Infection prevention and control

Project on the ICU in Herbertpur Christian Hospital

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We can do no great thing just small things with great love

- Mother Teresa -
For our final assignment in our BSc nursing training at the Christian University in Ede (Christelijke Hogeschool Ede), we had to do a research or project on a subject related to nursing. With lots of joy we have worked on the project about infection prevention and control on the intensive care unit (ICU) in Herbertpur Christian Hospital (HCH), India.

This project report contains a literature study about infection prevention and control and the methods we used. It also describes the two measurements we have done and the results of the measurements. We have compared the results of the first and second measurement as an answer to the central question which is described in the conclusion. For several months we have worked very intensively together as a team. Good cooperation within the team and with the hospital was needed and present to be able to realise this project. We have learned a lot while working together with each other and with the hospital. Within a short time span we were able to finish the writing before leaving India. Although it was sometimes very busy, we really appreciate the co-operation within the hospital which made the work enjoyable. We are happy to present the final project report. Thanks to the hospital that made this project possible, we were able to work on our development as a BSc-nurse.

We want to thank all the people we worked together with and we hope that we will not forget to thank anyone. Especially we want to thank our supervisors; Dr. Mitra Dhanaraj and Sr. Mary Nima. Dr. Mitra guided us and helped us during the project in a practical way. Sr. Mary Nima helped organizing things which had to be done, such as organizing tea after every teaching. We want to thank both of them for supervising the project, and giving us advice. Also we want to thank Sr. Bishnu who was involved in the whole project, and is actively participating in the continuation of the project on other wards.
We want to thank Dr. Biswas, in charge of ICU, for organizing and giving ideas during the project. Mr. Kiran we want to thank for preparing and doing the cultures on the ICU and Dr. Laji Samuel for his support toward the project and for informing all the doctors about the teachings.

We want to thank Mr. Thomas Kurian who helped us with ordering the alcohol based hand rub. Without him the implementation of hand alcohol could not have started. And we want to thank Mr. Albert who helped us in the topic of cleaning and waste disposal.

Beside this people, we should not forget all the ICU staff, the nurses, doctors and all other staff. Thank you for attending the classes and your motivation to change your own behaviour.

We also want to thank our tutor, Mr. Henk Chevalking, who gave us feedback and helped us during the writing of the report.

We hope that this report will be of help to improve the quality of care on all the wards of the Herbertpur Christian Hospital. We wish that the management and the people involved will start working with the recommendations and implement the project in the other wards so that the prevalence of hospital acquired infections can be reduced not only in the ICU but in the whole hospital.

Herbertpur, March 2009

Astrid Klomp

Leonard de Vos

Miriam Groenendijk
In this report an account is written of the project done about infection prevention and control on the Intensive Care Unit (ICU) of Herbertpur Christian Hospital.

The central question of this project was:

- What is the prevalence of cross contamination in the nursing station before and after supervising and improving the protocols and standards on infection prevention and control on the ICU?

- How can the staff be motivated and supervised to follow the protocols and standards on infection prevention and control?

To discover what the situation was on the ICU, an observation on infection prevention and control was done. Beside that a culture was taken in the nursing station to measure the prevalence of microorganisms.

After the first measurement the project group gave several teachings and supervised the staff on the ICU. To improve the adherence to protocols, alcohol based hand rub was provided along with other provisions. To discover the improvements a second measurement was executed after this month of teaching and supervision.

The cultures did not show any pathogenic microorganisms. The microorganisms that were found are dust and can be decreased by cleaning and dusting the ICU better. The amount of air contaminants is decreased by 50% during the project.

The observation before and after the teachings and supervision showed an increase of hand hygiene interventions from 14% to 39% of all opportunities and the use of gloves has increased from 53% to 68%, probably because of the introduction of hand alcohol and because of the teachings and supervision on the ICU.
The cleaning and waste disposal has not improved within the project mainly because the cleaners did not receive teaching yet.

The most important recommendation is to continue using alcohol based hand rub on the ICU and introduce it to other wards. Adherence to the hand hygiene protocols will increase and the risk of hospital acquired infections will decrease. At the same time there should be continuous teachings on the subject of infection prevention and control to keep the awareness high. It is strongly recommended to continue an active infection control committee and to start an infection control team with particular tasks on the wards.
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1 | Introduction

Herbertpur Christian Hospital (HCH), founded in 1936, is a 100-bedded hospital, situated at the foothills of the Himalaya. The hospital has a unique charity policy. Patients are charged according to what they can afford and are offered charity between 10 to 100%.

HCH is part of Emmanuel Hospital Association (EHA) since 1973. EHA is a fellowship of institutions and individuals that exists to transform communities through caring, with primary focus on the poor and marginalized. The vision of EHA is “Fellowship for transformation through caring”. HCH is using the same vision in their work.

Herbertpur Christian Hospital is transforming into a training and teaching hospital. The hospital is fulfilling its primary role of providing quality healthcare to the people of Uttarakhand and Uttar Pradesh. Situated at the foothills of the Himalayas, the hospital has been actively serving the surrounding communities, adding on new techniques and expertise. (annual report, 2008)

1.1 Cause

While having an internship in HCH, the members of the project group observed that there was a lack of proper hand hygiene on the different wards. For example, nurses were not always washing their hands between contacts with different patients; gloves were not always used while there was a risk of being exposed to body fluids, etc. Another aspect that has been observed is that contaminated materials, like sheets or blankets covered with blood or excretions, were not directly changed or removed from the floor. At the same time a spread of infections among patients on Maternity
Ward and Intensive Care Unit (ICU) occurred. Possibly some of these infections could have been prevented by proper infection prevention and control measures.

All these observations led to the idea of starting a project on infection prevention and control in HCH. In the past there have been several attempts to improve the infection prevention and control in HCH. Standards and protocols were developed, but they are not consistently followed by staff members. The infection prevention and control situation is difficult to assess; a lot of factors and actors contribute to this situation.

