Knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe.

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KEYWORDS

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ACRONYMS

CDC- Centre for Disease Control and Prevention

COVID-19- Coronavirus Disease

HAI- Hospital Acquired Infections

SADC- South African Development Community

IPC- Infection Prevention and Control

MOHCC- Ministry of Health and Child Care

WHO- World Health Organisation

ABSTRACT

Background: Hospital acquired infections are a huge public health concern, contributing to increased hospitalisation and death in developing countries. Infection prevention and control (IPC) is a discipline which relies on practical evidence-based approaches to preventing both patients and health workers from hospital avoidable infections. However, most of these infections, in many developing countries including Zimbabwe can be attributed to lack of compliance with infection prevention and control measures by health care workers.

Aim: The aim of this study was to assess the knowledge, attitudes and practices regarding infection prevention and control among hospital health care workers in Mangwe District, Zimbabwe.

Methodology: This study utilised a quantitative inquiry using a cross-sectional survey. Data on socio-demographic variables, health workers' knowledge about IPC, attitudes towards IPC and IPC practices were collected using a structured questionnaire, which was administered online. Purposive sampling was utilised to ensure participation of all health workers who are eligible and available.

Results: The study demonstrated that 92 % of health workers were knowledgeable on IPC, 77% had positive attitudes towards IPC and 74% were practicing acceptable activities towards IPC. The study revealed a significant association between acceptable IPC practice and the following socio demographic factors older age, higher educational level, and more work experience. In addition, the study showed a significant association between being knowledgeable in IPC and advanced age. Furthermore, the study revealed a positive linear correlation between being knowledgeable, positive attitude and acceptable practice towards IPC

Conclusion: The findings of this study showed that most participants were knowledgeable on IPC. Many of the participants also had positive attitudes on IPC and practising acceptable IPC activities. Some sociodemographic factors of the participants were associated with performing acceptable practices on IPC and being knowledgeable. The hospital and other concerned stakeholders should ensure the provision of training to health providers with a lower educational level, those of young age and less experienced. Moreover, maintaining and improving health worker knowledge may result in positive attitudes and acceptable practice.

DECLARATION

I declare that "*Knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe"* is my work, has not been submitted for any degree or examination at any university, and that all the sources that I have used or quoted have been referenced in the text and indicated in the referenced section.

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Date: 11/11/2021

Signature: 

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CHAPTER 1. INTRODUCTION

1.1. Global viewpoint in Infection Prevention and Control (IPC)

Infection prevention and control (IPC) is defined as an evidence-based approach utilising practical strategies which are designed to halt avoidable infection from harming patients and health workers (World Health Organization [WHO],2016, page 5). It is an approach derived from various disciplines which may include infectious diseases, epidemiology, social science, and health system strengthening (Centre for Disease Control and Prevention [CDC],2008, page 1). It is a strategy that occupies a special position in medicine to ensure patient safety and universal health coverage (Allegranzi *et al*, 2017). IPC as a strategy stops the spread of hospital acquired infections (HAIs) in healthcare settings (WHO, 2016; CDC, 2008; Tartari *et al*, 2021).

Hospital acquired infections (HAIs) are defined as infections resulting from adverse reaction to the presence of an infectious agent or its toxins acquired from health care settings in which the patient was not incubating or symptomatic of the infection at the time of admission at the hospital (CDC, 2008,page 1). HAIs are a huge global challenge mainly in low and middle-income countries (Allegranzi *et al*, 2011; Alhumaid *et al*, 2021; Tartari *et al*,2021). An estimated 10% of patients in hospital care in developed countries and 25% in developing countries develop HAIs due to suboptimal IPC implementation in health care settings (Alhumaid *et al*, 2021, Rosenthal *et al*, 2016). These infections pose a public health concern and a challenge to patient safety, contributing to increased illness, mortality, and economic burden (Rosenthal *et al*, 2016; Allegranzi *et al*, 2007; Tartari *et al*, 2021). Based on available evidence, the impact of HAIs implies increase hospital stay, long-term disability and increased resistance of microorganisms to antimicrobials (Tartari *et al*, 2021; Jones *et al*, 2015; Green *et al*, 2015). According to Alhumaid *et al*, 2021, HAIs cause patient anxiety and psychological effects as shown in Figure 2 below.

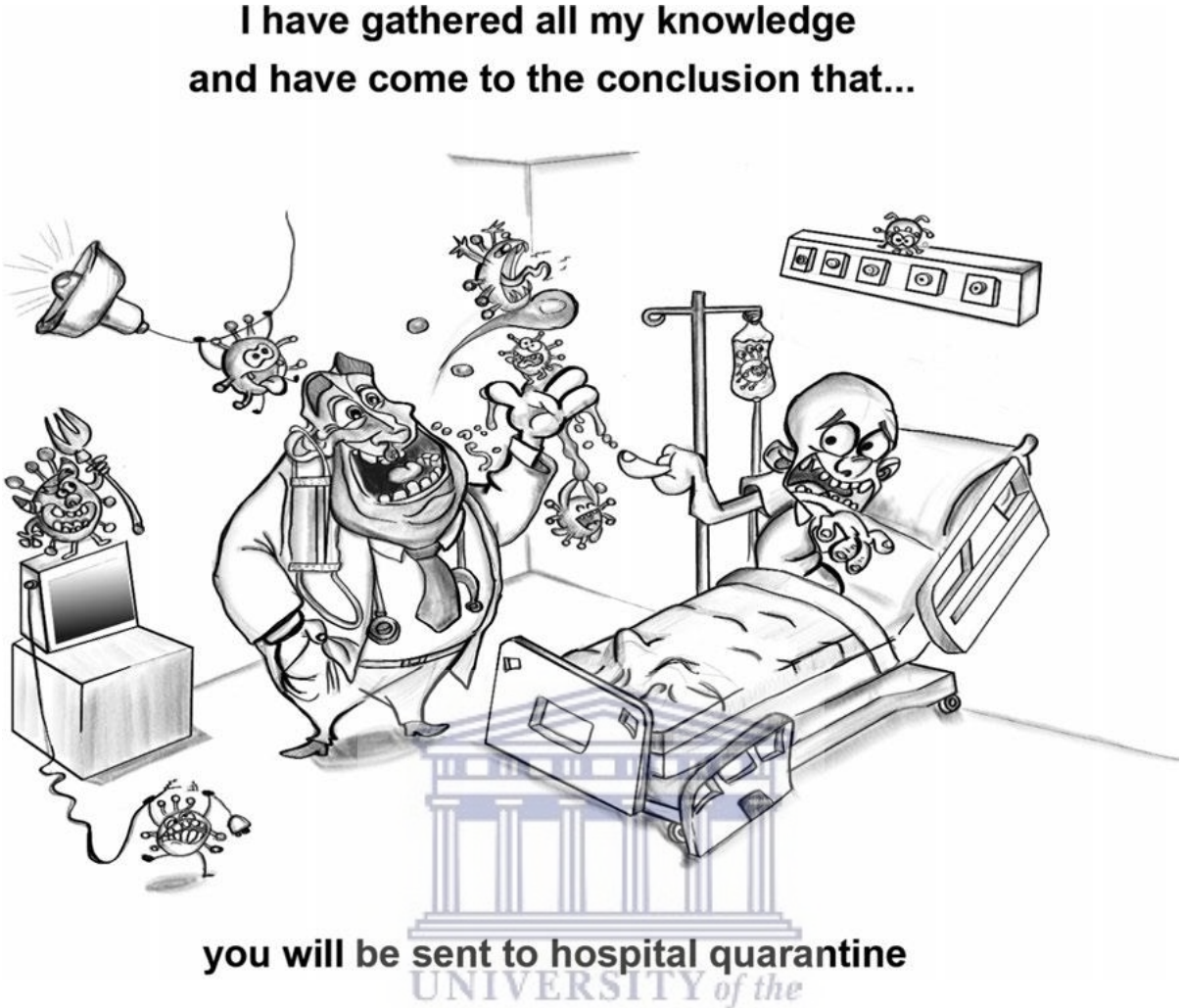

Figure 2:A picture showing a patient with fear and anxiety about a health worker not being compliant with IPC during health care provision (Alhumaid *et al.* 2021*)*.

As a response to the increased burden of HAIs, in 2016 the WHO developed guidelines on the core components of IPC programmes at national and at health care facility level. The guidelines provide eight recommendations on the core components of IPC (WHO, 2016). The recommendations provide a framework for effective prevention of HAIs and antibiotic resistance (Storr *et al*, 2017; WHO, 2O16). The recommendations include an active standalone IPC programme and the utilisation of evidence-based IPC guidelines (WHO, 2016). At hospital level the IPC programme must be anchored on trainings of health workers (WHO, 2016). HAIs surveillance is another intervention that should be performed to guide IPC practices within facilities including hospitals (WHO, 2016). The IPC programme should be implemented by using multimodal strategies and utilise monitoring, audits, and feedback mechanisms (WHO, 2016). In addition, to reduce the burden of HAIs, the number of patients should not exceed the capacity of the hospital and the health worker staffing levels should be adequate to the patient workload (WHO, 2016). Furthermore, an effective and efficient IPC

programme must be built on clean hospital environment and readily available appropriate IPC materials, infrastructure, and equipment (WHO, 2016).

1.2 IPC in Developing Countries

The burden of HAIs in many developing countries has been reported to be higher because of the huge number of patients against a limited number of staff, and insufficient compliance with IPC measures (Allegranzi *et al*, 2018; WHO, 2017; Tartari *et al*, 2021). The existing data, although limited, shows the burden of HAIs in developing countries is high, due to poverty; inadequate water supply; overcrowding; limited resources and limited funding; non-adherence to IPC principles due to health workers inadequate knowledge; negative attitudes and unacceptable practices (WHO, 2017; Allegranzi *et al*, 2011; Alhumaid *et al*, 2021). In addition, HAIs surveillance which is an important tool to quantify the burden of disease, plan for IPC interventions and evaluating the impact of these strategies are seldom done in developing countries including Zimbabwe (Storr *et al*, 2017; WHO, 2017).

The proportion of HAIs are much higher in Africa with Mali at 18.1% prevalence, Nigeria at 14.3%, Ghana 8.2% and 11.4% in Malawi (Yallew, Kumie & Yehuala ,2017; Abubakar, 2020; Labi *et al*, 2019 and Bunduki *et al*, 2021). This is compounded by the fact that most of the health workers' knowledge, attitudes, and practices towards IPC strategies are suboptimal (Olaifa, Govender & Ross, 2018; Alemayehu, Ahmed & Sada, 2016; Alhumaid *et al*, 2021). Therefore, improving the knowledge, attitudes, and practices of health workers towards IPC is essential to reduce the burden of HAIs. In the resource limited setting like most hospitals in Africa, it is difficult to control patients and health workers acquiring HAIs (WHO,2017; Tartari *et al*, 2021). Utilising simple practical procedures that are part of the components of IPC and improving knowledge, attitudes and practices of IPC have been found to be effective in reducing the HAIs (Rowe *et al*, 2018; Alhumaid *et al*, 2021).

1.3 IPC in Zimbabwe

The WHO in 2017, estimated that 5-10% of patients, acquired one or more infections in health facilities, the risk being 2-10 times higher in developing countries. Zimbabwe according to the Human Development Index is positioned number 156 out of 189 countries which means it falls under the poorer developing countries and the burden of HAIs is high (United Nations Development Programme, 2018). According to the Infection Control Association of Zimbabwe (2014) there is no data on the burden of HAIs in Zimbabwe.

In Zimbabwe, the IPC policy and strategy were launched in 2013 (Ministry of Health and Child Care [MOHCC], 2013). The goal of the strategy was to strengthen IPC implementation

in health facilities in Zimbabwe (MOHCC, 2013). In turn, IPC guidelines were developed in line with existing WHO guidance; trainings were done; and IPC plans developed for health facilities in the pilot phase (Biomedical research and training institute report, 2016). To aid the successful implementation of the IPC policies and guidelines the Infection Control Association of Zimbabwe intended to support in research on IPC at health facilities and contribute to the reduction of HAIs (Infection Control Association of Zimbabwe, 2014).

1.4. Problem statement

IPC is a practical evidence-based approach preventing both patients and health workers from HAIs (Nasiri *et al*, 2019; WHO, 2017). It is an approach of preventing susceptible client from being infected by microorganisms (Tietjen, 2011). Hence, HAIs associated morbidity and mortality are preventable through IPC strategies like, proper hand hygiene (Saito *et al*, 2017; Priya *et al*, 2015). Implementing standard precautions like injection safety; isolation precautions; precautions to halt transmission of contact, droplet, and airborne microorganisms (WHO,2017). Additionally, the strategies include proper use of antibiotics, use of vaccines, environmental cleaning, and disinfection (WHO,2016). Furthermore, a comprehensive department-based safety program and HAIs monitoring are the major steps of IPC (Allegranzi *et al*, 2018).

