Compliance to intraoperative basic hygiene and patient safety culture in Maputo, Mozambique.
An observational study

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ABSTRACT

**Background:** Surgical site infections are commonly occurring within healthcare, especially in Africa. Good hygiene is the most effective way in which to reduce and prevent infection, compliance however is often low or insufficient.

**Aim:** The Aim of the study was to investigate intraoperative compliance to basic hand hygiene in the operating theatre, the secondary aim was to investigate views on patient safety in a developing country.

**Method:** The design is a quantitative observational study. Through participant observation information was gathered on compliance to basic intraoperative hygiene routines in operating theatres in Mozambique. Operating personnel were then asked to complete a survey on patient safety culture.

**Result:** None of the work elements were performed in complete compliance to WHO’s guidelines at all times. The operating theatre personnel’s views on Patient Safety Culture showed the highest percentage of positive responses was within “Teamwork Within Hospital Units” and the dimensions with the least positive response was “Nonpunitive Response To Error” and “Staffing”. A medium relation was found between compliance to basic hygiene and the results of the patient safety culture survey.

**Conclusions:** The results of the study implies compliance to basic hygiene during the intraoperative phase in the operating theatre in Mozambique, Maputo was insufficient. There was a medium strong relation between the staffs views on patient safety and their compliance to basic hygiene. This implies that working with the staff’s attitudes concerning patient safety could be one way of improving hygiene compliance resulting in reduced number of surgical site infections.

**Keywords:** Hygiene, hand-hygiene, compliance, operating theatre, patient safety culture
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1.1 INTRODUCTION

Millions of surgical procedures are performed worldwide every year, majority of surgical wounds heal without complications. The wound is brought together, secured and a wound dressing is applied to protect from bacterial contamination (Dumville, Walter, Sharp, & Page, 2011). However thousands of infections are recorded nationally every year post surgery. Making surgical site infections commonly occurring in healthcare, ranging from superficial skin infections to much more severe conditions some in fact life-threatening (Korol et al., 2013). In 2011 a review by the World Health Organisation (WHO) studying surgical site infections in low-income countries and Africa in particular found that the frequency of surgical site infections were shockingly high in comparison to high-income countries (Aiken et al. 2012).

1.2 History of hygiene

In 1855 Florence Nightingale stated that it was strange of hospitals to claim that their first requirement was that “it should do the sick no harm” (Ericson & Ericson 2009 p.10). At the time she had just returned to England where it was well known that the hospitals where more dangerous than the battlefields. Nightingale and her nurse colleagues had been caring for the English soldiers fighting the Crimean War, where conditions had been horrifying. The wounded soldiers were cramped together, maggots crawled in their wounds, the food was bad, water was contaminated and surgery was performed on the floor. All the patients suffered from diarrhea and they all had lice, (Ericson & Ericson 2009). The soldiers were dying from cholera and typhus rather than battle wounds. Nightingale believed that the problem was dirt, diet and drains, she set her nurses to clean up the hospital. Soap, fresh towels and linen was purchased (Fee & Garofalo, 2010). The soldiers were washed and their clothes cleaned, hygiene standards were drastically improved. The outcome of their actions was death rates being lowered from 42% to 2% (Ericson & Ericson 2009).

Further in mid- 1800 Ignaz Semmelweis a house officer in one of two obstetric clinics in Wien had observed the maternal mortality rates were considerably higher in one of the clinics compared to the other. He hypothesized that the reason mortality rates were high was due to contamination, where the doctors had gone from performing autopsies to delivering babies.
(WHO, 2009) His statement was considered upsetting, a doctor's hands could not be considered dirty. None the less Semmelweis recommended hands should be scrubbed and cleaned with chlorinated lime solution before all patient contact, as a result mortality rates drastically improved, from 16% to 2%. (WHO, 2009) Nightingale and Semmelweis both teach us that good hygiene has to be included in all patient care. This includes correctly executed hand hygiene care preventing the patient from being exposed to unnecessary risks of infection. (Kristoffersen, Nortvedt & Skaug, 2006) Making hand hygiene of great importance for health personnel, the patient, the individual and society as a whole.

1.3 Recommendations

Patients going into surgery may potentially already have several risk factors for infection (Fry, 2013) however preventive measures such as good hand hygiene compliance is a widely-recognised effective way in which to reduce infections (Lee, et al. 2014) and can therefore improve the patient's outcome after surgery (Fry, 2013). In an operating theatre much care is taken to maintaining sterility in the operating field but less attention is given to basic hand hygiene. Operating personnel frequently touch the patient, failing to apply correct hand hygiene before and after patient contact can lead to contamination to non-sterile surfaces or implements that may later cross-infect to another patient (Krediet, Kalkman, Bonten, Gigenback & Barach, 2011). Basic hygiene recommendations according to WHO in order to prevent infection are:

- Correct dress code in accordance with local policies, short sleeved scrub suit which are changed daily or more often if needed. No jewelry on underarms or hands this also includes no wristwatches.
- Hands should be cleaned with water and soap if visibly dirty.
- Hands should always be disinfected before and after all patient contact and before and after all glove use.
- Gloves should be used when there is a risk of contact with blood, non-intact skin, any type of body-fluid, excretion, secretion or mucous membranes. Gloves should be removed before contact with non-contaminated surfaces or objects.
A gown or an apron should be used in order to protect clothes from being soiled whenever doing activities likely to cause splashes of urine, blood or other body fluids.