Relatives and friends enter the ward frequently (visiting hours are not being observed) and food comes from outside. Because HCH is a charity hospital, they cannot afford everything that is needed for good quality of care, for example alcohol-based hand rub is too expensive. Herbertpur is also located in a remote area, which makes the transport difficult. Human resources are a problem in HCH. The nursing staff is constantly changing and there is a lack of trainers and senior staff. This makes it difficult to train the nurses in maintaining and improving the quality of infection prevention and control. These and other factors add to the complexity of the situation. Because of the complexity of the situation and the limited time span it is impossible to solve all these problems within this project.

Miriam (a project group member) recently gave a class about hand hygiene and also supported colleagues to improve their hand washing on the ICU. The process has just started and it is good to keep in mind that some improvements may already have taken place in the area of infection prevention and control. This project follows up what Miriam has started on the ICU.

It is also good to mention that Mrs. Ann Veena, a quality worker in HCH, has started the implementation of quality standards of the National Accreditation Board for Hospitals and Healthcare providers (NABH, 2006). One part of these quality standards is on ‘hospital infection control’. In this project these standards will be used as far as it is possible and be implemented on the ICU. Miss Ann Veena is currently writing an infection control manual for use at HCH. The writing of the manual should be finished
by the end of April and possibly the results or a summary of this project will be mentioned in the infection control manual.

1.2 Theoretical support

It is one of the core values of EHA to deliver quality care: ‘we strive for the highest possible quality in all our services’ (annual report, 2008). Good quality of infection prevention and control is an essential part in delivering good quality of care.

It has been proved that the prevalence of Healthcare Associated Infections (HCAI) is a huge patients’ safety problem: ‘Healthcare-associated infections occur worldwide and affect both developed and resource-poor countries. Infections acquired in healthcare settings are among the major causes of death and increased morbidity in hospitalized patients’ (WHO, 2005, page 9).

The World Health Organization (WHO) is stimulating the prevention of infections. In 2005 WHO started a campaign called ‘Clean hands are safer hands’. In this campaign Dr. D. Pittet claims that ‘Clean Care is Safer Care’ is not a choice, but a patients’ right for quality care. He also states that clean hands prevent suffering and saves lives. (Pittet, D., 2005)

This project aims for higher quality in HCH and the focus is to reduce hospital acquired infections. The prevention and control of infections is part of the standards for quality in the hospital. Big international recognised organisations such as WHO are promoting the prevention of infections. For this project recent literature and promotion materials are being used to prevent infections in this hospital. The project group also used the information and their expertise of these organisations to implement standards of good quality and to find out the best way to implement these standards.
1.3 Aim and objective

Aim:

To reduce hospital acquired infections on the ICU.

Objective:

To measure and prove the efficacy of infection prevention and control protocols and standards.

To motivate the staff on the ICU to follow infection prevention and control protocols and standards.

1.4 Central question and sub questions

Central question

What is the prevalence of cross contamination in the nursing station before and after supervising and improving the protocols and standards on infection prevention and control on the ICU?

How can the staff be motivated and supervised to follow the protocols and standards on infection prevention and control?

Sub questions

1. What is infection prevention and control according to literature?

2. What guidelines, protocols and standards about infection prevention and control are available in literature?

3. Which standards and protocols on infection prevention and control are used by the EHA and in HCH?
4. Is the quality of the protocols and standards on infection prevention and control used in HCH high enough in comparison with the international standards?

5. How can the ICU in HCH be described?

6. What is needed to measure the cross contamination and the following of protocols and standards on infection prevention and control on the ICU?

7. How can the staff be motivated and supervised to follow the protocols and standards on infection prevention and control?

8. What is the effect of motivation and supervision of the ICU staff in following the protocols and standards on infection prevention and control?

9. Which conclusions can be drawn from the measurements?

10. Which recommendations can be drawn from the project?

1.5 Defining

For this project the term infection prevention and control is used instead of hygiene. According to literature hygiene is a collective term for all the ways that will keep people and animals healthy by keeping away pathogenic microorganisms. Infection prevention and control is a part of hygiene. Infection prevention and control is an essential, though often underrecognised and undersupported part of the infrastructure of healthcare.

The following aspects of infection prevention and control will be included in this project (Wikipedia, 2008):

1. Hand hygiene / hand washing

2. Personal protective equipment

3. Cleaning
4. Disposable waste

After consulting several doctors it was decided to do this project on the ICU. Especially on the ICU it is very important that the quality of infection prevention and control will be improved and maintained, because the patients admitted on the ICU are usually very weak and have a higher risk to develop hospital acquired infections.

One more reason to choose the ICU is the limited time span for this project. The ICU is a small ward with only seven beds and one warmer for a baby, so it is more likely to achieve the goals of the project in this limited time.

The culture will be taken from the nursing station. A microbiological culture taken from the nursing station will mainly prove the cross contaminations carried over by staff. A culture on the ward will probably prove all kinds of microorganisms which can cause infections. It would be difficult to determine where the microorganisms are coming from (hospital acquired infections) in those cultures, because patients are taking microbes from outside to the ward. Patients are also changing frequently because they are being transferred to another ward or being discharged. That makes it difficult to trace the source of infection. That is why the nursing station is a better place to test. The results of the tests will prove something about the staffs’ behaviour concerning infection control practices.

The whole staff is included in the project, because all disciplines working in the ICU are possible carriers of microorganisms which can cause cross infection.

1.6 Hypotheses

The hypothesis describes the expected results of the project (Verhoeven, N. 2006). In this paragraph the hypothesis is described as a possible answer to the central question. The hypothesis consists of two statements. One describes the prediction (the alternate hypothesis) and the other one describes all the other possible
outcomes (the null hypothesis) (Nettom, ?). By executing the actions described in the alternate hypotheses the aim to reduce hospital acquired infections will probably be reached.