The above stated indicate there are available low-cost interventions to halt HAIs. However, inadequate knowledge, negative attitudes and unacceptable practices amongst health workers can lead to suboptimal implementation of IPC leading to HAIs (Nasiri *et al*, 2019; Labi *et al*, 2019; Alhumaid *et al*, 2021). There are studies that have reported that health workers adopt IPC practices depending on their level of knowledge and perception of risk of acquiring an infection (Khan, Baig & Mehboob, 2017; Boev & Xia, 2015; Khan *et al*, 2015, Moodley *et al*, 2021). Inadequate knowledge on IPC is one of the most important causes of high HAIs prevalence worldwide (Nasiri *et al*, 2019; Olaifa *et al*, 2018; Khan *et al*, 2015). Poor adherence to evidence-based practices on IPC is also associated with HAIs among health workers and patients in health facilities (Geberemariyam *et al* 2018; Storr *et al*, 2017; WHO, 2016).

According to the Infection Control Association of Zimbabwe (2014), evidence regarding the level of knowledge, attitudes and practice towards IPC are not well explored in Zimbabwe, including Mangwe District. It therefore becomes important to assess the knowledge, attitudes, and practices of health workers on IPC in Mangwe district, Zimbabwe.

1.5 Purpose of the study

The purpose of the study was to assess knowledge, attitudes, and practices on IPC among health workers at St Annes Mission Hospital in Mangwe District. The study will contribute to the gap in research on IPC in Zimbabwe. The study will benefit the IPC programme in Mangwe District, Matabeleland South Province and Zimbabwe. It will also contribute to the development of effective strategies to reduce HAIs. Additionally, the study will contribute to the improvement in patient and health worker safety in the hospital. The findings of the study will be used by health workers in St Annes Mission Hospital and by policy makers in healthcare delivery in Zimbabwe for health systems strengthening.

1.6. Outline of thesis

This thesis is comprised of six chapters. The current chapter avails the context of the study by outlining the global perspective on IPC, the standpoint in sub-Saharan Africa and Zimbabwe. In addition, the chapter outlines the problem statement and the purpose of the study. The literature review related to IPC globally, in Zimbabwe and the knowledge, attitudes, and practices of health workers as barriers to IPC are presented in the second chapter. The methodology that was used in the study and the ethical considerations of such an inquiry are outlined in Chapter three. The study findings are presented in the fourth chapter. In chapter five is a discussion of the results is presented. Finally, chapter six outlines the conclusions and recommendations drawn from this study.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

IPC is considered as an essential component in the fight to halt and reverse the effects of HAIs (Allegranzi *et al*, 2017; WHO, 2016). To mitigate the impact of HAIs at a large scale, it is important to address the global, regional, country and facility level challenges faced in IPC implementation (Storr *et al*, 2017). IPC is defined as a scientific based approach utilising practical solutions which are designed to prevent harm caused by HAIs to patients and health workers (WHO ,2016). It is a strategy that stops the spread of HAIs in healthcare settings (WHO, 2016; CDC, 2008). The Zimbabwe health system expects all health facilities to provide a minimum package of services that includes adherence to IPC guidelines by health workers (MOHCC, 2013).

Non-adherence to IPC guidelines is an active or passive process whereby the health workers deviate from implementation of IPC guidelines and policies (WHO, 2016, CDC, 2008). Knowledge, attitudes, and practises of health workers are important factors leading to non-adherence to IPC guidelines in hospital settings (Alhumaid *et al*, 2021; Geberemariyam *et al* 2018; Rahiman *et al* ,2018; Ivan *et al*, 2017). The inadequate knowledge, negative attitudes and poor practices of health workers pose as barriers to IPC implementation (Alhumaid *et al*, 2021; Geberemariyam *et al* 2018, Rahiman *et al* ,2018; Ivan *et al*, 2017).

Understanding the latest IPC WHO guidelines and the IPC policy in Zimbabwe will assist in the exploration of the knowledge, attitudes, and practices of health workers regarding IPC in a hospital setting. In this chapter the available literature on the above stated factors is explored.

2.2. IPC WHO guidelines

IPC stops the spread of infections in healthcare settings (WHO, 2016; CDC, 2008). In 2016, the WHO developed new guidelines on the core components of IPC programmes at national and at health care facility level (WHO, 2016). These new guidelines form a key part of the strategies to prevent HAIs (WHO, 2016). They are intended to aid countries in the development of their own national guidelines on IPC and to support health facilities as they develop or strengthen their own protocols for IPC (Storr *et al*, 2017). The guidelines provide eight recommendations on the core components of IPC (WHO, 2016). The recommendations provide a framework for effective prevention of HAIs and antibiotic resistance (WHO, 2O16). The recommendations include an active standalone IPC programme and the utilisation

of evidence-based guidelines (WHO, 2016). At hospital level the IPC programme must be anchored on trainings of health workers on IPC (WHO, 2016). HAIs surveillance is another intervention that should be performed to guide IPC practices within facilities (Allegranzi *et al*, 2017). The IPC programme should be implemented by using multimodal strategies and utilise monitoring, audits, and feedback mechanisms (WHO, 2016). In addition, to reduce the burden of HAIs the number of patients should not go beyond the capacity of the hospital (WHO, 2016). Furthermore, an effective and efficient IPC programme must be built on clean hospital environment and readily available IPC commodities, infrastructure, and equipment (WHO, 2016).

The WHO guidelines have been used globally, although evidence from studies in the Middle East and West Africa indicate that global public health emergencies, such as the Middle East Respiratory Syndrome, Coronavirus Disease (COVID-19), and the Ebola virus disease outbreaks, revealed gaps in implementation of IPC (Rajakuruna *et al*, 2017; Fischer *et al*, 2015; Cobb *et al* ,2021). Furthermore, evidence from the review of the International Health Regulations has called for adherence to IPC guidelines globally (WHO, 2017; Storr *et al*, 2017). Despite WHO IPC guidelines, there are still HAIs due to barriers that are associated with poor implementation and compliance to the IPC guidelines by health workers (Alhumaid *et al*, 2021; Sastry *et al*, 2017; WHO, 2017).

2.3. Zimbabwe IPC policy

In Zimbabwe, the IPC programme is spearheaded by the Ministry of Health and Child Care (MOHCC) through improving IPC in health facilities nationwide to prevent the transmission of infections among patients and staff (MOHCC, 2013). The focus areas of the policy include the development and implementation of infection control plans; development of the curriculum; training of health workers; the adaption of the core components of IPC from WHO; improvement in leadership and governance (MOHCC,2013).

Despite these initiatives in Zimbabwe, studies in Zimbabwe reported inappropriate execution of the IPC programme due to no adherence of the IPC policy and guidelines (Mugauri *et al*, 2018; Govha *et al*, 2020; Gabasa *et al*, 2019). One of the studies was a cohort study done for an outbreak investigation of hospital acquired neonatal sepsis at Parirenyatwa Central Hospital which indicated poor compliance to national IPC guidelines was one of the factors associated with hospital acquired neonatal sepsis outbreak leading to a case fatality rate of 9.5% (Mugauri *et al*, 2018).

2.3. Barriers to IPC implementation

2.3.1. Health workers' inadequate knowledge about IPC

Inadequate health worker knowledge is defined as insufficient understanding of information about IPC that health workers get by experience or study, either known by one health worker or by a group of health workers (CDC, 2008). The inadequate health worker knowledge is known barrier for IPC implementation (Nasiri *et al*, 2019; Alhumaid *et al*, 2021). This aspect is shown in a study in KwaZulu-Natal Province, South Africa (Olaifa *et al*, 2018). The study revealed that 42.7% of health workers had poor knowledge on waste management which is component of IPC (Olaifa *et al*, 2018).

In another study done in Ethiopia revealed that lack of knowledge was associated with working experience (Desta *et al*, 2018). Health workers with less than five years' experience were 4 times more likely to lack knowledge on IPC as compared to those with ten years' experience (AOR = 4.03, 95%, CI = [1.229–5.68]) (Desta *et al*, 2018). The lack of knowledge on IPC among health workers in the study in Ethiopia was also associated with the level of education; such that health workers with certificates were two times (AOR = 2.15, 95%, CI = [3.245–8.789]) and three times (AOR = 3.034, 95%, CI = [1.856–4.756) more likely to have inadequate knowledge as compared to those with degrees and diplomas respectively (Desta *et al*, 2018).

The impact of health workers having inadequate knowledge on IPC is shown in a study done in Zimbabwe at Goromonzi District in which the knowledge score for health workers on IPC was 47% and this proved to be a barrier for effective IPC implementation (Govha *et al*, 2019). In another study that was conducted in Zimbabwe, Tirivavhu *et al* (2014) determined that poor knowledge on IPC was a barrier for IPC practices among nurses at Bindura provincial hospital. Therefore, these studies from literature reveal that the lack of knowledge can be a barrier to IPC.

2.3.2. Health workers' negative attitudes towards IPC

Negative health worker attitudes towards IPC are defined as a bad feeling or opinion about IPC (WHO,2018). The negative health worker attitudes can be a barrier to effective IPC (Nasiri *et al*, 2019). In a study done in Trinidad and Tobago showed that 53.3% of workers did not have a positive attitude towards IPC (Unakal *et al* ,2017). Negative attitudes of health workers to set IPC standards are also shown is study done in five hospitals in Poland (Rosi´nski *et al*, 2019). The study revealed that junior health workers had negative attitudes

towards IPC as compared to more senior staff [adjusted odds ratio 0.17 (p-value 0.02)] (Rosi´nski *et al*, 2019). Additionally, the study revealed negative attitudes were associated with working in medical wards [adjusted odds ratio -2.47(p-value 0.01)] (Rosi´nski *et al*, 2019).

A qualitative study done in Lesotho showed that despite their commitment, IPC committees were largely ineffective because of five major barriers including negative staff attitudes (Mugomeri, 2018). In another study conducted in Uganda showed negative attitudes affected IPC implementation, in the study about 74% of the health workers had negative attitudes. In Ethiopia another study revealed that negative attitudes were a barrier for IPC implementation in Hospital setting (Bayleyegn *et al*, 2021). In addition, in a study done is South Africa Tygerberg Hospital proved that 87% of the participants who did not have in-service training on IPC reported 72% negative attitudes towards IPC (Dramowski *et al*, 2015).

Gasaba *et al* (2019) showed that negative attitudes towards IPC were an associated barrier to effective implementation of IPC at a rural hospital in Mutasa District, Zimbabwe. Furthermore, in two central hospitals in Zimbabwe a study done by Ganda *et al* (2015) showed that negative attitudes on IPC amongst midwives was one of the factors associated with an increase in incidence of hospital acquired neonatal sepsis from 0.13% to 2.5%. The above stated literature reveals that negative health worker attitudes can be barrier for effective and efficient IPC implementation.

2.3.3. Health workers' poor IPC practices

Poor health worker practices towards IPC are defined as non-adherence to what really happens as opposed to what health workers think must be done practical in IPC implementation (CDC, 2008). The unacceptable health worker practices can be a barrier to IPC implementation (Nasiri *et al*, 2019). This is shown in a systemic review conducted by Alhumaid *et al* (2021), in which it was shown that poor health worker practices are a barrier to IPC. Cobb *et al* (2021), demonstrated that a significant increase in the number of COVID-19 hospital acquired infections were due to poor practices by health workers in adherence to set IPC regulations and guidelines.

In the African context, a facility based cross sectional study done in Ethiopia showed that health workers who do not have IPC guidelines available were 3.34 times more likely to practice poor IPC compared to those who have guidelines for their practice (AOR = 3.34, 95% CI: 1.65, 6.76) (Geberemariyam *et al*, 2018). In addition, healthcare workers who did not have a training on IPC were about 5.31 times more likely to practice unacceptable IPC

than those who have received training (AOR = 5.31, 95% CI: 2.42, 11.63) (Geberemariyam *et al*, 2018). Furthermore, in a systemic review conducted by Barrera-Cancedda *et al* (2019) in Sub Saharan Africa, showed negative attitudes are a barrier for implementation of IPC in health care facilities including Hospitals.

In a study done in Zimbabwe at Parirenyatwa central hospital after an outbreak of hospital acquired neonatal sepsis revealed a gap between theory and practice (Mugauri *et al*, 2018). The study also revealed that the IPC policy document, which was available at the institution, was being partially applied in practice (Mugauri *et al*, 2018). Mugauri *et al* (2018) showed that despite the facility scoring high on IPC knowledge, the actual practices diverted significantly from it. In addition, the study showed that thorough terminal disinfection upon patient discharge was known but not practised; resulting in the next admitted neonate being infected by the same bacteria resulting in the outbreak of hospital acquired neonatal sepsis (Mugauri *et al*, 2018). Furthermore, the study revealed that poor adherence to universal precautions and national IPC standards were associated with hospital acquired neonatal sepsis (Mugauri *et al*, 2018). Gabasa *et al* (2020) in a study in Zimbabwe proved 50% of health workers did not utilize the IPC manuals and guidelines, and this was associated with unacceptable IPC practices. Therefore, poor practices of health workers can be a barrier towards IPC.