Hygiene routines specific for intraoperative care according to WHO's guidelines for Safe Surgery (2009):

- Clean environment, operating theatres should be situated apart from the rest of the hospital to prevent spread of infection. Walls, floors and all surfaces kept clean with water and an alcohol-based solution.
- Ventilation; a well functioning and controlled ventilation system reduces airborne contamination and reduces airborne bacteria.
- Presurgical skin disinfection; the area planned for surgical incision must be cleaned with a disinfectant approved for presurgical skin preparation in order to significantly reduce the number of microorganisms and colony forming units.
- Sterile dressed personnel; surgical attire should consist of masks that cover both nose and mouth, hair-covering caps, surgical robes and sterile gloves.
- Guaranteeing the sterility of surgical instruments, all instruments used when entering body tissue must be sterilized, sterile instruments should be cleaned from all living microorganisms or the possibility of there being any remaining microorganisms are equal to or less than one in a million.
- Surgical draping, the area for incision should be surrounded by sterile surgical draping covering the patient completely.

1.4 Developing countries
Globally speaking there are big differences regarding infections and the possibility of treating them. Western society generally have good living conditions by having access to clean water controlled food, well functioning systems for health, hygiene and infection control (Kristoffersen, et al., 2006). Extremely low rates of hand hygiene have been documented in sub-saharan Africa, hand hygiene being one of the cornerstones in controlling infection (Schmitz, 2014). Implementing sustainable healthcare improvements is challenging in all sets but in low-
income countries examples of enforcing evidence-based practices is limited (Aiken, et al. 2013). Furthermore resources are limited, but surgery can still be performed at an acceptable level of care, it is however challenging, teamwork is of great importance and everyone must learn to work with the equipment that is available to them (Oludra, Nwiloh, Fabamwo & Adebola, 2014).

1.5 Patient safety culture

It is the theatre nurse responsibility to uphold a good standard of hygiene in the operating theatre to ensure the surgical procedure is performed in a safe manner, thus preventing and limiting postsurgical infections (Riksföreningen för operationssjukvård & svensk sjuksköterskeförening, 2011) Despite knowledge of the benefits of basic hygiene routines compliance often remains low among health personnel (Lee, et al., 2014). To understand why compliance remains low one must understand the staffs’ reason to follow or not to follow hygiene guidelines (Chavali, Menon & Shukla, 2014). A study done by Whitby, MvLaws & Ross (2006) describes an action such as handwashing behaviour as complex. Several theories have been developed in order to find a relationship between factors and its effect on health-related behaviour. One of these theories is the Theory of planned behaviour which describes a person's intention to perform a behaviour, in this case hygiene routines is predicted through three different variables (Whitby et al., 2006). Behavioral beliefs; beliefs on the outcome of the action and the evaluation of the outcomes, normative beliefs; beliefs on the normative expectation from others and the motivation to perform accordingly to them and lastly the control beliefs which is the beliefs of factors that may help or prevent the performance of the action (Javadi, Kadkhodae, Yaghoubi, Maroufi & Shams, 2013) These variables are created as a result from our biological characteristics, education, environment and culture and control the outcome of the behavior (Whitby et al., 2006).

The theory of planned behaviour can be linked to the patient safety culture, a specific aspect of the general organisational culture shaped by prevailing norms, values and beliefs in the organisation. (Nordin, Wilde-Larsson, Nordström & Theander, 2013) This culture within healthcare is shaped due to the leaders and co-workers attitudes and approach to patient safety.
Approaches and attitudes are mirrored in the safety within the ward or healthcare organisation and is often measured through questionnaires or surveys (Socialstyrelsen 2009).

1.6 Theoretical framework
A theoretical framework is used to organize and structure the study and can be used as guidelines in how to interpret the results (Henricson, 2012). The framework thought appropriate for implementation for this study is the so called PARIHS- model, Promoting Action on Research Implementation in Health Services. The framework is based on three cornerstones; evidence, context and facilitation. Evidence should be based on a combination of clinical experience and previous studies. The second cornerstone is context which implies the organizations’ possibility and condition to put the evidence into practice depending on leadership and understanding of the culture and the organization's routine and evaluation of healthcare process both individual and groups. Facilitation is the technique in which the information is implemented, the term aims to describe the way in which a person with knowledge and proficiency can help implement the evidence in their practice (Kitson, et al., 2008). The PARIHS- model can be used in several areas in nursing, in the operating theatre evidence in this study is studies proving that compliance to basic hygiene can prevent surgical site infections. Context is the condition under which the evidence is put into action, through observation and patient safety culture surveys the possibility to implement evidence can be studied. Facilitation being the technique in how it is implemented for example through educating operating staff of the consequences that inadequate hand hygiene may have for the patient and informing the personnel of how to implement correct basic hand hygiene.

1.7 Statement of the problem
Surgical site infections can be prevented, studies show that hand hygiene is not followed optimally in developing countries (Braimoh & Udeabor, 2013). Compliance to basic hand hygiene should therefore be prioritised in order to optimize patient safety, reason for performing these actions is affected by general culture but more specifically in health-care patient safety culture. Knowledge of reasons for basic hygiene guidelines not being performed in developing
countries must be studied and understood in order to improve patient safety and reduce infections.

1.8 Aim
The Aim of the study was to investigate intraoperative compliance to basic hand hygiene in the operating theatre, the secondary aim was to investigate views on patient safety in a developing country.

1. How is compliance to intraoperative basic hand hygiene performed in accordance with the guidelines in the operating theatre?
2. What are the operating theatre personnel’s views on Patient Safety Culture?
3. Is there a relation between compliance to basic hand hygiene and the results of the patient safety culture survey?

2.1 METHOD
Design
The design is a quantitative observational study, by using a structured protocol and a formal survey information will be gathered on compliance to intraoperative hygiene routines and views on patient safety (Polit & Beck, 2010).