*What is the prevalence of cross contamination in the nursing station before and after supervising and improving the protocols and standards on the ICU?*

The alternate hypothesis is: The amount of cross contaminations on the ICU will be less if the whole ICU staff follows the protocols. Following the protocols and standards will have a direct influence on the prevalence of cross contamination. The prevalence and presence of cross contamination will be reduced to a minimum, when following the protocols and standards (see chapter 2.2). The healthcare workers transfer microorganisms from one patient to another or from the environment to the patient (Board of Science, 2006). For that reason healthcare workers can play a big role in preventing and reducing the prevalence of cross contamination, by following the standards and protocols. The prevention of cross contaminations requires that all healthcare workers assume that the blood and body substances of all patients are potential sources of infection, regardless of the diagnosis, or the presumed infectious status (WHO, 2004). So the aim to reduce hospital acquired infections will be reached, if the staff is following the standards and protocols.

The null hypothesis is: Following more protocols and standards has no or little influence on the prevalence of cross contamination; the prevalence will be almost the same. So in the two measurements there will be no or less change visible.

*How can the ICU staff be motivated to continue following the protocols and standards on infection prevention and control?*

The alternate hypothesis is: The best way to motivate the staff is to give teachings about subjects related to infection prevention and control, to give supervision on the ward and system change. According to CDC (see chapter 3.3) a combination of different strategies is the best way to improve the adherence to infection control protocols. In the past it is proved that education is the main tool in teaching staff to
follow the protocols (CDC, 2002). It is also possible to motivate the staff by showing the results of the first and second measurement, so they will see what the effect is of following the protocols and standards.

When the staff is motivated the aim will be reached not only within the project but also afterwards.

The null hypothesis is: There is not a specific best way to motivate the staff; all the ways have only short term effects. It is very hard and almost impossible to motivate the staff of ICU to continue following the protocols and standards and the results of the second measurement will almost be the same as the first measurement.

1.7 Abbreviations used

CDC  Centres for Disease Control and Prevention
EHA  Emmanuel Hospital Association
HAIs  Hospital Acquired Infections
HCAI  Healthcare Associated Infections
HCH  Herbertpur Christian Hospital
ICC  (multidisciplinary) Infection Control Committee
ICU  Intensive Care Unit
IV  Intravenous
MRSA  Methicillin-Resistant Staphylococcus aureus
NABH  National Accreditation Board for Hospitals and Healthcare Providers
SARS  Severe Acute Respiratory Syndrome
WHO  World Health Organisation
Introduction

This chapter is the literature study which is used during the project. This chapter and chapter 9.1 describes the answers on sub question 1 to 4. International accepted guidelines and standards on infection prevention and control are described in this chapter as well as the EHA/HCH standards. In chapter 2.3 these guidelines are compared. More background information about hospital acquired infections and infection prevention and control can be found in chapter 9.1.

2.1 Guidelines and standards on infection prevention

Introduction

In the literature a lot of resources are available on the topic of infection prevention and control. The last decades the global awareness of the importance of infection prevention and control has increased. There are different causes for that movement. The emerge of severe acute respiratory syndrome (SARS) and methicillin-resistant Staphyloccus aureus (MRSA) are examples of those causes. When the virus SARS appeared in 2003 and spread to almost ten thousand people in two dozen countries across the world within weeks (10 percent of whom where killed), the primary cause was the hands of healthcare workers (Gawande, 2007). During that outbreak it appeared that the virus easily spreads through close hospital contact with infected persons (WHO, 2004). This outbreak increased the awareness of the importance of precautious actions for all healthcare workers.
2.1.1 Infection control programme

Knowing about the problem of hospital acquired infections and the factors that cause the spread of these infections, it is clear that something need to be done. The need to control the level of hospital acquired infections is mainly because of the emergence of antimicrobial-resistant microorganisms. Also the emergence of life threatening infections such as severe SARS and re-emerging infectious diseases like plague and tuberculosis have highlighted the need for efficient infection control programmes in all healthcare settings and capacity building for healthcare workers so they can implement them. An infection control programme puts together various practices which, when used appropriately, restrict the spread of infection. (Samlee Plianbangchang, M.D., P.H. Shigeru Omi, M.D., 2004)

A lack of infection control practices facilitates transmission of infections from patients to healthcare workers, other patients and visitors. It is therefore important for all healthcare workers, patients, their family members, friends and close contacts to adhere to the infection control guidelines strictly. It is also absolutely necessary for healthcare administrators to ensure implementation of the infection control programme in healthcare facilities (Samlee Plianbangchang, M.D., P.H. Shigeru Omi, M.D., 2004). The WHO (2004) describes that responsible health authorities should develop a national programme to support hospitals in reducing the risk of Hospital Acquired Infections (HAIs). There are a lot of things that this national programme should develop for the hospitals. Still the hospital itself has the ultimate responsibility for prevention and control of infection. The hospital director is responsible for establishing an infection control committee (ICC).

Infection control committee

Of course the aim of the infection control committee is to reduce the number of HAIs as much as possible. According to the WHO standards (2004) the infection control committee provides a forum for multidisciplinary input, cooperation and information sharing on the topic of infection control. WHO describes that this forum should have
a wide representation of all relevant departments; management, physicians, other healthcare workers, clinical microbiology, pharmacy, sterilizing service, maintenance, housekeeping and training services.

The infection control committee should immediately take action during an infection outbreak. According to the WHO (2004) it also has the following tasks:

- Reviewing and approving a yearly programme of activity for surveillance and prevention;
- Reviewing epidemiological surveillance data and identifying areas for intervention;
- Assessing and promoting improved practice at all levels of the health facility;
- Ensuring appropriate staff training in infection control and safety management;
- Providing safety materials such as personal protective equipment and products;
- Training of health workers.

Infection control team/individual

The infection control team is responsible for the day-to-day activities of the infection control programme. Because this team or individual puts the infection control into practice, it is required that there is an open reporting structure between the infection control committee and the infection control team. The infection control team has the following tasks:

- To carry out the surveillance programme;
- To develop and disseminate infection control policies;
- To monitor and manage critical incidents;
- To coordinate and conduct training activities.
The number of people joining the infection control team is dependant on the size of the organisation. In smaller organisations it could be an individual, like a nurse (NABH, 2006). At least it should be someone who is in touch with the daily work.