2.4 Conclusion

The literature review identified that whereas IPC can halt HAIs, there are many challenges that health workers face in the effective implementation of IPC. These challenges may be associated with negative attitudes, inadequate knowledge, and poor practices of health workers regarding IPC in health facilities.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter outlines the study methodology beginning with the aim and objectives of the study. The description of the study design, study setting, study population and sampling process are described as well, the description also includes the inclusion and exclusion criteria used. In addition, there is a description of the data collection processes, data analysis procedures and the steps taken to ensure validity and reliability. Furthermore, in conclusion of the chapter the ethical considerations of the study are presented.

3.2. Aim of the study

The study aimed to assess the knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe.

3.3. Objectives

1. To determine the knowledge of health workers on IPC at St Annes Mission Hospital, Zimbabwe.
2. To determine the attitudes of health workers towards IPC at St Annes Mission Hospital, Zimbabwe.
3. To determine IPC practices among St Annes Mission Hospital health workers

3.4. The study design

This study was a cross sectional survey design. It utilised quantitative research methodology given that it was seeking to answer questions about measurable concepts. A Dictionary of Nursing, Oxford University Press, (2008) describes quantitative research method as research which generates numerical data and usually seeks to establish causal relationships or association between two or more variables, using statistical methods to test the strength and significance of relationships. The study method of data collection was chosen for this study because it gives an advantage of reaching a large population group in limited time. Other studies have used quantitative methodology to assess knowledge, attitudes, and practices of health workers towards IPC in Zimbabwe (Gabasa *et al*, 2020, Govha et al, 2019; Mugauri *et al*, 2018; Tirivavhu *et al*, 2014).

3.4. Study setting

The study setting was the clinical environment at St Annes Mission Hospital in Mangwe district, Zimbabwe. St Annes is a mission run catholic hospital in the rural parts of Mangwe district (MOHCC, 2018). It has a catchment population of 86973 (MOHCC, 2018). It is one of the secondary level referral hospitals in Mangwe district (MOHCC, 2018). It has 9 clinical departments that offer clinical services (MOHCC, 2018). The hospital has erratic supplies of water and electricity (MOHCC, 2018). The clinical environment of the hospital consists of the general, surgical, gynaecology, postnatal, children's ward and maternity wards. The setting also includes the outpatient's department, casualty departments and theatres.

3.5. Study population and sampling

The study population refers to, 'all cases' which are the objects or people of interest to the researcher as they meet a specified criterion (Robson& McCartan, 2011:276). The population included all health workers in a clinical environment at St Annes Mission Hospital, Zimbabwe. They included doctors (n = 6), registered general nurses (n = 183), registered primary care nurses (n = 38) and nurse assistant (n=33). The above information was obtained from the official health facility establishment. The study used convenience sampling because of size of the population and to give all health workers an opportunity to be in the study. The questionnaire was sent to selected cadres who were on duty. According to Etikan (2016), this sampling method is a type of non-probability sampling method where participants are selected based on easy accessibility. The response rate was 43.8%.

3.6. Inclusion and exclusion criteria

3.6.1. Inclusion criteria

The inclusion criteria included all health workers working at St Annes Mission Hospital, Zimbabwe. All health workers working in a clinical environment and are directly involved in patient care were included in the study.

3.6.2. Exclusion criteria

Health workers who do not work in the clinical environment were excluded in the study. Individuals on annual, sick, and maternity leave during data collection were excluded from the study.

3.7. Data collection plan

3.7.1. Data collection procedures

For data collection, the Principal Investigator (PI) gained permission from the Hospital Manager (Appendix 6 **Approval letter from the Provincial Medical Director- Mat South**). The questionnaire (Appendix 3**: Questionnaire**) was shared online with participants so that they respond. A copy consent form and the information sheet were part of the online data collecting tools (Appendix 2**: Consent Form** and Appendix 1**: Participant's information sheet**). The participants responded to the questions in their own time without pressure. All the ethical considerations were maintained during the online survey. This ensured participants and the researcher maintained social distancing in line with precautionary measures stipulated in COVID-19 response. This ensured there was also convenience to the participants. It also allowed participants to provide information through their response to questions without the researcher's interference.

3.7.2. Data collecting tool

The questionnaire was related to the objectives of the study and included elements on IPC in the hospital. The questionnaire assessed socio demographic variables such as age, sex, marital status, levels of education, prior training on IPC, and the category of the health worker and years of practice. The knowledge, attitudes and practice questions were developed from the WHO checklist of IPC core components, the Zimbabwe IPC national guidelines and adapted from a mini thesis done for master's in nursing, Stellenbosch University, South Africa (WHO, 2017; Chisanga, 2017; MOHCC, 2013).

The knowledge of the health workers on IPC were assessed with eleven questions, each with three possible responses (i.e., "1 true", "2 false", "3 unsure"). Attitudes towards IPC were assessed with thirteen questions, using a 5-point Likert scale coded from 1 "strongly agree to 5 "strongly disagree". Twenty-two questions assessed IPC practices using a 3-point Likert scale coded 1 "always", 2 "sometimes", and 3 "never".

3.8. Data analysis plan

Data analysis was done using the SPSS version 25. Descriptive statistics were presented on the type of data; for continuous variables mean, median, mode was used. If categorical, then frequency and percentage of each category. The other descriptive statistics were presented as frequency tables for discrete data.

The outcome variables were dichotomised into binary outcomes for infection prevention and control knowledge it was analysed as either knowledgeable or not knowledgeable. For attitudes was also be dichotomised as negative or positive towards IPC. Additionally, for the outcome on IPC practices were dichotomised as acceptable or unacceptable. A bivariate analysis was performed to assess association between the dependent and independent variables. Crude odds ratios with 95% confidence intervals will be used to determine the strength of association between the dependent and independent variables. All the tests were two tailed and a p-value of less than 0.05 was used as cut off for all statistical significance. Parametric correlation coefficients (Pearson's correlation) were calculated to assess the correlation between the three scores of knowledges, attitudes and practices of infection prevention and control.

3.9. Reliability and Validity

3.9.1. Reliability

According to Sarantakos, (1998), reliability refers to dependability or a way a tool such as questionnaire will produce similar results in different circumstances if nothing changes. Reliability was ensured by ensuring that the PI shares the same the questionnaire for all participants online and does not share a different to other participants. To ensure reliability, questions were framed in a simple language and in a non-judgemental manner. This allowed participants to give the appropriate answers. Having said this, a participant completing an instrument meant to measure knowledge, attitudes and practices should have approximately the same responses each time the test is completed. In the study we used online survey that will reduce interviewer bias and may lead to an increase in the response rate thereby enhancing validity of the study.

3.9.2 Validity

Validity is used in epidemiology to assess the degree to which the information collected accurately answers the research question (Trochim, 2009). In this study, validity was maintained by adopting the tried and tested tool adapted the WHO questionnaire on IPC core components (WHO, 2016). To maximize validity, representative questions for each category were designed and evaluated against the desired outcome. To enhance content validity the questions on knowledge, attitudes and practices among health workers were measured in relation to IPC guidelines. The contents of the instrument included the best practices from the Zimbabwe Infection Control Guidelines as well as WHO (2017) guidelines in the prevention of hospital acquired infections (MOHCC, 2013).

The study was subjected to predictive validity of factors that the study intends to measure how they affect knowledge, attitudes, and practices of health workers in IPC. To ensure that the study is valid, and it measures what it was set to measure (Sarantakos, 1998). It was important to prevent biases during planning stage and analysis stage. In this regard, a structured pre-tested questionnaire was used in the study. The questionnaire was pre-tested online among five health workers in a nearby hospital to ensure validity. To establish face validity as an indication that an instrument appears to test what it is supposed to test and that it is a plausible method for doing so, will be considered by being clear about the definition of the concept that is being measured (Sarantakos,1998). Thus, the questionnaire was clear, simple, and written in a language that participants understand.

3.11. Ethical considerations

The research proposal was approved by the Faculty of Community and Health Sciences Higher Degrees Committee. The ethics clearance to conduct the research were obtained from University of Western Cape Biomedical Research Ethics Committee (Appendix 5 **UWC Ethics approval letter**) and the Medical and Research Council of Zimbabwe (Appendix 4**: Approval letter from Medical Research Council of Zimbabwe**). Prior to the commencement of the study, a formal request to conduct the research was obtained from the Ministry of Health and Child Care at Provincial level (Appendix 6 **Approval letter from the Provincial Medical Director- Mat South**). Those who were selected to be part of the study were informed of the purpose of the study and that participation is entirely voluntary, with no direct benefits or penalties, depending on their decision about study participation. All recruited participants were given the information sheet (Appendix 1**: Participant's information sheet**)explaining details about the study, benefits and risks, and voluntary nature of the study. The participants had the right to withdraw from the study at any stage without any negative consequences.

There were no anticipated harm in this study; however, participants had access to a psychologist or psychological counsellor should they have experienced any discomfort during the online completion of the questionnaire. To maintain confidentiality, I used study identity numbers which were assigned to participants. The online responses from the survey and the consent forms were filed separately to keep confidentiality and not link the two, securely locked in password operated laptop where I am based, only accessed by me as Principal Investigator. Data will be stored for five years after completion of the study and then destroyed as per standard research ethics practices. In terms of declaration of a conflict of

interest the researcher is not part of the hospital setup at St Annes Mission Hospital. All conflict of interests were therefore declared in earnest.

CHAPTER 4 STUDY FINDINGS

4.1. Introduction

This chapter outlines the findings from the study. A description of the socio-demographic characteristics of the health workers is given and this is followed by the findings related to the knowledge, attitudes, and practices of health workers in infection prevention and control (IPC). The descriptive statistics is presented in frequencies, percentages, means, and standard deviations. Additionally, findings indicating association between dependent and independent variables using crude odds ratios with 95% confidence intervals to determine the strength of association of the variables. Furthermore, findings on the correlation of the knowledge, attitudes and practice scores are outlined in the chapter.

4.2.1 Description of socio-demographic characteristics of the health workers

The description of the socio-demographic characteristics is shown below in Table 1. A total of 114 patients participated in the study and most of the study participants were female constituting (72.8%; n=83) and (27.2%; n=31) were males. The largest (40.4%; n=46) age group of the study participants were 30 – 39 years. Majority (49.1%; n=56) of the study participants were married. Almost two thirds (66.7%; n=76) of the participants had a diploma. Most of the study participants were nurses (73.7%; n= 84). In terms of work experience, majority of the study participants had more the 10 years' work experience (51.8%; n= 59). The bulk of the participants were full-time employees (95.6%; n=109). Most of the study participants worked at the outpatient's department (34%; n=39). The highest proportion (64.9%; n=79) of participants worked for 0-2 years in the same department.

Table 1: Socio-demographic characteristics of participants(N=114)

Variable	Category	Frequency(n=114)	Percentage (%)
Age	< 29 years	26	23.8 %
	30-39 years	46	40.4 %
	40-49 years	23	20.2 %
	> 50 years	19	16.7 %
Gender	Male	31	27.2 %
	Female	83	72.8 %
Marital status	Single	49	43.0 %
	Married	56	49.1 %
	Widowed	7	1.8 %
	Separated	2	6.1 %
Level of education	Secondary level	17	14.9 %
	Certificate level	5	4.4 %
	Diploma	76	66.7 %
	Undergraduate	14	12.3 %
	Postgraduate	2	1.8 %
Category of health worker	Doctor/Clinical Officer	8	7 %
	Registered General Nurse	84	73.7 %
	Primary Care nurse	5	4.4 %
	Nurse Aide	17	14.9 %
Work experience	<1 year	17	14.9 %
	1-3 years	21	18.4 %
	4-10 years	17	14.9%
	>10 years	59	51.8%
Employment status	Full time	109	95.6 %
	Contract	5	4.4.%
Working department/ward	General ward	26	22.8%
	Surgical ward	1	0.9%
	Gynaecological	2	1.8%
	Post-natal ward	2	1.8%
	Maternity ward	32	28 %
	Children's ward	8	7%
	Causality theatre	2	1.8%
	Main theatre	2	1.8%
	Outpatients' department	39	34.1 %
Length of working in the ward/ department	0 - 2 years	79	64.9%
	2 - 4 years	14	12.3%
	5 - 10 years	13	11.4%
	> 10 years	13	11.4%
Had any IPC trainings	Yes	68	59.6%
	No	46	40.4%
Length of the training if done (n=68)	Less than a day	19	26%
	1Day	16	21.9%
	2-6-Days	30	41.1%
	A Week	5	6.8%
	More than a week	3	4.1%

4.2.2 Prior IPC trainings

Majority of the study participants (59.6%; n=68) had been trained on Infection Prevention and Control (IPC) and (40.4%; n=46) did not have any training (Table 2). Of the study participants who were trained(n=68), the highest proportion (41.1%; n=30) were trained for 2-6 days (Table 3).