2.2 Study participants
The study took place in a private hospital in Mocambique, Maputo. The population of the study was all the operating theatres personnel, a convenience sampling was used where all personnel present at the time of the observation were included (Polit & Beck, 2010), a total of 24 people were observed. 15 nurses both anesthetic and scrub nurses completed the patient safety culture survey, both male and female, between 26-67 years of age. Surgeons and anaesthesiologist did not partake in the patient safety culture survey, this due to permission not being granted to ask
surgeons and anesthesiologists to take part of the survey. The operating team consisted of 5-10 people depending on the procedure and included; scrub nurses, anesthetic nurses, anesthesiologists and surgeons. Scrub nurses education varied, some had nursing degrees with previous general nursing experience and had later been schooled as scrub nurses either in Europe in a one year training program, or in Mozambique where they were trained by scrub nurses with European degrees. Some of the staff didn’t have a nursing degree but had been trained to assist and instrument in surgery as scrub nurses. Scrub nurses would also act as assistant scrub nurses when needed.

2.3 Data collection
The observational protocol lists elements within pre- and intraoperative surgery, based on guidelines by Sweden’s municipalities and county councils handbook, where basic hygiene is important (Vårdsboken, 2013) After two pilot observations the protocol was slightly adjusted, spinal anesthetics was a common step within several surgeries and was therefore added to the protocol. The definition of hand hygiene and hygiene routines are based on the world health organizations guidelines (WHO, 2007) which were the same guidelines the hospital went by.

The Observational protocol
The protocol consists of the following 10 elements:
- Dress code in operating room
- Spinal anesthetics
- Insertion of peripheral venous catheter
- Anaesthesia procedures consisting of ventilation and intubation, drug administration and performance of transesophageal echocardiogram
- Insertion of urinary catheter
- Placing the patient in surgical position
- Intraoperative skin disinfection
- Surgical draping
- Intraoperative management of blood sampling, infusion set, swabs and drainage tubing
- Asepsis during the surgical procedure.
(See attachment 1)

During each element an observational protocol was checked, listing each important hygiene step within the element making sure they were followed in accordance with the guidelines, a summarized version of the protocol can be seen in attachment 1.

The Survey
The hospital survey on patient safety culture was created 2004 by the Agency for Healthcare Research and Quality (AHQR, 2015) and since then it has been used internationally in hundreds of hospitals. It is proven to be reliable in countries worldwide, in developed as well as developing countries such as Taiwan and Oman (Al-Mandhari et. al 2014). The Portuguese version has also been assessed and tested in order to ensure its validity after translation (Reis, Laguardia, Martins, 2012).

The Surveys 12 dimensions
1. Communication Openness
2. Feedback and Communication About Error
3. Frequency of Event Reporting
4. Hospital Handoffs & Transitions
5. Hospital Management Support for Patient Safety
6. Nonpunitive Response To Error
7. Organisational Learning—Continous improvement
8. Overall Perceptions of Safety
9. Staffing
10. Supervisor/manager expectations & actions promoting safety
11. Teamwork Across Hospital Units
12. Teamwork Within Hospital Units

Response alternative from 1 = strongly disagree to 5 = strongly agree;
Response alternative from 1 = never to 5 = always
2.4 Settings
The operating ward had three spacious operating theatres all very well cleaned by cleaning staff who cleaned according to a strict daily schedule. All theatres had ventilation with a laminar air flow system suited for performing surgical operations, however due to difficulty in maintenance not all ventilation monitors were functioning so they could be checked that they were in fact upholding operating theatre temperature, humidity and ventilation standards. Each theatre had four doors, one main sliding door leading to the operating ward from which the patient would enter, the second lead into an anteroom with a dedicated scrub area, the third into a middle room with storage space for instruments and the fourth was a back door leading into the sterile. Thus creating a closed circuit where the main door leading out into the operating ward would not have to be used during surgery. One small hand-disinfectant sanitizers was placed in the corner on top of a low cupboard, gloves in one or two sizes were placed on top of the same cupboard and on the anesthetics drug trolley.

Operating staff were dressed according to local dress policy with operating scrubs, shoe covers and scrub caps. Scrub nurses often used hairbands to guarantee hair did not fall out from the scrub cap. Nurses hands were kept clean from jewelry and nail polish, however surgeons and anesthesiologists often wore watches and or wore nail varnish. Procedure for insertion of a urinary catheter was listed in a protocol which was checked post every surgery. Prior to the patient entering the operating theatre a sterile table with all equipment needed for insertion of the urinary catheter including a long hemostat for skin disinfection was set up by the scrub nurse. The surgeon responsible for placing the catheter, would wash their hands before applying a plastic apron and sterile gloves. The protocol controlled the method of insertion, working as a quality check but also a reminder of how to correctly insert the urinary catheter according to hygiene guidelines.
2.5 Procedure
The observer was located in the operating theatre dressed according to the local policies dress code for operating staff. All surgical staff were informed of the observer’s participation and the aim of the study prior to each surgery. The observation started when the patient entered the theatre and finished when the dressing had been applied to the surgical wound. Notes were kept in an observational log and were noted during and directly after each surgery. Each participant was coded during observations in order to keep track of each participant whilst remaining anonymous and in order to later be matched to the patient safety culture survey. During a two week period, a total of 24 surgeries were observed, two observations were used as pilot observations in order to adjust the observational protocol, all surgeries where the observer was not present from the very beginning or could not stay for the whole time of the procedure were excluded from the study, this excluded three observations. A total of 19 surgeries were therefore used in this study.

During the second week of observation permission was granted by the theatre manager to ask operating personnel to fill in the patient safety culture survey. Due to all employed staff being a relatively small group surveys were personally handed out to all daytime personnel working that week during calm working hours, attached to each survey was a short informative letter of the study in portuguese (See english translation, attachment 3) Each survey was coded with a matching code as they had been coded in the observations. The surveys were completed both during working hours and in some of the staff’s own time. All surveys that had been handed out were collected 2 weeks after they had first been handed out. Surgeons and anesthetics did not partake in the hospital patient safety culture survey.

2.6 Data analysis
1. How is compliance to intraoperative basic hand hygiene performed in accordance with the guidelines in the operating theatre?