2.1.2 Infection control practices

Microorganisms are commonly transmitted by healthcare workers; from one patient to another or from the environment to the patient (Board of Science, 2006). For that reason healthcare workers can play a big role in preventing and reducing the prevalence of cross contaminations of microbes. The prevention of cross contaminations requires that healthcare workers assume that the blood and body substances of all patients are potential sources of infection, regardless of the diagnosis, or the presumed infectious status (WHO, 2004). According to the WHO (2004) the application of infection control precautions is very important: “...they must be applied to all patients at all times, regardless of diagnosis or infectious status, and additional (transmission-based) precautions which are specific to modes of transmission (airborne, droplet and contact)”.

When to decontaminate hands

Current national and international guidance suggests that in deciding when it is necessary to decontaminate hands prior to patient contact, four key factors need to be considered (Department of Health, 2007):

- the level of the anticipated contact with patients or objects;
- the extent of the contamination that may occur with that contact;
- the patient care activities being performed;
- the susceptibility of the patient.

Infection control practices are mostly divided into two parts; standard precautions and additional precautions.
Standard precautions

According to the WHO's guideline (WHO, 2006) standard precautions include the following:

- hand washing and antisepsis (hand hygiene);
- use of no touch technique, avoiding direct contact of the hand with equipment (NICE, 2003) wherever possible;
- use of personal protective equipment (e.g. gown, mask, eye protection) when contamination with blood, body substances, excretions and secretions with clothes or face is anticipated (WHO, 2002);
- appropriate handling of patient care equipment;
- appropriate handling of soiled linen; discard, disinfect or sterilize between each patients use;
- prevention of needle stick/sharp injuries;
- environmental cleaning and spills management;
- appropriate handling of waste.

In the attachment (see chapter 9.3) the complete guidelines which are used for the project can be found. They are taken from WHO “Practical guidelines for infection control” (2004) and from Pratt and Pellowe “Epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England” (2007), and integrated in one part. These two documents are chosen because they are written by worldwide accepted organisations in healthcare. Also many other (small) organisations copied the WHO’s guidelines in their documents. The guidelines by Pratt and Pellowe had some other aspects, which are useful for this project.
Additional (transmission-based) precautions

The precautions for transmission based diseases go beyond the infection control standard precautions. This is needed because transmission based diseases are transmitted by air, droplets and contact. For example this could mean that besides all the precautions taken, the patient needs to be separated from the other patients at the ward. International sources show that there are different ways of dividing transmission based precautions:

- airborne precautions;
- droplet precautions;
- contact precautions.

Because the project does not include the additional precautions, these precautions are not explained any further in this chapter.
2.2 EHA and HCH standards and protocols on infection prevention and control

Introduction

HCH is implementing the standards as written by the National Accreditation Board for Hospitals and Healthcare providers (NABH), as already mentioned in the introduction, chapter 1. This chapter is an answer to sub question 3.

This chapter describes the standards and protocols related to infection prevention and control used within EHA and the ones used by several EHA hospitals. The infection control manual of HCH must be somewhere in the hospital, but until now it was not found. At this moment the protocols and standards that are used in HCH, are not known and therefore not described in this chapter. While executing this project Mrs. Ann Veena is also writing a new infection control manual for use at HCH, based on the standards written by NABH. According to the NABH, there must be an infection control manual, which contains a description of the high-risk areas and methods of surveillance of the high-risk areas. Besides, the manual should also contain the standard precautions, cleaning and sterilization practices, antibiotic policy, laundry and linen management, engineering and kitchen, and mortuary practises and procedures (NABH, 2006).

2.2.1 Infection control group

Several years ago HCH had an active infection control committee. In 2004 they implemented the disposable waste bins with different colours, so that waste could be separated properly. This is based on the rules of the ministry of environment & forests written in 1998 for all the biomedical waste in India (Ministry of environment & forests, 1998). The infection control committee organised several classes to teach the staff how to separate waste and to promote the right use of it. According to NABH the hospital should make provisions in regard to biomedical waste management and handling, so compared to that the actions of the infection control
committee were actually very good at that time. At this moment, the correct use of
the dustbins is not checked or supervised anymore and there is no protocol for it. The
infection control committee did not have a meeting anymore since 2004 and it is not
clear who exactly are the members of this committee at the moment. According to
the NABH, every organisation should have a hospital infection control programme.
This includes having a multidisciplinary infection control committee (ICC) and an
infection control team. The infection control team is responsible for the surveillance
in the high-risk areas. A qualified infection control nurse should also be included, join
the committee and if possible the team (NABH, 2006). At this moment there is no
active committee, team or nurse working on infection control in the hospital except
from Mrs. Ann Veena who is working on an infection control manual.

2.2.2 Infection control programme

The infection control programme should be supported by the hospital management
and includes training of staff and employee health. This support should contains
regular trainings and also adequate funds should be available in its annual budget.
During this project supervision and classes will be provided for the ICU staff.

According to the NABH (2006) it is important that proper facilities and adequate
resources are provided in order to support the infection control programme. This is
for example; hand washing facilities in all patient care areas. The proper hand
washing should be monitored regularly by observation and random checking. There
must be isolation/barrier nursing facilities. Gloves, masks, soap and disinfectants
should be available and used correctly. During the project the standards on infection
prevention and control prescribed by NABH will also be used after comparing with
international standards.

2.2.3 Standard precautions

The standard precautions carried out by another EHA hospital in Tezpur, describes
that the main message is: “Don’t touch or use anything that has the victim’s body fluid
on it without a barrier.” Their guidelines assume that all body fluids of a patient is
infectious and must be treated as infectious. These main rules of standard precautions also assume that all unsterile needles and other sharps are as similarly contaminated. (Baptist Christian Hospital, 2008)

Universal precautions for the staff as written in the set of nursing standards for EHA are about hand hygiene, protective clothing, spills, needles and laundry. After contamination with any body fluid the hands should be washed immediately. This guideline also assumes that all body fluids are infectious and the hands must be treated as infected.