Table 2:Distribution of study participants who had IPC trainings (N=114)

Had Infection Prevention and Control Trainings	Frequency	Percentages
Yes	68	59.6%
No	46	40.4%
Total	**114**	**100**

Table 3: Distribution of the length of IPC trainings (N=68)

Length of Infection Prevention and Control trainings	Frequency	Percentages
Less than a day	19	26%
1Day	16	21.9%
2-6-Days	30	41.1%
A Week	5	6.8%
More than a week	3	4.1%
Total	**68**	**100%**

4.3. Knowledge related to IPC

4.3.1 Knowledge scores of health workers related to IPC

The mean score of health worker knowledge towards IPC was 92.2 % with a standard deviation of 13 % as shown in Figure 3 below. It therefore indicates the study participants were knowledgeable on IPC.

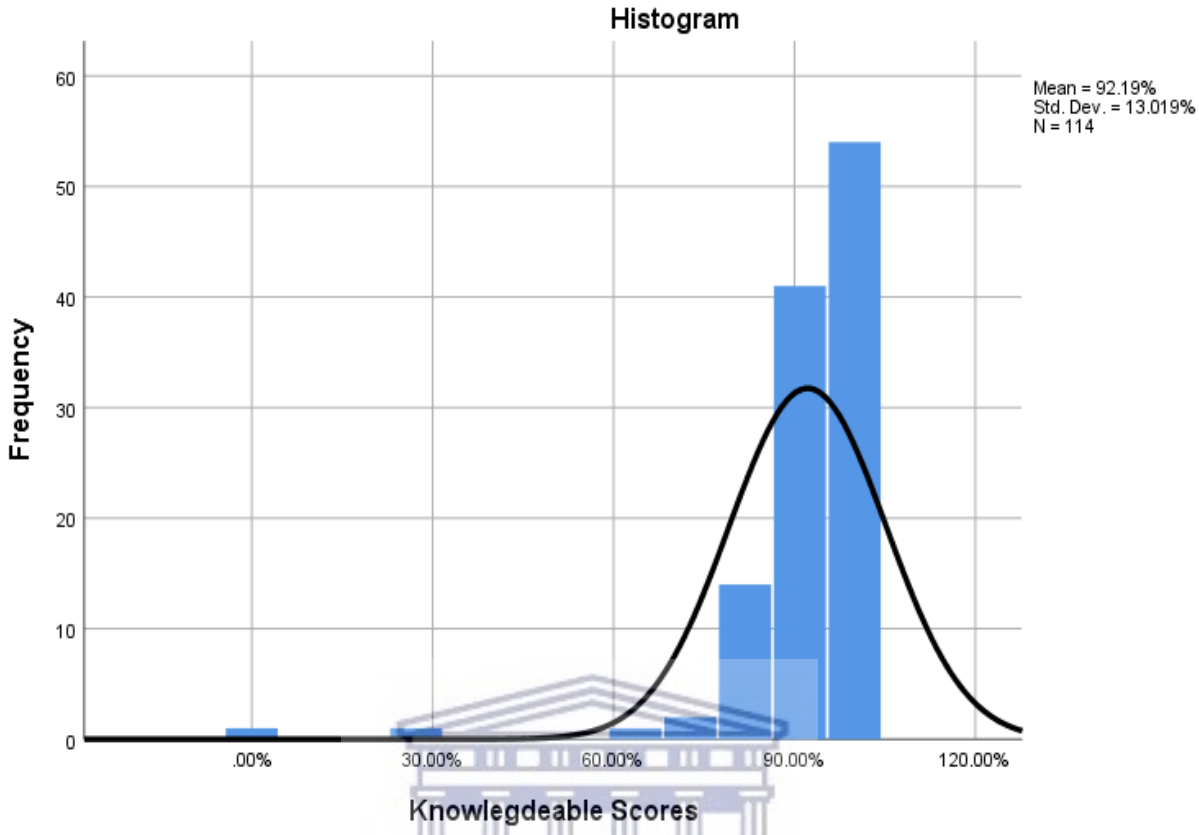

Figure 3.Graphical presentation of the distribution of the knowledge scores

4.3.2. Knowledge of health workers on IPC

Table 4 below depicts the participants' knowledge about IPC. Almost all participants (99.1%; n = 113) were knowledgeable that washing hands with soap or using an alcohol-based antiseptic decrease the risk of transmission of healthcare acquired infections. Most of the respondents (83.9%; n=94) knew that gloves cannot completely protect against transmission of infections. A high proportion of the participants (90.4%; n= 103) knew about the WHO "5 Moments of hand hygiene". Noticeable, 16.7% (n=19) were not knowledgeable that alcohol-based antiseptics used for hand hygiene are as effective as using soap and water. Furthermore, 16.1% (n=18) of the participants did not know that gloves cannot provide protection against transmission of infections.

Table 4: Knowledge about IPC amongst health workers (N = 114)

Variable	Knowledgeable Yes N (%)	No N (%)	Unsure N (%)
Hospital acquired infections can be transmitted by medical equipment	108 (94.7)	6 (5.3)	0(0)
Gloves cannot provide complete protection against transmission of infections	94(83.9)	18 (16.1)	0(0)
I know the World Health Organisation's '5 moments of hand hygiene.	103(90.4)	6 (5.3)	5(4.3)
Washing hands with soap or use of an alcohol-based antiseptic decreases the risk of transmission of healthcare acquired infections.	113 (99.1)	0(0)	1(0.9)
Use of an alcohol-based antiseptic for hand hygiene is as effective as soap and water	85(74.6)	19(16.7)	10(8.8)
Gloves should be worn if blood or body fluid exposure is anticipated.	101(88.6)	9(7.9)	4(3.5)
Hand washing is necessary before procedures are performed.	112 (98.2%)	0(0)	2(1.8)
Standard precautions on infection prevention and control apply to all patients	111(97.4)	1(0.9)	2(1.8)
Safety box should be closed when three quarters filled.	110(96.5)	1(0.9)	3(2.6)
All staff and patient should be considered potentially infectious	110(96.5)	1(0.9)	3(2.6)
Masks and goggles are necessary if procedure and patient care are likely to cause flushing of blood or exposure to deep body fluids.	103(90.4)	7 (6.1)	4(3.5)

4.4. Attitudes of health workers on IPC

4.4.1 Attitude scores of health workers related to IPC

The mean score on health worker attitudes was 76.88% with a standard deviation of 6.80% as shown in Figure 4 below. The data shows the study participants had positive attitudes towards IPC.

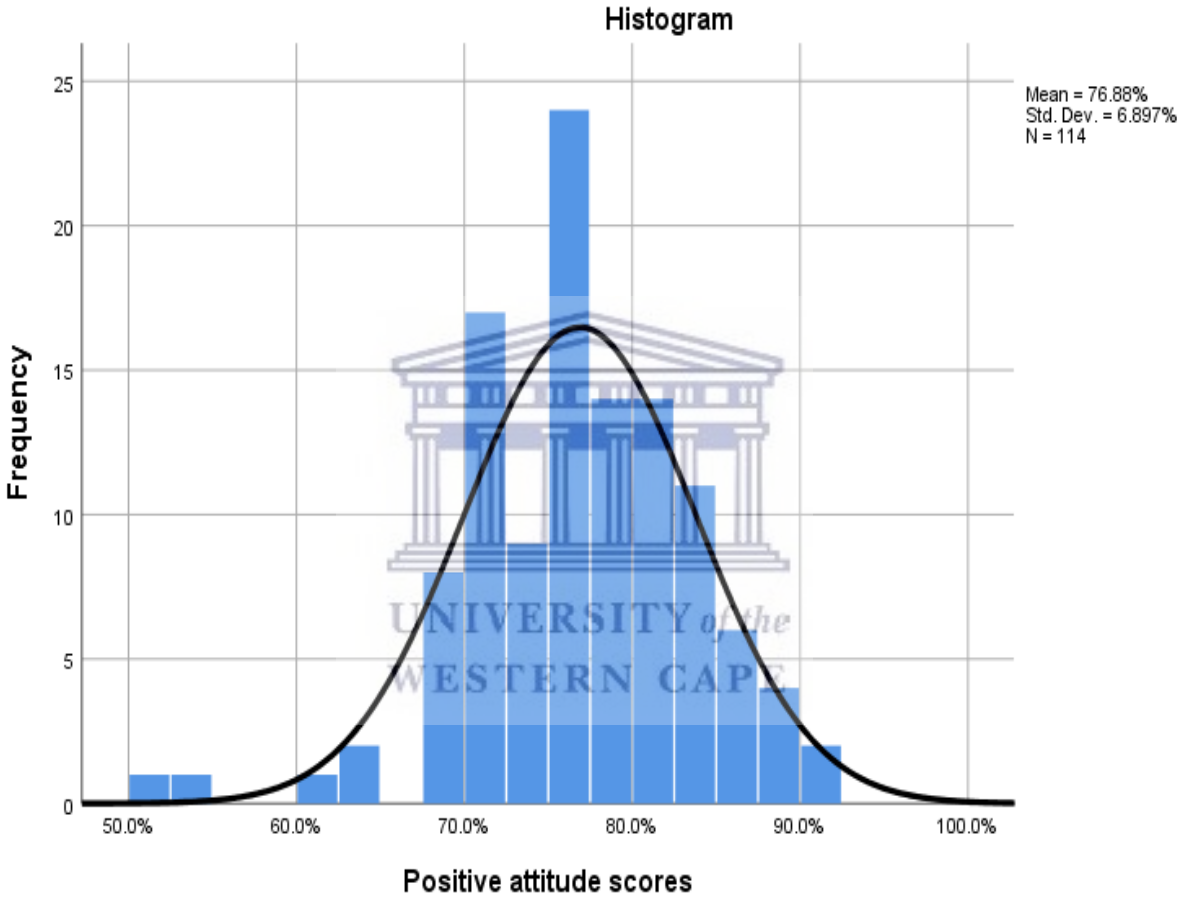

Figure 4.Graphical presentation of the distribution of the attitudes scores

4.4.2. Health worker attitudes towards IPC

As indicated in Table 5, most respondents (94.7 %; n=108) showed a positive attitude towards hand washing. Majority of the respondents (93%; n=106), revealed a positive attitude on adherence to policies and procedures related to IPC. A high proportion of health workers (94.7%; n=108) showed positive attitudes that following IPC guidelines will reduce HAIs. However, in terms of availability of time to adhere to IPC standards a notable proportion of study participants (32.5%; n=37) showed negative attitudes. In addition, 44.7% (n =51) showed a negative attitude regarding departmental workload affecting their ability to apply IPC guidelines. Noticeable, 66.7% (n=76) felt the IPC policies and guidelines are not enough in the hospital.

Table 5: Attitudes of health workers towards Infection Prevention and Control (N = 114)

Variable	Agree N (%)	Disagree N (%)
I must wash hands if I used gloves	108 (94.7)	6 (5.3)
Policies and procedures for infection control should always be adhered to	106 (93)	8(7.0)
I should attend in-service training/workshop related to infection prevention and control at least once per year	101(88.6)	13(11.4)
Does workload affect my ability to apply infection prevention guidelines?	51 (44.7)	63(55.3)
I am aware that patients expect me to wash hands before touching and after touching them.	95(83.3)	19(16.7)
I feel that the infection control policies and guidelines are enough in the hospital.	38(33.3)	76 (66.7)
It is my responsibility to comply with the infection prevention and control guidelines.	107(93.9)	7 (6.1)
Infection prevention and control guidelines are important to this hospital	103 (90.4)	11 (9.6)
I have enough time to comply with infection prevention and control guidelines	77(67.5)	37(32.5)

I believe that following the infection prevention and control guidelines will reduce rates of hospital acquired infection.	**108(94.7)**	**6(5.3)**
I should follow the procedure guidelines of the department	**110(96.5)**	**4(3.5)**
I feel that needles should be recapped after use and before disposal	**11(9.6)**	**103(90.4)**
Infection prevention and control does not improve patient outcomes	**13(11.4)**	**101 (88.6)**

4.5 Practices of health workers towards IPC

4.5.1 Practice scores of health workers related to IPC

According to Figure 5 shown below, the mean score of health worker attitudes was 74.08% with a standard deviation of 7.8%. The data shows the study participants had acceptable practices towards IPC.