Data from the observational protocol was analysed using Statistical Package for Social Sciences (SPSS) When the whole team correctly performed an element in accordance with hygiene guidelines, compliance was rated as 100% thus being complete. The team’s compliance
percentage was rated as a whole, when guidelines were not followed as intended, compliance was rated as partial being between 99%-60% and if several steps in an element where not followed as intended giving the whole team a percentage of 60% or below compliance was rated as insufficient. Complete, partial and insufficient compliance will be ranked as 1, 2 and 3 these rankings will be used as 3 variables in order to analyze research question 3.

2. What are the operating theatre personnel’s views on Patient Safety Culture?
The answers to each question in the patient safety culture survey were compiled in their dimension and its amount calculated. The dimensions were answered on a scale of 1-5, ranging from strongly disagreeing with a statement to strongly agreeing, or never to always. The percentage and quota was calculated according to the instructions as written in the handbook “measuring patient safety culture” The amount of possible responses to each dimension was calculated followed by adding up the amount of positive responses within the dimension, divided by the amount of possible answers and multiplied with 100 (Socialstyrelsen 2009). The analysis shows which areas within the organisation could use improvements, the differences between between the different professions and most importantly the patient safety culture (AQHR).

3. Is there a relation between compliance to basic hand hygiene and the results of the patient safety culture survey?
Based on the results and analysis to research question 1 and 2, they were then compared to see if there is a relation between views on patient safety and the personnel's compliance to basic hygiene. This will be done by using Spearman correlation. Each dimension from the survey and will have a column and each person will get a average compliance score rating between 1-3, and each code (participant) will have a row. By examining and analysing the variables we will then be able to find if there is a relation between research question 1 and 2. The Results will then be interpreted according to Cohen's guidelines on a scale ranging from a small to large correlation (Pallant, 2005).
2.7 Ethical considerations
Researchers are obliged to avoid and prevent harm in studies with humans therefore participants should not be subjected to discomfort. To minimize the risk of participants feeling uncomfortable the researcher must be clear in explaining the purpose of the study. The study intends to benefit patients, by reducing suffering from surgical site infections, society and the participants themselves and all participants must be assured that the data and information they may provide will not be used against them in any way (Polit & Beck, 2010).

The study took place in a hospital that describes themselves as being designed with patients in mind, with wards designed with top of the line equipment to optimize patient safety and comfort. The study can hopefully be useful in developing safer patient care, however being observed can be perceived as being judged or scrutinized which could give the participants a negative view of the study. The information of the study was therefore pointed and emphasized that the study aims to benefit the patients and not to judge the staff of their actions. When operating staff did not agree to participate in the study, his or her wishes were respected.

3.1 RESULTS
Nineteen surgical procedures where observed consisting of cesareans, hysterectomies, amputations, cysts, tumors and fistula operations. The time of surgery varied from 20 minutes to five hours, with five to ten people in the operating theatre depending on the procedure.

3.2 Compliance to intraoperative basic hand hygiene performed in accordance with the guidelines in the operating theatre
The Observational protocol $n=19$

None of the work elements were performed in accordance to the hygiene guidelines according to WHO at all times (Table 1). Only three out of the nineteen observations had complete compliance to the dress code in the operating theatre, this due to watches, rings and nail polish.
often being used. Surgical masks were sometimes worn covering only the mouth leaving the nose exposed according to WHO 2009 both mouth and nose have to be covered in order to prevent microorganisms from the upper respiratory system to contaminate the patient's tissue, but also to protect oneself from splashes of blood or bodily fluids.

Insertion of peripheral venous catheter, spinal anaesthesia and anaesthesia procedures consisting of ventilation, intubation and drug administration were performed in partial and insufficient compliance, with no easy access to hand-disinfectant sanitizers this step was always flawed unless the caregiver went to the designated scrub area to wash hands before and after glove use. When inserting a urinary catheter compliance was complete in 8 out of 11 observations.

Whenever placing the patient in surgical position, the patient was encouraged to help out as much as possible therefore reducing the number of times the personnel had to physically touch the patient. When there was physical contact gloves were often used, counting as improper use of gloves since gloves should only be used when there is a risk of contact with blood, secret or other body fluids (WHO, 2009). But due to lack of hand-disinfectant sanitizers the staff often chose gloves in order to protect oneself from patient-staff contamination.

Intraoperative skin disinfection was performed in complete compliance in 14 out of 19 observed surgeries, when the element was not performed in compliance it was due to contamination. Surgical draping was also partial in 5 observations and complete 14, contamination did not occur in the same observations as the skin disinfection. Management of blood sampling, infusion set, swabs and drainage tubing was never performed in complete compliance. Asepsis during the surgical procedure was complete in 12 observations and partial in 7.

3.3 Operating theatre personnel’s views on Patient Safety Culture
Strengths in patient safety culture could be seen in the dimension “Teamwork Within Hospital Units” with the most positive responses, this dimension included questions regarding whether the staff supported and respected one another and if the staff worked together as a team when a lot of
work needed to be done quickly. “Organisational Learning- Continuous improvement” also received a high positive response, where the staff was asked if they felt they were actively trying to improve patient safety by making positive changes after mistakes were made and evaluating the changes of their effectiveness. “Frequency of event reporting” received 74% positive response, including questions such as how often mistakes that could potentially harm a patient are reported (Figure 1).

The weakest dimensions with the least positive responses was “Nonpunitive Response To Error” with 17%, suggesting staff often felt mistakes were held against them and that they worried mistakes they made were kept in their personnel file. The second dimension with the least positive responses was “Staffing” meaning the staff often felt they did not have enough staff to handle their workload, and that they often had to work harder and longer than was best for the patient.
3.4 Relation between compliance to basic hand hygiene and the results of the patient safety culture survey

The relation between the responses to the dimensions combined and the personnel's compliance to basic hygiene was investigated with Spearman's correlation coefficient, the relation was a negative medium correlation between the two variables (r=-.35, n=12 p=0.017) (Table 2.) Suggesting that there is a relation between the two, the higher the personnel rated patient safety the better their compliance to hygiene routines.