The following rules for hand washing are developed by an EHA hospital in Tezpur (Baptist Christian Hospital, 2008);

- Wash hands before and after the duty shift, after personal use of a toilet and before and after meals;
- Wash hands before and after all procedures, even when gloves are used;
- Wash the hands before performing invasive procedures, before caring for particularly susceptible patients, before and after touching wounds (even when gloves are used) and after dealing with any situation where microbial contamination is likely (even when gloves are used);
- Between handling patients, between procedures on the same patient and after handling contaminated articles like urinals, bed pans, etc.

The other EHA hospitals, including Tezpur, are using the following precautions besides hand washing:

- Use appropriate protective clothing if there will be any contact with body fluid or contamination;
- Gloves (sterile or non-sterile, depending on the procedure) should be worn for all invasive exposure prone procedures (including inserting IV-lines, taking blood samples), for contact with body fluids, non-intact skin and mucous membranes;
- Wear goggles and/or mask to protect eyes and mouth when blood splashing is a possibility. The mask should cover the nose, mouth and facial hair;
• Wear gowns and plastic aprons when contamination of clothing is possible;
• Wear shoes or protective boots on the ward;
• The cleaners must wear rubber gloves;
• Clean up spills of blood and other body fluids directly and carefully. Treat it as assumed infectious as already described in the main rule of the hospital in Tezpur.
• Do not recap needles. Everybody is responsible for the disposal of their own needles, syringes and sharps;
• Directly after use, store needles in a rigid container for disposal;
• Laundry which is contaminated with blood or body fluids should be transported in leak proof bags to the laundry;
• Other wastes like sanitary pads, placenta and lab waste should be placed in a leak proof bag or container and all the dustbins should have a leak proof bag.

Other standards for infection control precautions are handling of sterile syringes and needles, handling IV fluids and collection and transportation of specimens.

EHA (?), ACT project (1998) and Baptist Christian Hospital (2008) all describe that disinfection and sterilization have an important role in preventing hospital acquired infections for which separate rules are being used.

2.2.4 Standards for the ICU

In the set of nursing standards for EHA (?) the following standards on infection prevention and control are written. Only the relevant standards for the ICU are mentioned in this chapter.

Concerning the beds in the ICU; clean bed sheets, draw sheets, pillows with cover, blankets and mattresses with Rexene cover must be provided. If the bed is dirty or infected, it must be cleaned thoroughly and be carbolized. Every bed must have a bucket for garbage and a basin. The bed side lockers should be washed outside daily, and inside weekly.
Concerning the bathroom in the ICU; for every 6 patients there must be one toilet. There must be a sink for washing hands and a separate bathroom/shower with hot water facilities. At least twice a day the toilets should be cleaned with a brush and vim powder. The whole bathroom should be cleaned with scouring powder once a day as well as the sinks and wash-basins.

Concerning the cleanliness for the ICU; the floor should be swept and washed every morning (cleaning, mopping and waxing floors daily), sweeping must be done during every shift. The equipments used for cleaning the floors must be washed and disinfected by heat. The walls and ceiling should be swept once a week. The ward should be carbolized once a week. If the floor is soiled by excretion, a chemical disinfectant should be used for direct cleaning. The waste bins should be cleaned every shift.

The ward should be cleaned thoroughly once a month and the lockers and beds should be painted every now and then. Also the ward should be sprayed every month with pesticides to avoid pests (EHA, ?).


2.3 Comparison of the WHO protocols with the EHA hospitals

Introduction

In this chapter the answer is given to sub question 4: “Is the quality of the protocols and standards on infection prevention and control used in HCH high enough in comparison with the international standards?”

As it is mentioned in the chapters before, the protocols and standards which are currently used in HCH are not known. Therefore in this chapter the WHO guidelines are being compared with the guidelines described in chapter 2.3 which are the guidelines of EHA and individual EHA hospitals.

2.3.1 Infection control manual

According to the NABH an infection control manual should be present in the hospital which describes the high-risk areas, methods of surveillance, standard precautions, cleaning and sterilization practices, antibiotic policy, laundry and linen management, engineering and kitchen, and mortuary practices and procedures (NABH, 2006). This is also what the WHO strongly suggests (Ducel, G., Fabry, J., Nicolle, L., 2002). The infection control manual should contain instructions and practices for patient care and is an important tool in the infection prevention. The manual should be developed and updated by the infection control team and reviewed and approved by the committee. It also must be available for healthcare workers and be updated regularly. (Samlee Plianbangchang, M.D., P.H. Shigeru Omi, M.D., 2004)

Both the WHO and NABH say there should be an infection control programme, an infection control committee and an infection control team.
2.3.2 Universal precautions

Universal precautions for the staff as written in the set of nursing standards for EHA are about the hand hygiene, protective clothing, spills, needles and laundry. EHA agrees with the precautions mentioned by the WHO. The hands should be washed immediately after contamination with any body fluid. This guideline also assumes that all body fluids are infectious and the hands must be treated as infected.

Some of the rules which are used by an EHA hospital in Tezpur (Baptist Christian Hospital, 2008) are different from the WHO standards. The first one: washing hands before and after the duty is not mentioned by the WHO, but it is a sensible rule. The hands have to be washed before and after touching a patient anyway. That is why the project group decided to mention only ‘before and after patient contact’ and not ‘before and after duty’. The second difference is that hands have to be washed after meals, besides washing before meals. This is just a minor difference. The project group decided to both in the observation list.

In the hospital in Tezpur a standard is to wash the hands before performing invasive procedures, before caring for particularly susceptible patients, before and after touching wounds (even when gloves are used), after dealing with any situation where microbial contamination is likely (even when gloves are used). They mention several other situations which are all right situations to wash the hands. In comparison with the WHO standards a few aspects are missed in the standards as used by Tezpur. The WHO standards to wash the hands before and after every patient contact no matter what the likely microbial contamination is, is missed in the guidelines of the Baptist Christian Hospital. The project group made the decision, according to literature (Centre for Disease Control and Prevention, 2002) that the hands should be washed before and after patient contact, because microbial contamination is difficult to determine while working on the ward. This also applies to touching something in the patients’ environment. Not everything seems to be contaminated, but still this is possible. That is why the project group also made the decision that after touching something in the patients’ environment, such as the IV stand, the cardiac monitor or
the blankets, hands should be washed or rubbed with hand alcohol. The Centres for Disease Control and Prevention (2002) suggest this standard for implementation and according to them it is supported by suggestive clinical or epidemiologic studies or a theoretical rationale.