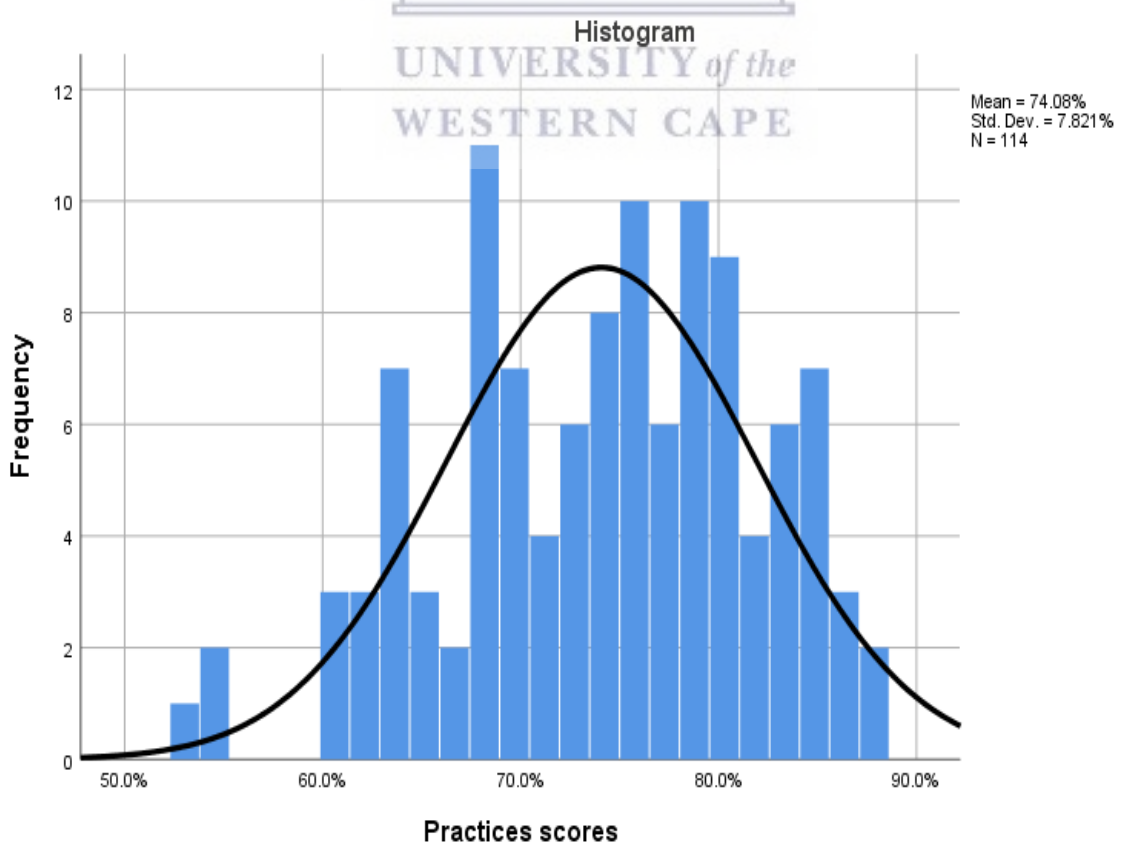

Figure 5.Graphical presentation of the distribution of the practice scores

4.5.2. Practices of health workers towards IPC

Table 6 below depicts the participants' practices about IPC. Most of respondents, (96.5%; n=110) always wash their hands immediately when encountered with blood or contaminated items. All most all the participants (97.4%; n = 112) always dispose sharps in a safety box and a similar percentage do not always recap used needles after use which are acceptable IPC practices. However, 13.2 % (n= 15) have always attended in service training or workshops related to IPC. In addition, 34.2% (n= 39) sometimes do not wash their hands before and after patient care. Noticeable, 42.1% (n=48) have never screened patients to detect hospital acquired infections and provide feedback on hospital acquired infection rates to other departments which are unacceptable IPC practices.

Table 6: Practices of Health workers on IPC (N=114)

Variable	Always N (%)	Sometimes N (%)	Never N (%)
Do you wash hands with soap and water before and after patient care?	74(64.9)	39(34.2)	1(0.9)
Do you wash hands immediately when encountered unwanted contacted with blood fluids or contaminated items?	110(96.5)	3(2.6)	1(0.9)
Do you dispose sharp materials in safety box?	111(97.4)	3(2.6)	0(0)
I attend in-service training/workshop related to infection prevention and control yearly.	15(13.2)	61(53.5)	38(33.3)
I Recap used needle before disposing.	0(0)	6(5.3)	108(94.7)
Do you screen of patients to detect Hospital acquired infections in the department and provide feedback on HAIs rates given to all departments?	10(8.8)	56(49.1)	48(42.1)
Do you wear Double gloves during surgery in deep body cavities or other procedures in which gloves rips or punctures are likely?	93(81.6)	18(15.8)	3(2.6)
Do you use alcohol-based antiseptic?	55(48.2)	59(51.8)	0(0)
Are you involved in both planning and executing the implementation of Standard operating procedures for Infection Prevention and Control in the hospital?	9(7.9)	52(45.6)	53(46.5)

4.6. Socio-demographic factors associated with knowledge of healthcare worker about Infection Prevention and Control

In the bivariate analysis shown in Table 7, it revealed age was significantly associated with health workers being knowledgeable of IPC. Accordingly, health workers who were older (i.e., 40 years and above) were about 7 times more likely to be knowledgeable on IPC when compared to those younger (OR 7.474 95% CI [0.807-69.525]). The p-value shows the odds ratio is significant however the 95% confidence interval is inclusive of 1 which might imply there is no difference in association. The wide margin of the confidence interval may mean that the sample is small.

Table 7: Bivariate analysis of the association between socio-demographic factors towards knowledge of IPC

Variable		Knowledge Scores		OR (CI 95%)	p-value
		Knowledgeable	Not Knowledgeable		
Age	< 29 years -39 years 40- years > 50 years	71 38	1 3	7.474 (0.807-69.252)	0.041*
Gender	Male Female	31 78	0 5	0.76 (0.636-0.806)	0.162
Level of education	Diploma and below Undergraduate and above	93 16	5 0	0.83 (0.789-0.922)	0.355
Category of health worker	Medical (Doctors) Nursing (Nurses/Primary Care Nurses/ Nurse Aides)	8 101	0 5	0.927(0.876-0.977)	0.530
Work experience	<1 year-3 years 4- >10 years	36 73	2 3	0.74(0.118-4.636)	0.746
Employment status	Full time Contract	104 5	5 0	0.954(0.916-0.998)	0.624
Had any Infection Prevention and Control trainings.	Yes No	65 44	3 2	0.985(0.158-6.137)	0.987

*Shows statistically significant at p-value < 0.05.

4.7. Factors associated with attitudes of health workers towards infection prevention and control

Table 8 below depicts results from a bivariate analysis of the socio demographic factors compared with attitudes scores of the study participants towards IPC. The findings revealed no significant association between the below mentioned dependant and independent variables as all p values were statistical insignificant (p – value > 0.05).

Table 8: Bivariate analysis of socio-demographic factors associated with attitudes of health workers towards IPC (N=114)

Variable		Attitudes Scores		OR (CI 95%)	p-value
		Positive	Negative		
Age	< 29 years -39 years 40- > 50 years	53 27	19 15	0.645 (0.285-1.466)	0.294
Gender	Male Female	21 59	10 24	0.895(0.839-0.951)	0.789
Level of education	Diploma and below Undergraduate degree and above	70 10	28 6	0.667(0.221-2009)	0.469
Category of health worker	Medical (Doctor/Clinical Officer) Nursing (Registered General Nurse Primary Care nurse Nurse Aide)	4 75	4 29	2.53(0.595-10.788)	0.196
Work experience	<1 -3 years 4-years >10 years	26 73	2 6	0.513(0.206-1.277)	0.149
Employment status	Full time Contract	104 5	5 0	0.954(0.916-0.994)	0.624
Had any Infection Prevention and Control trainings	Yes No	65 44	3 2	1.626 (0.7-3.780)	0.256

*Shows statistically significant at p-value < 0.05

4.8. Factors associated with practice of health workers towards IPC

In the bivariate analysis depicted in Table 9 below factors which were significantly associated with acceptable practice of IPC were: age, level of education and work experience. Therefore, health workers who were older (40 years and above) were about 2 times more likely to practice acceptable IPC when compared to those younger (OR 1.995 95% CI [0.789-4.985]). The p-value shows that the odds ratio is significant however the 95% confidence interval is

inclusive of 1 which might imply there is no difference in association. Regarding educational level, Health workers with an educational level of diploma and above were three times (OR = 2.618, 95%, CI = [0.836-3.408]) more likely to practice acceptable IPC than those with certificate level education and below. Furthermore, the bivariate analysis showed, health workers that are more experienced with 4 to above 10years work experience are two times more likely to practice acceptable IPC as compared to those less experienced (OR = 2.44, 95%, CI = [1.042-5.738]).

Table 9: Bivariate analysis of the socio-demographic factors associated with acceptable IPC practice(N=114)

Variable		Practice scores		OR (CI 95%)	p-value
		Acceptable	Unacceptable		
Age	< 29 -39 years 40-> 50 years	49 34	23 8	1.995 (0.789-4.985)	0.028*
Gender	Male Female	22 61	9 22	1.134(0.45-2.835)	0.787
Level of education	Below diploma Diploma and above	17 67	5 25	2.618(0.836-3.408)	0.042*
Category of health worker	Medical (Doctor/Clinical Officer) Nursing (Registered General Nurse Primary Care nurse Nurse Aide)	7 76	1 30	0.362(0.43-3.068)	0.333
Work experience	<1 -3 years 4- >10 years	32 60	18 16	2.446(1.042-5.738)	0.037*
Employment status	Full time Contract	104 5	5 0	0.544(0.086-3.420)	0.510
Had any Infection Prevention and Control trainings	Yes No	65 44	3 2	0.531(0.23-1.223)	0.134

*****Shows statistically significant at p-value < 0.05

4.9. Correlation between the variable's knowledge, attitudes, and practices

Table 10 below shows there is a positive linear correlation between knowledge and attitudes with a Pearson correlation coefficient of 0.345 which is statistically significant as the p-value was (0.000). In addition, there is positive linear correlation between knowledge and practices with a positive Pearson's correlation coefficient of 0.289 which is statistically significant with a p-value= 0.002. As a result, with improved knowledge the attitudes may be improved. In addition, with improved knowledge the practices of the health workers may be improved as well. There is no significant correlation between attitudes and practices.

Table 10: Correlations between the knowledge, attitudes, and practice scores(N=114)

		Knowledge Scores	Attitude scores	Practices scores
Knowledge Scores	Pearson Correlation	1	.345**	.289**
	Sig. (2-tailed)		.000	.002
	N	114	114	114
Attitude scores	Pearson Correlation	.345**	1	.139
	Sig. (2-tailed)	.000		.141
	N	114	114	114
Practices scores	Pearson Correlation	.289**	.139	1
	Sig. (2-tailed)	.002	.141	
	N	114	114	114

**. Correlation is significant at the 0.01 level (2-tailed).

4.10 Conclusion

The results of this study are represented using ten tables and three figures. The analysis looked at health workers knowledge, attitudes, and practices towards IPC (n =114). The results described the socio-demographic characteristics, knowledge, attitudes, and practices among study participants. A bivariate analysis using Chi-square tests was used to assess association between knowledge; attitudes; practices and socio-demographic characteristics of the health workers. In addition, findings using Pearson's correlation between knowledge, attitude and practises are outlined. The results will be discussed in detail in chapter five.

CHAPTER 5 DISCUSSION

5.1 Introduction

This chapter will discuss the key findings from this cross-sectional survey. The key findings to be discussed are knowledge, attitudes, and practices of health workers towards IPC at St Annes Mission Hospital in Mangwe District, Zimbabwe. These key findings will be discussed in relation to literature. The chapter is concluded with a discussion of the study limitations.

5.2. Socio-demographic findings related to IPC

Majority of the study participants were females a shown in the study findings. According to Chirwa *et al* (2016) at a study in a rural mission hospital in Zimbabwe, it was shown that most of the health workers are female which is a similar finding to this study. This finding is also shown in related studies in Zimbabwe, Cambodia, Uganda, India, China, Nigeria, and Tanzania as shown in a systemic review conducted by Morgan *et al* (2018). According to Buzuzi (2018), gender roles play an integral part in health worker placement, career choices and progression with most females being stationed at rural health facilities as compared to their male counterparts who occupy high level positions in management and at urban higher-level hospitals.

In this study it was revealed that the largest (40.4%) age group of the study participants were between 30 – 39 years. This concurs with findings from two studies on knowledge, attitudes, and practices in IPC in Ghana and South Africa in which majority of the participants were between 30-39 years (Alhassan *et al*,2021; Moodley *et al*, 2021). However, there are differences' shown in similar studies in Zimbabwe and Ethiopia, in which Govha *et al* (2021) revealed that majority of health workers in their study were between 20-29 years and Geberemariyam *et al* (2018), in Ethiopia 53.4% showed that most of the study participants were between 18-29 years.

In this study a high proportion (66.7%) of the participants had a diploma as the highest level of education. Level of education is barrier or facilitator for effective implementation of IPC in a Hospital setting (Tartari *et al*,2021). This finding is shown in similar studies conducted in Ethiopia in which 59.7% of the study participants had a diploma and another study in Ethiopia, 60.3% of the health workers had a diploma, which were majority in both surveys (Assefa *et al*, 2020; Geberemariyam *et al*, 2018). However, in a similar study at a hospital in South Africa a large proportion of participants (46.6%) did not possess a diploma or degree (Moodley *et al*, 2021).

Most of the study participants were nurses (73.7%) in this study. This finding is common in most studies conducted in Sub-Saharan Africa to assess knowledge, attitude, and practices of health workers towards IPC (Alhumaid *et al*, 2021, Storr *et al*, 2017, Desta *et al*, 2018, Gabasa *et al*, 2020, Assefa *et al*, 2020, Govha *et al*, 2021, Moodley *et al*, 2021). In addition, nurses are the majority health workers in any health facility in Zimbabwe (Boniol *et al*, 2019). Since there are the majority, to assess the knowledge, attitudes, and practices of health workers it would be prudent if they constitute the highest proportion as shown in this study.