When comparing the dimensions individually to the operating theatre personnel's compliance to basic hygiene routines the strongest relation was seen between the 5th dimension in the patient safety hospital survey, “Hospital Management Support for Patient Safety” Spearman's rho=-.7 (r=-.70, n=12, p=0.008) This implies that the higher the staff rated the hospital management support for patient safety the better their compliance was.

A large and therefore strong relation was also found between “Communication openness” and compliance (r=.56, n=12, p=0.076), this relationship was a positive relation meaning that the higher the personnel rated communication openness the lower their compliance was.
Table 2. The relation between compliance to basic hand hygiene and views on patient safety culture

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Small (r=0.10 to 0.29)</th>
<th>Medium (r=0.30 to 0.49)</th>
<th>Large (r=0.50 to 1.0)</th>
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</thead>
<tbody>
<tr>
<td>Communication Openness</td>
<td>-</td>
<td>-</td>
<td>r=0.56</td>
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<tr>
<td>Feedback and Communication About Error</td>
<td>r=0.22</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Frequency of Event Reporting</td>
<td>r=0.13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hospital Handoffs &amp; Transitions</td>
<td>r=0.06</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Hospital Management Support for Patient Safety</td>
<td>-</td>
<td>-</td>
<td>r=0.70</td>
</tr>
<tr>
<td>Nonpunitive Response To Error</td>
<td>r=0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Organisational Learning—Continous improvement</td>
<td>r=0.04</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Overall Perceptions of Safety</td>
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<td>r=0.47</td>
<td>-</td>
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<tr>
<td>Staffing</td>
<td>r=0.03</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Supervisor/manager expectations &amp; actions</td>
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<td></td>
<td>r=0.33</td>
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<tr>
<td>Teamwork Across Hospital Units</td>
<td>r=0.13</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Teamwork Within Hospital Units</td>
<td>r=0.26</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
4.1 DISCUSSION
None of the work elements were performed in complete compliance to WHO’s guidelines at all times, proving that compliance to basic hygiene often falls short of acceptable standards (Bramioh & Udeabor 2013) The operating theatre personnel’s views on Patient Safety Culture showed the highest percentage of positive responses was the dimensions “Teamwork Within Hospital Units” and “Organisational Learning- Continuous improvement”. The dimensions with the least positive response was “Nonpunitive Response To Error” and “Staffing”. When comparing compliance to basic hygiene and the results of the patient safety culture survey a medium relation was found, where the staff who gave the most positive response to the survey also complied better to the WHO’s hygiene guidelines.

4.2 Result discussion
Compliance to basic hygiene guidelines was often insufficient, insertion of peripheral venous catheter, spinal anesthetics and anesthesia procedure where never performed in complete compliance in the observed procedures. Due to lack of available hand-disinfectant sanitizers in the operating theatre, staff could not sanitize hands prior or after completing each procedure, resulting in partial or insufficient compliance. Oludra, Nwiloh, Fabamwo & Adebola (2014) describe how performing surgery in countries where resources are limited as challenging, the staff must make use of the equipment that is available to them. Operating staff often wore gloves when placing the patient in surgical position in order to protect themselves and the patient from contamination, this is an example of using the available equipment at hand when hand-disinfectant sanitizers is not available. Even though by doing so glove use was in fact improper, since gloves should only be used when there is a risk of contact with blood, non-intact tissue or other body fluids (WHO, 2009).

Intraoperative skin disinfection, surgical draping and asepsis during procedure was however performed in complete compliance to the guidelines in several observations. Theatre nurses were skilled in maintaining a sterile environment, thus supporting the theory that much care is taken to maintain asepsis during procedures, but less to basic hand hygiene (Krediet, Kalkman, Bonten, Gigenback & Barach, 2011)
Compliance to hygiene when inserting a urinary catheter was partial in 3 and complete in 8 of the observations, reason for compliance being complete may have been a local protocol being followed, thus checking hygiene steps were followed as intended. Urinary tract infections caused by catheters is the most commonly acquired infections within hospitals. The most important step in preventing infections is correct insertion of the urinary catheter, wards or hospitals that introduce strict guidelines on prevention of catheter-associated urinary tract infection have been able to decrease the frequency urinary infections (Jain, Dogra, Mishra, Thakur & Loomba, 2015).

“Teamwork within hospital units” received the highest positive response out of all the dimensions in the hospital patient safety culture survey similar to the results of Nordin et al study performed in Sweden (2013) and Chen and Li study in Taiwan(2009). Well functioning teamwork contributes to safer patient safety on the other hand “Nonpunitive Response To Error” and “Staffing” had a very low positive response percentage also similar to studies in Taiwan (Chen and Li, 2009) meaning majority of the operating personnel found that they were not enough staff to handle the workload at hand. “Frequency of event reporting” received 74% positive response, reporting of events is an important factor in order to improve healthcare and prevent harm (Nabhan, et al. 2012). However the negative response “Nonpunitive response to error” meant staff often feel like their mistakes are held against them and that staff worry mistakes they make are kept in their personnel file. If staff felt their mistakes are held against them staff may refrain from reporting an error. When observing the staff the author could see a hierarchy within the organisation and a punishment culture. If personnel feel they are not respected as equals they may feel that they are judged by the higher organisation when mistakes are made, making them feel as though problems are held against them.