2.3.3 Cleaning

The WHO standards do not say anything about dirty or infected beds that should be carbolized. Carbolization is a disinfecting procedure with the use of chemicals. The WHO does not mention anything about carbolization, which is commonly used in Baptist Christian Hospital; an EHA hospital in Tezpur (Baptist Christian Hospital, 2008). Although this standard is not based on a WHO standard, the project group choose to add this standard because the doctor in charge of the ICU wanted this standard to be reached at the ICU.

The WHO says that isolation rooms and other areas that have patients with known transmissible infectious diseases, which can occur on the ICU, should be cleaned with a detergent/disinfectant solution at least daily. Further there should be routine cleaning on all the wards which means wet mopping and the use of a neutral detergent solution. When areas are visibly soiled with blood or body fluids, these should be cleaned immediately with a detergent and water (Samlee Plianbangchang, M.D., P.H. Shigeru Omi, M.D., 2004). The standard used in the Baptist Christian Hospital goes a step further and says that a chemical disinfectant should be used for cleaning the floor when it is visibly dirty.

Carbolization is good for decreasing the amount of microbial contamination. Because the chemicals that are used are harmful to human beings, the ward has to be closed for at least 24 hours when it is carbolized. That is a factor which makes the implementation of this standard difficult.
The use of pesticides is potential toxic to humans, other animals and it has some negative effects on the environment such as water pollution (US Environmental Protection Agency, 2007) and is therefore not recommendable.

2.3.4 Waste disposal

The rules for waste disposal are made according to standards required from the Indian government (Ministry of environment & forests, 1998). Every country has different rules for waste disposal and that is why this rules cannot be compared to the WHO guide lines and why these rules are most appropriate for use in this hospital.
3 | Methodology

Introduction

In this chapter the population, the ICU, the type of research, the measurement
instruments and the collecting of data and analyses is described. This chapter is also
an answer to sub question 5 and 6.

3.1 Population - group

As described in the introduction (chapter 1), the project will be done at the ICU. The
main focus of the project is on the ICU staff. This paragraph describes more about the
ICU, the population and the resemblance within the population.

The ICU in HCH has eight beds for all kind of patients and one radiation warmer for a
(newborn) baby. During the shifts there are usually two nurses on duty, sometimes
there are even three nurses during a dayshift.

The patient categories are very diverse. Of course all critically ill people will be
admitted in the ICU such as patients who need to be on ventilation, patients with a
heart attack or stroke. Other diagnoses on this ward are poisoning, snake bites,
pneumonia, all kinds of post-operative patients, RTA (road travel accidents) etc. Most
of the patients are very sick. Others are doing better because they are mainly
admitted for observation.

The population in this project involves the complete ICU team. The ICU staff includes
nurses, doctors (family medicine, surgical, gynaecology and paediatrics),
physiotherapist, radiologist and the cleaning staff.
The population has in common that they all work in the ICU, have more or less contact with patients and come in the nursing station; the medical and nursing staff more than the others.

3.2 Research

This paragraph describes the type of research and the framework of the research. It explains which methods are used and the reason why these methods are chosen. The adherence of the ICU staff to infection prevention and control protocols will be measured in two ways; a culture of the nursing station and an observation. So the measurements can be divided in two parts.

The whole project consist of four parts; the first measurement, teachings and supervision, the second measurement and finally the motivation for continuation by giving a final presentation. The methods for education, supervision and motivation for continuation are written in paragraph 3.3.

3.2.1 Type of research

The efficacy of following the infection prevention and control protocols will be measured by executing the observations and taking the cultures. The project is a quantitative research, because all the data can be converted to digits. The digits will be the results. Digits are easy to compare and to draw conclusions from (Verhoeven, N. 2006).

The observation will take place in a direct way. The staff will notice that the observation is taking place, but probably the first time they will not know what the project group is exactly observing. When the second measurement will take place they will know, because the project is explained to them and they will be actively involved. The observation is structured by the observation list. This structured way of measuring is the best way to repeat an observation in exactly the same way (Verhoeven, N. 2006).
3.2.2 Measurements

The first and third part of the project includes two instruments. The first part of the measurement is that the microbiologist will take a culture in the nursing station. The second part of the measurement is observation. The staff will be observed if they are following the protocols on infection prevention and control. For this observation there are observation lists developed to test the adherence of ICU staff members to the protocols. This procedure will be easy to repeat after four weeks of supervision, motivation and education.

The time of intensive supervision, motivation and education is only one month. It would be better to spend more time on that so that the results of the project will be even more visible, but the project group is bound to this time span.

The culture and observation test will be repeated after this month of intensive supervision and motivation so that conclusions of the efficacy of using the protocols can be made. This is the third part of the project.

The second culture will show the prevalence of microorganisms. A comparison with the first culture gives an indication if the amount of microorganisms which can cause cross infections is reduced or not. Besides, the staff will be observed again by doing the same observation to find out if there is a difference in comparison with the first measurement.

The conclusions drawn from the cultures and the observations show if the adherence in following the protocols has effect on the reduction of cross contaminations.

3.2.3 Measurement-instruments

The adherence of the ICU staff to infection prevention and control protocols will be measured with two instruments; a culture of the nursing station and an observation list which is already mentioned in paragraph 3.2.2. The instruments are further described in this paragraph.
Culture

This is the method of the culture as written by Mr. Kiran, microbiologist in HCH.

“The microbiological surveillance in hospitals is done to detect the presence of colonized microorganisms in the respective environment. The surveillance helps in the monitoring of hospital infection and therefore motivates the hospital staff to practice infection control principles.

The method involves the microbiologist taking swabs from critical units like the Operation theatre, ICU, NICU, Dialysis wards and also other areas like hospital water supply, food, etc. These swabs are then cultured and checked for growth and identified as pathogens, contaminations, etc.