Work experience as a socio-demographic factor is essential in assessing health worker knowledge, attitudes, and practices towards IPC. In this study majority (51.8%) of health workers had more than 10 years' work experience. This is a similar finding in a study done by Gabasa *et al* (2020), in Zimbabwe, Manicaland Province to assess health worker knowledge, attitudes, and practices towards IPC in a rural mission hospital, in which participants with more than 10 years' experience constituted 41.4% being the majority. In contrast, in a similar study in Ethiopia majority (60.9%) of the study participants had 0-9 years' work experience (Bayleyegn *et al*, 2021). In addition, in a study done at a teaching hospital in Ghana, the majority (73.7%) of the study participants had between 0-9 years of working experience (Alhassan *et al*,2021).

The type of employment whether contract or full time plays a key role in determining knowledge, attitudes, and practice of health workers towards IPC. In this study almost all (95.6%) of the participants were full-time employees. This study finding is similar to what was revealed in a cross-sectional survey on knowledge, attitudes and practices of nurses towards IPC conducted in Zambia, in which the highest proportion (88.3%) of nurses were full-time employees (Chisanga, 2017).

The ward or department the health worker works in is an important socio-demographic characteristic in assessing their knowledge, attitudes, and practices towards IPC. Health workers working in the outpatient department contributed the highest number of the study participants (34%). This finding concurs to what was revealed in a study conducted in Ethiopia by Assefa *et al* (2020), majority (29.8%) of the study participants were working in outpatient department.

According to Boniol *et al* (2019), in a rural hospital the department with highest workload is outpatient's department and usual has the highest proportion of health workers stationed. Therefore, when assessing health worker knowledge, attitudes, and practices in a rural mission hospital most study participants are likely to be from that department.

Majority of the study participants (59.6%) had been trained on IPC. The IPC trainings included lectures, practical sessions, and mentorship, these were used to improve health worker knowledge, attitude, and practices towards IPC. The assessment of whether study participants were trained on IPC is a vital socio-demographic characteristic for such a survey. Rowe *et al* (2018), argue that training in IPC conjunction with other strategies such as teamwork, effective management skills, good infrastructure support and supervision, could improve healthcare worker knowledge, attitudes, and practices towards IPC. In addition, this is shown in studies conducted in Ethiopia, Ghana, South Africa, Nigeria, Zambia, and Zimbabwe in which all of them prior training in IPC was one of the socio-demographic characteristics explored (Assefa *et al* ,2020; Desta *et al* ,2018; Alhassan *et al* ,2021, Govha *et al*, 2021, Geberemariyam *et al*, 2018; Adeke *et al*, 2021; Moodley *et al*, 2021, Chisanga,2017). However, there are similar studies in which prior IPC trainings were not part of the socio-demographic characteristics. These are shown in two studies done in Ethiopia by Yazie *et al* (2021) and Kassie *et al* (2020) in which prior IPC training although important as socio-demographic characteristic were not considered. Furthermore, in another similar study in Nigeria by Ukwenya *et al* (2021) prior IPC training was not included in the socio-demographic characteristics.

5.3 Knowledge related to IPC

Knowledge on IPC is one of the most important strategies in hospitals. In this study, the proportion of health workers who were knowledgeable about IPC was found to be 92%. This finding revealed that majority of the health workers in the hospital were knowledgeable on IPC, a finding in line with similar and related studies in Ethiopia in which 90% of the health workers were had adequate knowledge on IPC (Bayleyegn *et al*, 2021). In addition, in another study in Ethiopia the knowledge score of health workers was 84.6% (Desta *et al*, 2018).

This finding is exceptional higher than in a similar study in Zimbabwe at Goromonzi District in which the knowledge score for health workers on IPC was 47% (Govha *et al*, 2019). In a related study in South Africa, it was 67.4% which is less as compared to the finding in this study (Moodley *et al*, 2021). In another study in South Africa, it was found that 42.7% of health workers had poor knowledge on waste management which is component of IPC which is less than what was found in this study (Olaifa *et al*, 2018). In addition, in a similar study in Ethiopia the findings showed 70.8 % of the study participants were knowledgeable (Assefa *et al*, 2020). Furthermore, in Uganda in a similar study of health worker knowledge, attitudes, and practices towards IPC the knowledge score was 69 % which is relatively low to what was

found in this study (Olum *et al*, 2020). These differences might be due to variations in sample size, the sampling technique used in the various studies, in service trainings on IPC and other sociodemographic differences.

5.4 Attitudes related to IPC

Positive health worker attitudes towards IPC are important in health facilities. In this study, it was revealed that 77% of health workers had positive attitudes towards IPC. The finding indicates most health workers in the hospital had positive attitude towards IPC, a finding which was revealed in a related study in Ethiopia which was 75.7% (Kassie *et al*, 2020). This finding is similar to what was revealed in another study in Uganda in which the positive attitude score was 78.4% (Kamacooko *et al*, 2021).

This finding is better than in a study done in Zimbabwe at Mutasa District in which the positive attitude score for health workers on IPC was 50% (Gasaba *et al*, 2020). In a similar inquiry in South Africa, in a study on IPC attitudes of health workers whilst caring for clients with COVID-19 the score was 50.7% which is relatively lower than findings in this study (Moodley *et al,* 2021). According to Olaifa *et al* (2018), in another study in South Africa it was revealed 54% of the health workers had positive attitudes towards waste management a key component of IPC. In addition, in Trinadad and Tobago it was found that only 47.7 % of health workers had positive attitudes to IPC (Unakal *et al*, 2017) and in another study in Uganda health workers who had a positive attitude towards IPC were 26% (Olum *et al*,2020). Furthermore, in Ethiopia the positive attitude score was 57.2 % (Bayleyegn *et al*, 2021). These differences might be due to variations in sample size, the sampling technique used in the various studies and the socio-demographic characteristics.

5.5 Practices related to IPC

The proportion of health workers who were practicing acceptable IPC was 74% which is comparable with a study conducted in an Ethiopian hospital in which 66.1% of the health workers were practising safe IPC (Sahiledengle *et al*, 2018). However, this is much high than in a study done by Gabasa *et al* (2020), which showed that 50% of the health workers had acceptable IPC practices at rural hospital in Mutasa District, Zimbabwe.

Desta *et al* (2018) in Ethiopia also showed that 57.3% of the health workers had acceptable IPC practices which is less as compared to this study. Moodley *et al* (2021) revealed that 51.3% of health workers in a hospital in South Africa were practising safe IPC activities and it is relatively low as to what was shown in this study. Furthermore, according to Assefa *et al*

(2020), in a study in Ethiopia which revealed that health workers practicing acceptable IPC were 55% which is lower than what was shown in this study. This discrepancy in the findings might be due to a difference in knowledge of towards IPC, the different methodologies used in the studies, sample size differences, sociodemographic differences and suboptimal IPC supplies leading professionals' nonadherence to IPC activities.

5.6. Factors associated with knowledge of healthcare worker about IPC

In this study health workers who were older (40 years and above) were about 7 times more likely to be knowledgeable on IPC when compared to those younger (OR 7.474 95% CI [0.807-69.525]). This finding is in line with other studies in Sub Saharan Africa which revealed similar significant association (Alhumaid *et al*, 2021, Desta *et al*, 2018, Alhassan *et al* ,2021, Moodley *et al*, 2021). This might be attributed to that as the health workers advance in age, they are more likely to upgrade their knowledge through experience (Desta *et al*, 2018; Alhumaid *et al*, 2021; Lein *et al*, 2018). The differences in the findings and similar studies might be due to sample size, sampling technique used, study participant socio demographic differences and misreporting or self-reporting bias.

5.7. Factors associated with positive attitudes of health towards IPC

In this study the was no significant association between the socio-demographic factors and positive attitudes towards IPC amongst health workers at St Annes Mission Hospital, Mangwe District, Zimbabwe. This finding was also shown in a similar study done in Uganda (Olum *et al*, 2020). This is in contrast with other studies done in Africa and Europe which showed significant association of positive attitude of health workers and various socio-demographic factors including age, gender, level of education, category of health worker, work experience, working department/ward, and training on IPC (Olaifa *et al*, 2018; Assefa *et al*, 2020; Rosi´nski *et al*, 2019; Ganda *et al*, 2015).

5.8. Factors associated with acceptable practice of health workers towards IPC

Health workers who were older (40 years and above) were about 2 times more likely to practice acceptable IPC when compared to those younger (OR 1.995 95% CI [0.789-4.985]). This is in line with following studies which revealed similar association between advanced age and acceptable IPC practice amongst health workers (Alhumaid *et al*, 2021; Aloush *et al*, 2018, Assefa *et al*, 2020). Regarding educational level, health workers with an educational level of diploma and above were 3 times (OR = 2.618, 95%, CI = [(0.836-3.408)]) more

likely to practice acceptable IPC than those with lower than diploma level of education. This significant association of higher educational level of diploma and above with acceptable IPC practice is also shown in these studies in Ethiopia (Desta *et al*, 2018; Assefa *et al*, 2020).

Furthermore, the study showed, health workers that are experienced (4 to above 10years work experience) were two times more likely to practice acceptable IPC as compared to those less experienced (less than 1 year to 3years work experience) (OR = 2.44, 95%, CI = [1.042-5.738]). This significant association is shown in similar a study done in Zimbabwe at Parirenyatwa Hospital (Mugauri *et al*,2018). Furthermore, the findings concur with other studies done in Sub Saharan Africa that revealed similar associations (Barrera-Cancedda *et al*,2019; Engeda &Abdo 2017; Aloush *et al*, 2018, Desta *et al*, 2018).

5.9. Correlation between the variable's knowledge, attitudes, and practices

In the study it was revealed, there was a significant positive linear correlation between knowledge and attitudes. In addition, there is significant positive linear correlation between knowledge and practices. As a result, with improved knowledge the attitudes of health workers towards IPC improves. In addition, with improved knowledge the practices can also be improved. This finding concurs to a study done in India on knowledge, attitudes, and practices of health workers on IPC in Dental clinic, in the inquiry there was a positive correlation between knowledge scores and positive attitudes and acceptable practices (Bains *et al*, 2020). According to Geberemariyam *et al* (2018), in a similar study in Ethiopia they revealed a positive linear correlation between health workers IPC knowledge score and the practice score with a Pearson correlation coefficient of 0.703 ($p < 0.001$).

5.10. Limitations of the study

Although exhaustive efforts had been made to minimize the possible shortcomings of this study, the findings could not be interpreted in the absence of some inevitable limitations. According to Setia (2016), the cross-sectional nature of this study will make it difficult to form a temporal relationship between the outcome and predictor variables. Health workers might not give true and genuine responses on an online questionnaire, preferring to provide more socially acceptable responses than their actual do on a day-to-day practice leading to social desirability bias (Ehrenberg & Bound, 1993). Evidence has been shared in literature showing differences between self-reported IPC practices and direct observation (Al-Wazzan *et al*, 2011; Oliveira *et al* ,2017). Additionally, the findings of the study are only limited to a public hospital therefore affecting generalisation of findings. Furthermore, due to the sampling method used there is a possibility of under- or over-representation of the population,

and they may be biased results, due to the reasons why some people might choose to take part, and some not (Glen, 2019). Moreover, data obtained from the non-probability sampling strategy may not be easily generalisable.

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

This chapter presents the summary and interpretation of the research findings of the assessment of knowledge, attitudes, and practices amongst health workers towards IPC in Mangwe District, Zimbabwe. It also points out, the proposed recommendations from the study. Additionally, a conclusion of the study is outlined. Finally, the contribution of the study is shared.

6.2. Knowledge of health workers towards IPC

The first objective of the study was to determine the knowledge of health workers on IPC at St Annes Mission Hospital, Zimbabwe. The goal of reducing the burden of hospital acquired infection lies on effective implementation of IPC by health workers on every encounter with patients (Alhumaid *et al*, 2021). Adequate knowledge on IPC amongst health workers is one of the most important interventions to halt the spread of HAIs worldwide (Nasiri *et al*, 2019).

In the study, 92% of the health workers were knowledgeable on IPC and the findings are like a related study in Ethiopia in which 90% of the health workers were knowledgeable on IPC (Bayleyegn *et al*, 2021). Noticeable, in the study advanced age was significantly associated with being knowledgeable in IPC. Therefore, to improve and maintain health worker knowledge on IPC; trainings in IPC conjunction with other strategies such teamwork, effective management techniques, good infrastructure, support and supervision are suggested (Rowe *et al*, 2018).