The personal approach and attitude towards patient safety is shaped due to norms, values and beliefs of the organisation and according to the theory of planned behaviour predicts the staffs intention to perform an intention such as handwashing (Whitby et al., 2006) (Socialstyrelsen 2009). When comparing the operating staffs compliance to basic hygiene and the staffs views on patient safety we could find a medium relation between their response and how well the staff
complied to hygiene routines. The more positive view of patient safety the better their compliance was, which could mean the better the personnel felt about hospital management support for patient safety and their overall perception of patient safety the better they themselves performed in accordance with the guidelines as is expected of them.

Thousands of surgical site infections are recorded every year (Korol, et al., 2013). Causing prolonged hospital stays, patient suffering and increased hospital costs (Brisibe, Ordinioha & Gbeneolol, 2014). Finding factors that could prevent surgical site infections is therefore of importance for the individual patient, healthcare and society as a whole. According to PARIHS-model, evidence can be found in previous studies proving hygiene often is inadequate within the operating theatre (Lee, et al., 2014). The current study also suggests that intraoperative hygiene is often flawed, further studies observing why hygiene guidelines are not followed as intended would strengthen the evidence. The context is the hospitals possibility to put the evidence into action. The results of the current study was presented to the staff responsible for infection-control, knowledge of the results from the current study could lead to knowledge and an understanding of flawed areas within the organisation that may be in need of change and improvement. The technique in which the information and knowledge are then implemented is the facilitation (Socialstyrelsen 2009). However due to hierarchies within the organisation at the hospital of the study implementation of improvements was difficult, staff higher in hierarchy were often not receptive to changes, when the suggestion of improvement came from a staff member lower in rank than themselves. Change would have to be put into action from the top management in order for all staff to respect and act accordingly to the changes. Alternately Gagliardi, Webster & Straus (2015) suggest a knowledge translation within the same profession, where one person educates or mentors another as an efficient way of implementing change. Educating staff within each profession in order to implement change could therefore be better suited within organisations with hierarchical cultures. Hierarchy within healthcare is a common recurring problem within healthcare (Shah, Castro-Sa´nchez, Charani, Drumright & Holmes, 2015).
Apart from the leaders and organisation responsibility of upholding a safe standard within healthcare, nurses ethics code state that nurses have a responsibility of working and acting alongside guidelines and up-to-date research within their profession (SSF, 2014). Theatre nurses are responsible for hygiene and asepsis during surgery but also for providing the best possible care for the patient, following guidelines on basic hygiene in order to prevent surgical site infections is therefore of utmost importance. In the current study views on patient culture did have a relation to how the staff complied to basic hygiene guidelines. Knowledge of reasons for staff not to follow guidelines must always be analysed in order to develop healthcare (Lee, et al., 2014) and perform safer surgery in order to stop the chain reaction of patient surgical site infections, prolonged hospital stays, patient suffering and increased hospital costs.

4.3 Method discussion

Study limitations

The official language of Mozambique is Portuguese, not speaking the official language may have limited the study since a better understanding of culture and understanding of observations could have been made. The author has lived in Africa and previously visited Mozambique, therefore had a prior knowledge of the culture and country. The author could profit from prior knowledge by respecting and understanding the culture and therefore gain trust and understanding from the staff. But previous knowledge may also affect or angel the study without the author's purpose or knowledge.

All observations were done by a single observer, to improve reliability two observers would have been preferable in order test the interrater reliability, where the observations of both observers would have been compared in order to see that they had both came to the same conclusion. The results may therefore have differed id the study had two observers making sure no hygiene guidelines where flawed. However several observations were made by the single observer, often observing the same participants, often confirming previous made observations of compliance to basic hygiene, making the internal consistency reliability high (Graziano & Raulin 2010). The observational protocol itself has been tested previously and proven reliable (Swenne &
Alexandrén 2012) During the observations the staff never gave the impression of being stressed or judged by the observer, having two people in the operating theatre observing would take up more space and possible stress the staff more than a single observer did. Having two observers may also have changed the conclusion, since the results could have been discussed between the two observers and could lead to several or further conclusions one observer may not have thought of.

The Hospital patient safety culture survey has been tested and proven to be both a reliable and valid instrument for measuring patient safety culture (Farup, 2015). The Portuguese translation of the survey has also been tested and proven reliable (Reis, Laguardia & Martins, 2012). Two pilot observations where done in order to confirm the observational protocol was a valid instrument to measure the operating personnel's compliance. After the pilot studies, spinal aesthetics was added to the protocols work elements, since it was a common recurring procedure. The patient safety culture survey validity has been tested in previous studies (Farup, 2015). Both instruments for measurement have previously used and proven internally valid.

The definition of external validity from Polit and Beck (2009) has been used in order to evaluate whether the current study results can be generalised. The participants in the study where both male and female and ages varied between 26-67. The study was conducted in an operating ward with 22 nurses working at the time of the study, the response rate to the patient safety culture survey was 75% this due to the survey taking time more than 30 minutes. Surgeons and anaesthesiologist did not partake in the patient safety culture survey, the hospital was small and private in Mozambique, Maputo. The results of the study can therefore not be generalized to a whole culture or all developing countries. Similar studies would need to be conducted in developing countries in order to generalize the results to a country or culture. The current study was observational, interventional studies where staff would be educated in order to improve patient safety and comparing results to compliance before and after the intervention could further strengthen the result of a relation between compliance and patient safety.
4.4 Conclusion
The results of the study implies compliance to basic hygiene during the intraoperative phase in the operating theatre in Mozambique, Maputo was insufficient. There was a medium strong relation between the staffs views on patient safety and their compliance to basic hygiene. This implies that working with the staff’s attitudes concerning patient safety could be one way of improving hygiene compliance resulting in reduced number of surgical site infections.