The environmental contaminant examination is done by the exposed plates method in which the Petri plates containing the microbiological media is opened and kept in the area of examination for fifteen minutes and then checked for growth.

The reports of the microbiological surveillance are dispatched in 24 and 48 hours time depending on the growth parameters.”

Observation list

As written in the introduction (chapter 1) the following aspects of infection prevention and control will be measured; hand hygiene and hand washing, personal protective equipment, cleaning and waste disposal. These subjects are all covered in the observation list and will be the focus of the project.

The observation list is developed by using the literature study of chapter 2.3. This includes international guidelines and standards and specific EHA hospital standards and protocols on infection prevention and control. For the observation list the project group looked critically at the EHA guidelines in comparison with the international guidelines to discover if the quality was high enough.

After checking the observation list within the project group the observation list was tested by doing a pilot. For one day of twelve hours the project group observed by
using the observation list. The problems were written down and by the end of the day the observation list was changed according to the suggestions of the project group members.

### 3.3 Education, supervision and motivation

The second part of the project includes education, motivation and supervision which will be an answer to sub question 7 of the project. The plan for the teachings, can be found in chapter 9.9. Literature about supervision and motivation can be found in chapter 9.2. Part four includes the final presentation of the project. In this presentation the results will be presented, it will be shared how the improvements can be continued after the project is finished and recommendations will be given. This chapter will make a connection between the literature study (question 7 in chapter 9.2) and our project, so that the relevance of the methods which are chosen will be clear.

#### 3.3.1 Strategies

In this paragraph the strategies that are used in the project will be explained. The most successful strategies for teaching proper hand hygiene according to CDC (2002, page 28) require education, motivation and system change. Pratt and Pellowe (2007, page 25) stressed that multi-faceted approaches have a more marked effect on hand hygiene practices and rates of Healthcare associated infections. This project will use the following strategies, so that it will have more effect on the practices.

**Routine observation and feedback**

Between the two measurements daily one of the project group members will be present at the ICU to work together with the staff. In the following way they will supervise the following of the protocols.

*Working with the staff*
It is decided that for six moments a week one of the project group members will be present at the ward during the busiest morning- and evening hours (7am-11am and 3.00pm-6.30pm). While working together with the ICU staff it will be possible to supervise them in following the protocols in a correct way.

During the work the project members should exactly know the protocols and standards, and recognize the situations that require hand hygiene interventions or other interventions that are included in the project (see ‘protocols ICU’ chapter 9.10). When these situations occur, it has to be observed if the ICU staff member takes the right intervention. If he or she does not make the (right) intervention it has to be mentioned by the project member to this person. The attitude of the project members should be positive and motivating. They should not be judgemental because this will probably have an opposite effect on the motivation of the ICU staff members. They should also show appreciation when the right interventions are done at the right time. The problems the ICU staff members are facing in following the protocols can be recognised and discussed while working together with them.

During the work the project group members will check the storage of hand alcohol, soap detergent, gloves and dry towels. If necessary they will talk about it with the staff so that they can refill the hand alcohol or soap, or order more gloves or towels.

*Unexpected visits*

Every now and then one of the project group members will visit the ICU for at least fifteen minutes. The visit will be unexpected for the staff, but have to be communicated within the project group. During this time the project group member will only check if the present staff members are following the protocols. According to the observations the project group member can do what he thinks is necessary at that moment. This can include correction and encouragement.

During the visits the project group member will check the storage of hand alcohol, soap detergent, gloves and dry towels again.
Make alcohol-based hand rub available

The project group will provide alcohol based hand rub during the four weeks of education, motivation and supervision.

Make hand hygiene possible, easy, and convenient & change in hand-hygiene agent

Besides the hand alcohol, soap dispensers will be provided. These are more hygienic than plain soap that was used before the start of the project. Elbow taps will also be installed to improve the hygiene of the sinks. Because paper towels are too expensive for the hospital, it has been decided to make more towels available. In that way there will always be a dry towel available for after the hand washing procedure.

Promote and facilitate skin care for healthcare-workers’ hands

A bottle of ‘Vaseline, moisture locking lotion’ is provided for the ICU staff. Of course this will not be continued after the project, but it is good to help and motivate them in this way. The ICU staff can not complain about dry hands because the lotion is provided.

Reminders in the workplace

Several posters about hand hygiene will be placed in the ward. A poster about waste disposal will be developed and placed near the waste bins. A book with the protocols on infection prevention and control will be developed and implemented at the ICU, so that the ICU staff can always take a look into the protocols and remind themselves.

During the classes participation of every attendant is expected, because there will be a lot of interaction. During the hours that the project group will work at the ward, active participation of the individual ICU staff members is required and stimulated.

Education

Three classes will be given in order to achieve the right level of knowledge (chapter 9.9). These classes are also meant to improve the adherence to the protocols and to give motivation for that. The teachings will be given with the use of interaction so that the information will be remembered better. The project group likes the classes to
be of inspiration for all the attendants. It has to make them enthusiastic for improvement. The importance of following the protocols should become clear. For the education within the project it is good to look at the four topics described by CDC (2002, page 25) which must be addressed in successful educational programmes;

1) “Scientific information for the definitive impact of improved hand hygiene on healthcare–associated infections and resistant organism transmission rates”. In the first meeting, the orientation meeting, the project will be explained. Besides this information will be given about the impact of following infection prevention and control protocols by using international literature and evidence. In that way the population should become motivated for full cooperation with the project(group) to improve the care of the patients they are treating at ICU.

2) “Awareness of guidelines for hand hygiene and insufficient knowledge concerning indications for hand hygiene during daily patient care”. After the first observation indications of the staffs adherence to infection prevention and control protocols can be made. Because of the specified observation list it also becomes very clear in which protocols the ICU staff needs more guidance or more knowledge. The standards which need to be reached will be taught. So after the first observation period the project group will make a specific teaching and supervision plan for the ICU staff. Besides that a booklet with protocols will be developed for use at the ICU and posters will be placed to remind and to make the staff aware to follow the protocols.