6.3. Attitudes of health workers towards IPC

The second objective of the study was to determine the attitudes of health workers towards IPC at St Annes Mission Hospital, Zimbabwe. However, in Africa negative attitudes amongst health workers can lead to suboptimal implementation of IPC leading to HAIs (Nasiri *et al*, 2019; Labi *et al*, 2019; Alhumaid *et al*, 2021). In this study, the proportion of health workers who had positive attitudes towards IPC was 77%. The finding indicates most health workers in the hospital had positive attitude towards IPC, a finding which was revealed in a related study in Ethiopia in which it was 75.7% (Kassie *et al*, 2020). This finding contrasts with a study done in Zimbabwe at Mutasa District in which the positive attitude score for health workers on IPC was 50% (Gasaba *et al*, 2020). Moreover, in the study it was shown there was a significant positive correlation between knowledge and attitudes. Therefore, improving

health worker knowledge through trainings may lead to improved attitudes towards IPC (Rowe *et al*, 2018).

6.4. Practices of health workers towards IPC

The third objective of the study was to determine IPC practices among St Annes Mission Hospital health workers. Alhumaid *et al* (2021) argue that unacceptable health worker practices are a barrier to IPC implementation. In this study, the proportion of health workers who were practicing acceptable IPC was 74% which is comparable with a study conducted in an Ethiopian hospital in which 66.1% of the health workers were practising safe IPC (Sahiledengle *et al*, 2018).

The health worker acceptable practices towards IPC were significantly associated with advanced age, more work experience and higher level of education. This significant association is shown in similar a study done in Zimbabwe at Parirenyatwa Hospital (Mugauri *et al*,2018). In addition, the findings concur with other studies done in Sub Saharan Africa that revealed similar associations (Barrera-Cancedda *et al*,2019; Engeda &Abdo, 2017; Aloush *et al*, 2018, Desta *et al*, 2018). Moreover, there was a positive correlation between being knowledgeable and practising acceptable IPC. Therefore, improving health worker knowledge through mentorship, more work experience and higher level of education may lead to improved health worker practices towards IPC leading to a decline in hospital acquired infections.

6.5. Conclusion

The study has demonstrated that 92% of health workers were knowledgeable about IPC, 77% had positive attitudes towards IPC and 74% were practicing acceptable activities towards IPC. Advanced age as socio-demographic factor was significantly associated with being knowledgeable on IPC. Noticeable, there was no significant association between positive health worker attitudes and the socio demographic factors explored in the study. In addition, there was significant association between acceptable IPC practices with the following socio-demographic factors: advanced age, higher level of education and more working experience. Furthermore, the study revealed a significant positive linear correlation between high knowledge scores, positive attitudes, and acceptable practices.

6.6. Recommendations

Based on the information obtained from this study, the researcher makes the following recommendations related IPC to the Minister of Health and Child Care, health worker

training schools, Health worker regulatory councils, Provincial Medical Directorate, District Health Management team, St Annes Mission Hospital management, and researchers

- **Minister of Health and Child Care**

The Minister of Health and the Permanent Secretary to allocate ample resources for IPC. According to Bwalya (2021), on the policy briefing targeting SADC countries and the pledges as per Abuja declaration, it seems Zimbabwe has never achieved 15% annual budget allocation to the Ministry of Health and Child Care since 2001. Bwalya (2021) recommends the strengthening existing domestic resource-generation mechanisms (such as tax compliance) to improve countries' fiscal position and improve budget allocation to health and in turn to support IPC. Furthermore, to avert the negative effects of low resource mobilisation and allocation, there is need for the Minister to educate our political leaders on the benefits of IPC and the effects of budget cuts on health outcomes including IPC activities (Rowe *et al*, 2018).

- **Provincial Medical Directorate**

To ensure that the resources allocated for IPC are not deviated to other things at facilities including St Annes Mission Hospital. This can be achieved by performing support and supervisory at the hospitals. It is argued by Sahiledengle *et al* (2021) that spot checks coupled with support and supervision can enhance proper resource management towards IPC. In this study, 41.6% of the health workers had not attended training/workshops related to IPC. The researcher further recommends for resources to be allocated for IPC conferences locally and internationally. This will assist the IPC teams and committees get the latest information on IPC.

- **Health worker training schools**

According to the current study, the younger health workers who have been recently graduated were less knowledgeable towards IPC. In addition, younger health workers and health workers who are less experienced who according Chirwa *et al* (2016) are mainly recently qualified cadres were practising unacceptable IPC practices. In line with stated findings, the

researcher recommends the health worker training schools to emphasise the importance of IPC in their curricula and training programs for students before deployment post training.

- **Health worker regulatory councils**

In a study done in Uganda in similar setting it was found that health worker trainings as part of continuous professional development spearheaded by their regulatory authorities and councils was significantly associated with acceptable IPC practices (Seruwagi *et al*, 2021). In the study, it was revealed there was a positive linear correlation between knowledge and practice. Rowe *et al* (2018), argued that knowledge in IPC is advanced through trainings. The researcher recommends the inclusion of IPC training as part of the continuous professional development of health workers yearly.

- **District Health Management team**

The researcher further recommends to the district team to facilitate in trainings or retraining of health workers on IPC conjunction with other strategies such as teamwork, improved management skills, improved IPC commodity supply, proper infrastructure, support, and supervision (Rowe *et al*, 2018). This recommendation is to improve knowledge, attitudes and practices towards IPC targeting the younger cadres, health workers with a lower education level (Certificate level and below) and less experienced.

- **St Annes Mission Hospital facility management**

Alhumaid *et al* (2021), argue that establishing vibrant IPC committees at hospital who monitor rates of hospital acquired infections (HAIs) will enhance effective and efficient IPC. The researcher recommends the establishment of a proactive IPC champions at St Annes Mission Hospital to which will be involved quantifying the rate of HAIs and provide feedback to facilitate interventions timely. The study revealed that only 8.8% of the health worker who participated in the study indicated they always participate in monitoring HAIs rates and provide feedback to other departments. Hence the above stated recommendation.

- **Researchers**

The researcher is recommending the below mentioned research topics on IPC.

- The Barriers affecting compliance to IPC measures among health workers at Rural Health facility level.
- Research on the IPC policy implementation at health facility level

The impact of the shortage of health workers on IPC.

- A study to measure the prevalence of hospital acquired infections in Zimbabwe.
- Qualitative research on behavioural factors leading suboptimal IPC implementation.
- IPC amid COVID-19

6.7. Contributions of the study

This study has outlined important findings about the knowledge, attitudes, and practices of health workers towards IPC in Mangwe District, Zimbabwe. This study determined the knowledge of health workers towards IPC. In addition, the attitudes of the health workers towards IPC were determined. Furthermore, the practices of the health workers towards IPC were assessed. These findings will assist the facilities to design and develop of targeted interventions for health workers knowledge, attitudes, and practices in IPC. It also highlighted out important areas on which health workers need to focus on IPC implementation in a clinical setting. Additionally, the study will provide some important information to policy makers, provincial health managers, district health managers, facility managers, and other key stakeholder involved in IPC and health systems strengthening in Zimbabwe and Mangwe in particular. Furthermore, the study will contribute on the research body on IPC in Zimbabwe and worldwide.

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APPENDICES

Appendix 1: Participant's information sheet

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa
Tel: +27 21 959 2809 Fax: 27 21 959 2872
E-mail: soph-comm@uwc.ac.za

INFORMATION SHEET

Project Title: Knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe.

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What is this study about?

This is a research project being conducted by Langalokusa Sibanda at the University of the Western Cape for a mini thesis for a Master's in Public Health. We are inviting you to participate in this research project because you are a health worker at St Annes Mission Hospital working in the clinical environment. The purpose of the study is to assess knowledge, attitudes and practices on infection prevention and control (IPC) among health workers at St Annes Mission Hospital. The study will contribute to the gap in research on IPC in Zimbabwe. The study will benefit the IPC programme in Mangwe district, Matabeleland South province and Zimbabwe. It will also contribute to the development of effective strategies to reduce hospital acquired infections.

What will I be asked to do if I agree to participate?

If you express interest in the study, an appointment will be set for data collection. During data collection visits, an informed consent form will be signed after more information is provided and full understanding of the study is ensured. Thereafter, a structured questionnaire will be administered by the Principal Investigator for about thirty (30) to forty-five (45) minutes. The questionnaire will be in English. However, the Principal Investigator will respond and explain any questions from those participants who do not understand some of the English words in the questionnaire. The research will be conducted in your working clinical area at St Annes Mission Hospital. The questions in the questionnaire will include questions on demographic

characteristics. The questions also include questions on your knowledge, attitudes and practices in infection prevention and control in your workplace.

Would my participation in this study be kept confidential?

The researchers undertake to protect your identity and the nature of your contribution. To ensure your anonymity, your name will not be included on the survey and other collected data. The questionnaire will be coded through an identification number and I will be able to link the survey to your identity. Only the researcher will have access to the identity key and access to data. To ensure your confidentiality, the completed questionnaires will be kept in locked filling cabinets and storages facilities. The data will entered and stored in password-protected computer files. If we write a report or article about this research project, your identity will be protected.

In accordance with legal requirements and/or professional standards, we will disclose to the appropriate individuals and/or authorities information that comes to our attention concerning child abuse or neglect or potential harm to you or others. In this event, we will inform you that we have to break confidentiality to fulfil our legal responsibility to report to the designated authorities.

What are the risks of this research?

There may be some risks from participating in this research study. All human interactions and talking about self or others carry some amount of risks. We will nevertheless minimise such risks and act promptly to assist you if you experience any discomfort, psychological or otherwise during the process of your participation in this study. Where necessary, an appropriate referral will be made to a suitable professional for further assistance or intervention. There is no anticipated harm in this study; however, participants will have access to a psychologist or psychological counsellor should they experience a discomfort during the administration of the questionnaire

What are the benefits of this research?

This research is not designed to help you personally, but the results may help the investigator learn more about factors associated with infection prevention and control practices amongst health workers. We hope that, in the future, other people might benefit from this study through improved understanding of the factors associated with infection prevention and control amongst health workers.

Do I have to be in this research and may I stop participating at any time? Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

What if I have questions?
This research is being conducted by Langalokusa Sibanda who is in the School of public health at the University of the Western Cape. If you have any questions about the research study itself, please contact Langalokusa Sibanda at: Plumtree district hospital, Plumtree , Matebeleland South Province, Zimbabwe; +263772101461; langadawu3@gmail.com .

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof Uta Lehmann
Head of Department: School of Public Health
University of the Western Cape
Private Bag X17
Bellville 7535
ulehmann@uwc.ac.za

Prof Anthea Rhoda
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BIOMEDICAL RESEARCH ETHICS ADMINISTRATION
Research Office
University of the Western Cape
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This research has been approved by the University of the Western Cape's Biomedical Research Ethics Committee . (REFERENCE NUMBER: to be inserted on receipt thereof)

Appendix 2: Consent Form

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa
Tel: +27 21 959 2809 Fax: 27 21 959 2872
E-mail: soph-comm@uwc.ac.za

CONSENT FORM

Title of Research Project: Knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe.

Principal Investigator- Langalokusa Sibanda
Phone number(s) +263772101461

What you should know about this research study:

- We give you this consent so that you may read about the purpose, risks, and benefits of this research study.
- Routine care is based upon the best-known treatment and is provided with the main goal of helping the individual patient. The main goal of research studies is to gain knowledge that may help future patients.
- We cannot promise that this research will benefit you. Just like regular care, this research can have side effects that can be serious or minor.
- You have the right to refuse to take part or agree to take part now and change your mind later.
- Whatever you decide, it will not affect your regular care.
- Please review this consent form carefully. Ask any questions before you make a decision.
- Your participation is voluntary.

PURPOSE

The purpose of the study is to assess knowledge, attitudes, and practices on IPC among health workers at St Annes Mission Hospital. The study will contribute to the gap in research on IPC in Zimbabwe. The study will benefit the IPC programme in Mangwe district, Matabeleland South Province, and Zimbabwe. It will also contribute to the development of effective strategies to reduce hospital acquired infections. Additionally, the study will contribute to the improvement in patient and health worker safety. The findings of the study will be used by health workers in St Annes Mission Hospital and by policy makers in healthcare

delivery in Zimbabwe for health systems strengthening. The approximate number of participants to be included in the study are 260 all in St Annes Mission Hospital, Mangwe District, Matabeleland South Province, Zimbabwe_____

PROCEDURES AND DURATION

If you express their interest in the study, a structured pre-tested questionnaire will be administered by the PI for about thirty (30) to forty-five (45) minutes. The questionnaire will be in English, which is mostly understood by the health workers in Zimbabwe. However, the PI will respond and explain any questions from those participants who do not understand some of the English words in the questionnaire

RISKS AND DISCOMFORTS

There may be some risks from participating in this research study. All human interactions and talking about self or others carry some amount of risks. We will nevertheless minimise such risks and act promptly to assist you if you experience any discomfort, psychological or otherwise during the process of your participation in this study. Where necessary, an appropriate referral will be made to a suitable professional for further assistance or intervention. There is no anticipated harm in this study; however, participants will have access to a psychologist or psychological counsellor should they experience a discomfort during the administration of the questionnaire.