4.5 Acknowledgement
The author is grateful to the skilled staff of Hospital Privado Maputo for their participation and cooperation in this study. Thank you for all your knowledge and kind hospitality.
References


Attachment 1.
<table>
<thead>
<tr>
<th>Work Elements</th>
<th>Consisted of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dress code in the operating room</td>
<td>Tightly woven scrub suit, surgical cap, surgical mask covering mouth and nose, no jewelry on hands or underarms, no wristwatches</td>
</tr>
<tr>
<td>Insertion of peripheral venous catheter</td>
<td>Hand disinfectant prior procedure, correct glove use, skin disinfection before puncturing the skin, dressing on catheter, no contamination with hands/gloves, hand disinfectant after procedure</td>
</tr>
<tr>
<td>Spinal anesthetics</td>
<td>Hand disinfectant prior procedure, correct sterile glove use, skin disinfection before puncturing the skin, sterile dressing applied after procedure, no contamination with hands/gloves, hand disinfectant after procedure</td>
</tr>
<tr>
<td>Anesthesia procedures</td>
<td>Hand disinfectant prior to procedure, masks that cover mouth and nose, correct glove use, no contamination by touching with hands/gloves, hand disinfectant after procedure</td>
</tr>
<tr>
<td>Insertion of urinary catheter</td>
<td>Hand disinfectant prior to procedure, sterile glove use, plastic apron, disinfection of genitalia, maintain sterile environment through procedure, no contamination by touching with hands/gloves, hand disinfectant after procedure</td>
</tr>
<tr>
<td>Placing the patient in surgical position</td>
<td>Hand disinfectant prior to procedure, hand disinfectant after procedure, no contamination of clean surfaces/objects</td>
</tr>
<tr>
<td>Intraoperative skin disinfection</td>
<td>Sterile surgical gown, sterile gloves, no contamination of sterile instrument table, separate setup for skin disinfection set</td>
</tr>
<tr>
<td>Surgical draping</td>
<td>Maintain sterile procedure during draping, unsterile area not touched with sterile gloves, change of sterile gown or gloves if contaminated</td>
</tr>
<tr>
<td>Intraoperative management of blood sampling, infusion set</td>
<td>Hand disinfection before and after procedure, correct glove use, disinfection before inserting infusion</td>
</tr>
<tr>
<td>Asepsis during the surgical procedure</td>
<td>Change of punctured gloves, maintain sterile procedure during surgical procedure, contamination of lamp handle</td>
</tr>
</tbody>
</table>

(Swenne &, Alexandrén, 2012)
Hospital Survey on Patient Safety

Instructions
This survey asks for your opinions about patient safety issues, medical error, and event reporting in your hospital and will take about 10 to 15 minutes to complete.

If you do not wish to answer a question, or if a question does not apply to you, you may leave your answer blank.

- An "event" is defined as any type of error, mistake, incident, accident, or deviation, regardless of whether or not it results in patient harm.
- "Patient safety" is defined as the avoidance and prevention of patient injuries or adverse events resulting from the processes of health care delivery.

SECTION A: Your Work Area/Unit
In this survey, think of your "unit" as the work area, department, or clinical area of the hospital where you spend most of your work time or provide most of your clinical services.

What is your primary work area or unit in this hospital? Select ONE answer.

☐ a. Many different hospital units/No specific unit
☐ b. Medicine (non-surgical) ☐ h. Psychiatry/mental health
☐ c. Surgery ☐ i. Rehabilitation
☐ d. Obstetrics ☐ j. Pharmacy
☐ e. Pediatrics ☐ k. Laboratory
☐ f. Emergency department ☐ l. Radiology
☐ g. Intensive care unit (any type) ☐ m. Anesthesiology

☐ n. Other, please specify:

Please indicate your agreement or disagreement with the following statements about your work area/unit.

Think about your hospital work area/unit...

1. People support one another in this unit .................................................. ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

2. We have enough staff to handle the workload ........................................... ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

3. When a lot of work needs to be done quickly, we work together as a team to get the work done ................................................................. ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4. In this unit, people treat each other with respect .................................... ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5. Staff in this unit work longer hours than is best for patient care .............. ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
**SECTION A: Your Work Area/Unit (continued)**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</thead>
<tbody>
<tr>
<td>6. We are actively doing things to improve patient safety</td>
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<td>7. We use more agency/temporary staff than is best for patient care</td>
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<td>8. Staff feel like their mistakes are being against them</td>
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<td>9. Mistakes have led to positive changes here</td>
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<td>10. It is just by chance that more serious mistakes don't happen around here</td>
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<td>11. When one area in this unit gets really busy, others help out</td>
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<td>12. When an event is reported, it feels like the person is being written up, not the problem</td>
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<td>13. After we make changes to improve patient safety, we evaluate their effectiveness</td>
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<td>14. We work in “crisis mode” trying to do too much, too quickly</td>
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<td>15. Patient safety is never sacrificed to get more work done</td>
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<tr>
<td>16. Staff worry that mistakes they make are kept in their personnel file</td>
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<tr>
<td>17. We have patient safety problems in this unit</td>
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<tr>
<td>18. Our procedures and systems are good at preventing errors from happening</td>
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</tbody>
</table>

**SECTION B: Your Supervisor/Manager**

Please indicate your agreement or disagreement with the following statements about your immediate supervisor/manager or person to whom you directly report.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures</td>
<td></td>
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<tr>
<td>2. My supervisor/manager seriously considers staff suggestions for improving patient safety</td>
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<tr>
<td>3. Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts</td>
<td></td>
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</tr>
<tr>
<td>4. My supervisor/manager overlooks patient safety problems that happen over and over</td>
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</tr>
</tbody>
</table>
SECTION C: Communications

How often do the following things happen in your work area/unit?

