb print _____ Date: _____ (Participant)

Signed: _____ Date: _____ (Witness)

Signed: _____ Date: _____ (Researcher)

APPENDIX 4

THE UNIVERSITY OF ZAMBIA

SCHOOL OF MEDICINE

DEPARTMENT OF COMMUNITY MEDICINE

STRUCTURED INTERVIEW SCHEDULE

TOPIC: ATTITUDES TOWARDS LUMBAR PUNCTURE AMONG CAREGIVERS AT THREE HOSPITALS IN ZAMBIA.

Hospital Code: []
1. ADH
2. KCH
3. NCH

Name of Interviewer: _____ Date: _____

No. of Interview schedule: _____

INSTRUCTIONS FOR THE INTERVIEWER

1. Always greet and introduce yourself before starting the interview.
2. Explain the purpose of the study and ask for permission to interview the participant.
3. Assure the respondent of maximum confidentiality.
4. Explain that the respondents have a choice to participate and the option to withdraw. If the respondent is unwilling to take part, do not force them.
5. Make the respondent sign the consent form before you start the interview, or use the thumb print for those who cannot sign.
6. Do not write the name of the respondent on the interview schedule.
7. Write the appropriate responses in the spaces provided.
8. Tick or circle the correct answers where they are provided.
9. Thank the respondent at the end of the interview

Relationship of caregiver with the patient -----

SECTION A:

DEMOGRAPHIC DATA

1. Age of respondent []
 1. 18-24 years
 2. 25 – 29 years
 3. 30 – 34 years
 4. 35 – 39 years
 5. 40 years and above

2. Sex of respondent []
 1. Male
 2. Female

3. Marital status []
 1. Single
 2. Married
 3. Separated
 4. Divorced
 5. Widowed

4. Highest educational level attained []
 1. Grade 0 – 7
 2. Grade 8 – 12
 3. Post Secondary/Tertiary

5. Occupation []
1. Student
 2. Formal employment
 3. Informal employment.
 4. Unemployed.
 5. Other (specify) _____
6. Denomination []
1. Catholic
 2. Seventh Day Adventist
 3. United Church of Zambia
 4. Pentecostal
 5. Baptist
 6. Jehovah's Witness
 7. Other (specify) _____
7. Area of residence []
1. Low density residential area.
 2. Medium density residential area
 3. High density residential area
 4. Other, specify _____

8. How long have you lived in Ndola/Kitwe? []
1. Less than 1 year
 2. 1- 3 years
 3. 4 - 6+ years
 4. Other, specify _____

9. How long have you stayed in this ward? []
1. 1 week or less.
 2. 1- 2 weeks.
 3. 3 weeks or more.

SECTION B:

KNOWLEDGE ON LUMBAR PUNCTURE

10. Are there some serious conditions for which people are referred from the clinics to the Hospital for further management? []
1. Yes
 2. No

11. Which ones are the serious conditions? []
1. Cerebral Malaria
 2. Meningitis
 3. Diabetes
 4. Stroke
 5. AIDS
 6. Other (specify)_____

12. Of these serious conditions, which one do you think the Doctor will collect fluid from the spinal canal? []
1. Cerebral Malaria
 2. AIDS
 3. Meningitis
 4. I don't know
 5. Other, specify_____

13 Of the conditions you have mentioned above which one was your patient referred for? []

14 Have you ever heard of meningitis? []

1. Yes

2. No

If the answer to **question 14** is “No”, go to question 19

15 What is meningitis? []

16 Are there any members of your family who have suffered from meningitis before? []

1. Yes

2. No

If the answer to **question 16** is “No”, go to question 19

17 How did the doctor know it was meningitis? []

- 18 What was done to confirm the diagnosis? []
1. Blood test
 2. Blood slide
 3. X-ray
 4. Lumbar puncture
 5. Don't know
 6. Other (specify) _____

19. What information have you received from health care providers regarding lumbar puncture since you have been here? []
1. Importance of the procedure
 2. What lumbar puncture is
 3. None.
 4. Other (specify) _____

SECTION C

ATTITUDES TOWARDS LUMBAR PUNCTURE

20. In your opinion why do you think some people may not allow their relatives to undergo lumbar puncture procedure? []
1. Hospital staff discourage caregivers to give consent.
 2. No proper explanation is given on the importance of the procedure.
 3. Lack of knowledge of the procedure.
 4. Do not know.
 5. Other, specify _____

21. Did it worry you that your patient was about to undergo lumbar puncture? []

1. Yes

2. No

22. If the answer to **question 21** is “Yes”, why were you worried? []

23. If the answer to **question 21** is “No”, give reasons. []

24. What led you not to allow your patient to undergo lumbar puncture? []

25. Would you advise a patient to undergo lumbar puncture in future, []

1. Yes

2. No

26. If the answer to **question 25** is “No”, give reasons. []

27. In your opinion, what do you think is the outcome of lumbar puncture? []

28. Give reasons for your answer. []

29. Would you accept the procedure of lumbar puncture to be administered on you? []

1. Yes
2. No

30. If the answer to **question 29** is “No”, give reasons. []

31. Tick in appropriate box.

| Statement | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
|--|----------------|-------|---------|----------|-------------------|
| | 5 | 4 | 3 | 2 | 1 |
| 1. Lumbar puncture should be recommended for all patients with meningitis. | | | | | |
| 2. Lumbar puncture is necessary for appropriate treatment of meningitis. | | | | | |
| 3. Lumbar puncture is a very safe Investigation. | | | | | |
| 4. Complications of lumbar puncture are rare. | | | | | |
| 5. Lumbar puncture should be performed in children | | | | | |

32. Do you have any other comments?

**THANK YOU FOR SPARING TIME TO ANSWER THIS INTERVIEW
SCHEDULE**