[RISKS TO PREGNANT WOMEN] Not applicable

BENEFITS AND/OR COMPENSATION

This research is not designed to help you personally, but the results may help the investigator learn more about the knowledge, attitudes and practises regarding infection prevention and control amongst health workers in Mangwe District. We hope that, in the future, other people might benefit from this study through improved understanding of the infection prevention and control among health workers in Mangwe District. We cannot promise that you will receive any benefits from this study.

ALTERNATIVE PROCEDURES OR TREATMENTS: NOT APPLICABLE

CONFIDENTIALITY

If you indicate your willingness to participate in this study by signing this document, we plan to disclose to Matabeleland South Provincial Medical Directorate and the information will be disclosed to assist the health workers at St Annes Mission Hospital in improving infection prevention and control practices. Any information that is obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission.

To ensure your anonymity, your name will not be included on the survey and other collected data. Study identity numbers will be used which will be assigned to participants like HW1 for the first health worker. The completed questionnaires and the consent forms will be filed separately to keep confidentiality and not link the two, securely locked in the office of the researchers where they are based, only accessed by the Principal Investigator. Data will be stored for five years after completion of the study and then destroyed as per standard research

ethics practices. The data will be entered and stored in password-protected computer files. If we write a report or article about this research project, your identity will be protected.
Under some circumstances, the MRCZ may need to review patient records for compliance audits.
ADDITIONAL COSTS: No additional costs are anticipated for the participants.

IN THE EVENT OF INJURY

In the event of injury resulting from your participation in this study, treatment shall be offered by the study.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your future relations with Matabeleland South Health facilities, its personnel, and associated hospitals**.** If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty.

ADDITIONAL ELEMENTS

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.
What if I have questions?
This research is being conducted by Langalokusa Sibanda who is an Masters Student with University of the Western Cape, South Africa. If you have any questions about the research study itself, please contact Langalokusa Sibanda at: Change this address number 92 Neqi Township, Harrisvale , Bulawayo, +263772101461, langadawu3@gmail.com .
Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:
Prof Uta Lehmann
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SIGNATURE PAGE

Project Title: Knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe.
Protocol Version Number/date

OFFER TO ANSWER QUESTIONS

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

AUTHORIZATION

You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

_____ _____

Name of Research Participant (please print) Date

_____ _____

Signature of Participant or legally authorized representative Time

_____

Relationship to the Participant

[the above two lines should appear on forms signed by legal representatives of the participant, for example the parents of a minor.]

_____ _____

Name of Staff Obtaining Consent Signature Date

_____ _____

Name of Witness (*if required)* Signature Date

YOU WILL BE OFFERED A COPY OF THIS CONSENT FORM TO KEEP.

If you have any questions concerning this study or consent form beyond those answered by the investigator, including questions about the research, your rights as a research participant or research-related injuries; or if you feel that you have been treated unfairly and would like to talk to someone other than a member of the research team, please feel free to contact the Medical Research Council of Zimbabwe (MRCZ) on telephone (04)791792 or (04) 791193 and cell phone lines 0784 956 128. The MRCZ Offices are located at the National Institute of Health Research premises at Corner Josiah Tongogara and Mazowe Avenue in Harare.

Appendix 3: Questionnaire

QUESTIONNAIRE

TITLE OF THE STUDY: Knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe.

Section 1: Socio-demographic information

Number	Question	Responses		Skip
Q1	What is your gender?	Male	1	
		Female	2	
Q2	How old are you?	< 29 years	1	
		30 – 39 years	2	
		40 – 49 years	3	
		> 50 years	4	
Q3	What is your marital status?	Single	1	
		Married	2	
		Widowed	3	
		Separated	4	
		Other (Specify)	5	
Q4	What is level of education?	Secondary level	1	
		Certificate level	2	
		Diploma	3	
		Undergraduate Degree	4	
		Post graduate degree	5	
Q5	What is your category as a health worker?	Doctor	1	
		Registered general nurse	2	
		Primary care nurse	3	
		Nurse aide	4	
Q6	How many years have you practised as health worker?	<1 year:	1	

		1-3 years:	2	
		4-10 years:	3	
		>10 years:	4	
Q7	What is your employment status?	Full time	1	
		Contract	2	
		Locum	3	
Q8	Which ward are you currently based in?	General ward	1	
		Surgical ward	2	
		Gynaecological	3	
		Post natal ward	4	
		Maternity ward	5	
		Children's ward	6	
		Causality theatre	7	
		Main theatre	8	
		Out patients department	9	
Q9	How long have you worked in the current department?	0 - 2 years	1	
		2 - 4 years	2	
		5 - 10 years	3	
		> 10 years	4	
Q10	Do you have any service training in infection prevention and control?	Yes	1	
		No	2	Skip to Q13
Q11	If yes, can you please tell me the year you received			
Q12	How long was the training	Less than a day	1	

		1Day	2	
		2-6-Days	3	
		A Week	4	
		More than a week	5	

Section 2. Knowledge about Infection control and prevention.

Number	Statements	TRUE	FALSE	UNSURE
Q13	Hospital acquired infections (HAI's) can be transmitted by medical equipment such as syringes, needles, catheters, stethoscope, thermometers, etc.	1	2	3
Q14	Gloves cannot provide complete protection against transmission of infections	1	2	3
Q15	I know the World Health Organisation's '5 moments of hand hygiene.'	1	2	3
Q16	Washing hands with soap or use of an alcohol based antiseptic decreases the risk of transmission of healthcare acquired infections.	1	2	3
Q17	Use of an alcohol based antiseptic for hand hygiene is as effective as soap and water if hands are not visibly dirty.	1	2	3
Q18	Gloves should be worn if blood or body fluid exposure is anticipated.	1	2	3
Q19	Hand washing is necessary before procedures are performed.	1	2	3
Q20	Standard precautions on infection prevention and control apply to all patients regardless of their diagnosis.	1	2	3
Q21	Safety box should be closed/ sealed when three quarters filled.	1	2	3
Q22	All staff and patient should be considered potentially infectious	1	2	3
Q23	Masks and goggles are not necessary if procedure and patient care are likely to cause flushing of blood or exposure to deep body fluids.	1	2	3

Section 3. Attitudes towards infection control and prevention

Number	Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Q24	I do not have to wash hands if I used gloves	1	2	3	4	5
Q25	Policies and procedures for infection control should be adhered to at all times	1	2	3	4	5
Q26	I should attend in-service training/workshop related to infection prevention and control at least once per year	1	2	3	4	5
Q27	The workload affects my ability to apply infection prevention guidelines.	1	2	3	4	5
Q28	I am aware that patients expect me to wash hands before touching them and after touching them.	1	2	3	4	5
Q29	I feel that the infection control policies and guidelines are enough in the hospital.	1	2	3	4	5
Q30	It is not my responsibility to comply with the infection prevention and control guidelines.	1	2	3	4	5
Q31	Infection prevention and control guidelines are important to this hospital	1	2	3	4	5
Q32	I have enough time to comply with infection prevention guidelines	1	2	3	4	5
Q33	I believe that following the infection prevention and control guidelines will reduce rates of hospital acquired infection.	1	2	3	4	5
Q34	I should follow the procedure guidelines of the department	1	2	3	4	5

Q35	I feel that needles should be recapped after use and before disposal	1	2	3	4	5
Q36	Infection prevention and control does not improve patient outcomes	1	2	3	4	5

Section 4. Infection control and prevention practices

Number	Statements	Always	Sometimes	Never
Q37	Is a reliable water station with clean present and accessible for staff, patients and families at all times and in the wards?	1	2	3
Q38	Do you wash hands with soap and water before and after patient care?	1	2	3
Q39	Do you wash hands immediately when encountered unwanted contacted with blood fluids or contaminated items?	1	2	3
Q40	Do you dispose sharp materials in safety box?	1	2	3
Q41	I attend in-service training/workshop related to infection prevention and control yearly.	1	2	3
Q42	I Recap used needle before disposing.	1	2	3
Q43	Are containers available where needles or other sharps are disposed?	1	2	3
Q44	Is screening of patients being done to detect Hospital acquired infections in the department and a feedback on HAIs rates given to all departments?	1	2	3
Q45	Is vaccination is provided to health workers?	1	2	3
Q46	Are gloves easily accessible in the department?	1	2	3
Q47	Are gowns readily available in the department?	1	2	3
Q48	Are masks easily accessible in the department?	1	2	3
Q49	Are Double gloves worn during surgery in deep body cavities or other procedures in which gloves rips or punctures are likely?	1	2	3

Q50	Are the latest National Infection prevention and control guidelines available in your working areas?	1	2	3
Q51	Are standard operating procedures for IPC easily accessible in your department?	1	2	3
Q52	Do you use alcohol based antiseptic?	1	2	3
Q53	Does the department have waste management facilities?	1	2	3
Q54	Are hand washing facilities easy accessible in the department?	1	2	3
Q55	Is there an allocated budget specifically for the IPC programme?	1	2	3
Q56	Are you involved in both planning and executing the implementation of Standard operating procedures for IPC in the hospital?	1	2	3
Q57	Are appropriate staffing levels assessed in your department according to patient workload using national standards?	1	2	3
Q58	Do you have an IPC committee actively supporting the IPC team in your department?	1	2	3

Thank you for taking time off in a busy schedule.

Appendix 4: Approval letter from Medical Research Council of Zimbabwe

Telephone: 08644073772/791193
E-mail: mrcz@mrcz.org.zw
Website: http://www.mrcz.org.zw

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazowe Street
P. O. Box CY 573
Causeway
Harare

APPROVAL

MRCZ/B/2006 **20 May, 2020**

Langalokusa Sibanda
92 NEQI Township
Harrisvale
Bulawayo

RE: - Knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe

Thank you for the application for review of Research Activity that you submitted to the Medical Research Council of Zimbabwe (MRCZ). Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to conduct the above titled study.

This approval is based on the review and approval of the following documents that were submitted to MRCZ for review: -

1. Full protocol
2. Informed Consent forms
3. Data collection tools

- **APPROVAL NUMBER : MRCZ/B/2006**

This number should be used on all correspondence, consent forms and documents as appropriate.

- **TYPE OF MEETING : EXPEDITED**
- **APPROVAL DATE : 20 May, 2020**
- **EXPIRATION DATE : 19 May, 2021**

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ offices should be submitted three months before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING**: All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices or website.
- **MODIFICATIONS**: Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices or website.
- **QUESTIONS**: Please contact the MRCZ on Telephone No. (0242) 791193, 0864407377203 or by e-mail on mrcz@mrcz.org.zw

Other

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.
- In addition to this approval, all clinical trials involving drugs, devices and biologics (including other studies focusing on registered drugs) require approval of Medicines Control Authority of Zimbabwe (MCAZ) before commencement

Yours Faithfully

.....

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE

MEDICAL RESEARCH COUNCIL OF ZIMBABWE
2020 -05- 20
APPROVED
P.O. HRE CY 573 CAUSEWAY, HARARE

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

Appendix 5 UWC Ethics approval letter

UNIVERSITY of the WESTERN CAPE

60 YEARS of hope, action & knowledge

20 March 2020

Dr L Sibanda
School of Public Health
Faculty of Community and Health Sciences

Ethics Reference Number: BM20/1/12

Project Title: Knowledge, attitudes and practices regarding infection prevention and control among hospital health workers in Mangwe District, Zimbabwe.

Approval Period: 19 March 2020 – 19 March 2023

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report by 30 November for the duration of the project.

Permission to conduct the study must be submitted to BMREC for record-keeping.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Director: Research Development
University of the Western Cape
Private Bag X 17
Bellville 7535
Republic of South Africa
Tel: +27 21 959 4111
Email: research-ethics@uwc.ac.za

NHREC Registration Number: BMREC-130416-050

FROM HOPE TO ACTION THROUGH KNOWLEDGE.

Appendix 6 Approval letter from the Provincial Medical Director- Mat South

LANGALOKUSA SIBANDA

NUMBER 92

NEQI TOWNSHIP

HARRISVALE

BULAWAYO

PROVINCIAL MEDICAL DIRECTOR-MATABELELAND SOUTH PROVINCE

OLD MEMORIAL BUILDING

CORNER 11TH AVENUE/HERBERT CHITEPO STREET

BULAWAYO

ZIMBABWE

02 SEPTEMBER 2019

Dear Madam,

LETTER REQUESTING APPROVAL TO CONDUCT A STUDY AT ST ANNES MISSION HOSPITAL

The above refers;

I, Dr Langalokusa Sibanda, a student with the University of the Western Cape- School of Public Health, South Africa. I am currently doing a Masters in Public Health; in which as part of my studies I have to conduct a mini thesis. I am kindly seeking authority to conduct a study on the factors associated with infection prevention and control practices amongst health workers in St Annes mission hospital, Zimbabwe.

I have applied to the Biomedical Research Ethics Committee from the University of Western Cape- South Africa for ethical approval.

I would be very grateful if my request is considered.

Noted. Also proves MRCA approval. As PMD I have no objection.

Yours sincerely

Dr Langalokusa Sibanda.

PROVINCIAL MEDICAL DIRECTOR MATABELELAND SOUTH 03 SEP 2019 1st FLOOR NEW GVT. COMPLEX 3rd AVENUE

03/09/19