Think about your hospital work area/unit...
1. We are given feedback about changes put into place based on event reports................................................................. □ 1 □ 2 □ 3 □ 4 □ 5
2. Staff will freely speak up if they see something that may negatively affect patient care .................................................. □ 1 □ 2 □ 3 □ 4 □ 5
3. We are informed about errors that happen in this unit .......................................................... □ 1 □ 2 □ 3 □ 4 □ 5
4. Staff feel free to question the decisions or actions of those with more authority ................................................................. □ 1 □ 2 □ 3 □ 4 □ 5
5. In this unit, we discuss ways to prevent errors from happening again...... □ 1 □ 2 □ 3 □ 4 □ 5
6. Staff are afraid to ask questions when something does not seem right.... □ 1 □ 2 □ 3 □ 4 □ 5

SECTION D: Frequency of Events Reported

In your hospital work area/unit, when the following mistakes happen, how often are they reported?

1. When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported?.......................... □ 1 □ 2 □ 3 □ 4 □ 5
2. When a mistake is made, but has no potential to harm the patient, how often is this reported? ............................................. □ 1 □ 2 □ 3 □ 4 □ 5
3. When a mistake is made that could harm the patient, but does not, how often is this reported? ............................................ □ 1 □ 2 □ 3 □ 4 □ 5

SECTION E: Patient Safety Grade

Please give your work area/unit in this hospital an overall grade on patient safety.

□ Excellent □ Very Good □ Acceptable □ Poor □ Failing

SECTION F: Your Hospital

Please indicate your agreement or disagreement with the following statements about your hospital.

Think about your hospital...
1. Hospital management provides a work climate that promotes patient safety................................................................. □ 1 □ 2 □ 3 □ 4 □ 5
2. Hospital units do not coordinate well with each other.......................... □ 1 □ 2 □ 3 □ 4 □ 5
3. Things “fall between the cracks” when transferring patients from one unit to another .................................................. □ 1 □ 2 □ 3 □ 4 □ 5
4. There is good cooperation among hospital units that need to work together................................................................. □ 1 □ 2 □ 3 □ 4 □ 5
SECTION F: Your Hospital (continued)

Think about your hospital....

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Important patient care information is often lost during shift changes</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>6. It is often unpleasant to work with staff from other hospital units</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>7. Problems often occur in the exchange of information across hospital units</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>8. The actions of hospital management show that patient safety is a top priority</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>9. Hospital management seems interested in patient safety only after an adverse event happens</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>10. Hospital units work well together to provide the best care for patients</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
<tr>
<td>11. Shift changes are problematic for patients in this hospital</td>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
</tbody>
</table>

SECTION G: Number of Events Reported

In the past 12 months, how many event reports have you filled out and submitted?

□ a. No event reports □ b. 1 to 2 event reports □ c. 3 to 5 event reports
□ d. 6 to 10 event reports □ e. 11 to 20 event reports □ f. 21 event reports or more

SECTION H: Background Information

This information will help in the analysis of the survey results.

1. How long have you worked in this hospital?

□ a. Less than 1 year □ b. 1 to 5 years □ c. 6 to 10 years
□ d. 11 to 15 years □ e. 16 to 20 years □ f. 21 years or more

2. How long have you worked in your current hospital work area/unit?

□ a. Less than 1 year □ b. 1 to 5 years □ c. 6 to 10 years
□ d. 11 to 15 years □ e. 16 to 20 years □ f. 21 years or more

3. Typically, how many hours per week do you work in this hospital?

□ a. Less than 20 hours per week □ b. 20 to 39 hours per week □ c. 40 to 59 hours per week
□ d. 60 to 79 hours per week □ e. 80 to 99 hours per week □ f. 100 hours per week or more
SECTION H: Background Information (continued)

4. What is your staff position in this hospital? Select ONE answer that best describes your staff position.
   - [ ] a. Registered Nurse
   - [ ] b. Physician Assistant/Nurse Practitioner
   - [ ] c. LVN/LPN
   - [ ] d. Patient Care Assist/Hospital Aide/Care Partner
   - [ ] e. Attending/Staff Physician
   - [ ] f. Resident Physician/Physician in Training
   - [ ] g. Pharmacist
   - [ ] h. Dietician
   - [ ] i. Unit Assistant/Clerk/Secretary
   - [ ] j. Respiratory Therapist
   - [ ] k. Physical, Occupational, or Speech Therapist
   - [ ] l. Technician (e.g., EKG, Lab, Radiology)
   - [ ] m. Administration/Management
   - [ ] n. Other, please specify:

5. In your staff position, do you typically have direct interaction or contact with patients?
   - [ ] a. YES, I typically have direct interaction or contact with patients.
   - [ ] b. NO, I typically do NOT have direct interaction or contact with patients.

6. How long have you worked in your current specialty or profession?
   - [ ] a. Less than 1 year
   - [ ] b. 1 to 5 years
   - [ ] c. 6 to 10 years
   - [ ] d. 11 to 15 years
   - [ ] e. 16 to 20 years
   - [ ] f. 21 years or more

SECTION I: Your Comments
Please feel free to write any comments about patient safety, error, or event reporting in your hospital.

THANK YOU FOR COMPLETING THIS SURVEY.
Attachment 3.

UPPSALA
UNIVERSITET

Department of Public Health and Caring Sciences

PARTICIPANT INFORMATION LETTER

You have been asked to complete a Survey regarding patient safety, the survey will be used in the study; Compliance to intraoperative basic hygiene and patient safety culture in Maputo, Mozambique.

The aim of the study is to investigate the surgical teams views on patient safety and to observe intraoperative compliance to basic hand hygiene in the operating theatre in order to see if there is a relation between the two.

Your answers are important!
The results will be used into making patient health care safer. All participation is voluntary and answers are anonymous, they can therefore not be traced back to you.

When the study is complete your hospital will receive copies of the study for you to read and take part of the results.

If you have any questions regarding the survey or the study, please don’t hesitate to ask:
Rebecka Oscarsson
Sweden, Uppsala University Student
rebecka.oscasson@hotmail.com

Thank you for your participation!

With kind regards
Rebecka Oscarsson