3) “Knowledge concerning the low average adherence rates to hand hygiene by the majority of healthcare workers”. Within the teachings and supervision it has to be made very clear that this ward is not the only ward having low adherence rates to hand hygiene. It is a worldwide problem which is to be addressed by each and every individual healthcare worker. In this way it is prevented that the healthcare workers will start feeling guilty and ashamed, because they feel they are behaving very bad. The staff should not feel guilty, but has to see and understand the need of change (chapter 9.2)
4) “Knowledge concerning the appropriateness, efficacy, and understanding of the use of hand-hygiene and skin-care-protection agents”. The biggest part of the teachings will contain explanation about specific protocols. The barriers to following the protocols need to be cleared and addressed. For example, when there is a thought that alcohol based hand rub dries out the skin, the skin-care-protection agents need to be explained.

3.4 Collecting data and analysis

There are several ways to analyze and collect data. This paragraph describes how it will be done within this project.

Cultures

The cultures will be taken by the microbiologist for he is using his professional knowledge to collect the data and analyze the culture. The microbiologist will analyze the culture and send the report about the culture to the project group. In this way the project group can compare the results after two measurements.

Observation

For the observational part, the observation list will be used. During two days (including Sunday because more shifts can be observed) from 7am till 7pm the ICU will be observed using the observation list by three members of the project group. Two persons will observe at the same time. After a month of intensive training and supervision, the same observational procedure will be repeated.

Processing of data

The data will be processed in Excel after the first and the second measurement. By using this computer programme, all the results can be monitored and analyzed. It is possible to calculate percentages and make tables so that it is easy to show the results and explain them. After the second measurement a comparison with the first observation can be made by using Excel.
Analysis

After the first measurement the conclusion can be drawn on which aspect of infection prevention and control the most attention will be needed and on which aspect the staff will need more education. There will be an orientation meeting about the project on the ICU after the first measurement and the results of this measurement will be presented.

After the second measurement, the results of the two measurements will be compared with each other. The results of this comparison will be an answer to our central question about the efficacy of using infection prevention and control protocols.

This answer will be presented to the whole hospital in the final presentation, so that the whole hospital will be motivated to work according to the protocols.
4 | Results

Introduction

This chapter describes the comparison of the results of the two measurements that are executed within the project. The results of the first and second observation are described separately and can be found in chapter 9.4 and 9.5. All the tables, from the first and second measurement and the comparison graphs, can be found in chapter 9.4, 9.5 and 9.6.

4.1 Cultures

This table on the next page shows a comparison of the cultures that are taken. The first culture is taken before the period of supervision and teaching. The second culture is taken after that period. It is remarkable that in both cultures no pathogens are found. In some areas improvements are made. The number of Micrococci in the environment (exposed plates) and on the telephone has been reduced by 50%. The other sources do not show a progression.
<table>
<thead>
<tr>
<th>SNO</th>
<th>SOURCE</th>
<th>ORGANISM</th>
<th>PATHOGENS</th>
<th>ORGANISM</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1st culture</td>
<td>2nd culture</td>
<td>1st culture</td>
</tr>
<tr>
<td>1.</td>
<td>Desk</td>
<td>1 fungal colony</td>
<td>4 Micrococi(^1)</td>
<td>Nil</td>
</tr>
<tr>
<td>2.</td>
<td>Telephone</td>
<td>4 Micrococi</td>
<td>2 Micrococi</td>
<td>Nil</td>
</tr>
<tr>
<td>3.</td>
<td>File / case</td>
<td>No growth</td>
<td>1 fungal colony</td>
<td>Nil</td>
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<td></td>
<td>register</td>
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</tr>
<tr>
<td>4.</td>
<td>Injection rack</td>
<td>No growth</td>
<td>4 Micrococi</td>
<td>Nil</td>
</tr>
<tr>
<td>5.</td>
<td>Clothes</td>
<td>No growth</td>
<td>10 ASF(^2)</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>cupboard</td>
<td></td>
<td>colonies</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Exposed plates</td>
<td>16 colonies of</td>
<td>8 cols of Micrococi</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Micrococi</td>
<td>1 ASF</td>
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</tr>
</tbody>
</table>

\(^1\) Micrococi are microorganisms which occur in a wide range of environments, including water, dust and soil.

\(^2\) ASF = Aerobic Spore Form. This is an airborne contaminant.
4.2 Observation

The most remarkable changes between the first and second observation are described below.

4.2.1 Hand hygiene

In the first observation in only 14% of all the situations hand hygiene interventions were done; this is improved to 39%. The adherence ‘between patient contact’ has been improved from 8% to 39%. Also ‘before an aseptic task’ the adherence is improved from 0% to 15%. Actually in all the situations the adherence has been improved of which some significantly such as in the situation ‘after handling contaminated items’. This has improved from 36% to 84%. There is only one situation that the adherence is decreased which is in the situation ‘after handling body fluids’. The adherence has decreased from 44% to 32%. ‘Removing jewellery’ is slightly increased from 46% to 47% of the staff. In the first observation 6 persons (25%) had long fingernails or nail polish, while in the second observation there were only 3 persons (7%).

4.2.2 Gloves

In the first observation in 53% of all the situations gloves were used; this is improved to 68%. Gloves were used more often ‘during invasive procedures’ (from 23% to 67%) and also ‘when risk of exposure to body fluids’ (from 55% to 83%).

Also in the second observation gloves were often not ‘changed between patients’ (from 0% to 2%) or ‘between tasks/procedures on the same patient’ (0% to 6%). The gloves were more often ‘removed immediately after using’; it has improved from 35% to 66%.

4.2.3 Personal protective equipment

The use of ‘personal protective equipment’ (mask, protective eyewear, gown/apron and covers shoe/hair) is only observed in the first observation. In the second observation there were no situations that required the use of personal protective
equipment. In the first observation 36% of the ICU staff with patient contact were ‘wearing the closed ICU shoes’, in the second observation this number was 30% of the staff.

4.2.4 Cleaning

During the second observation the soiled linen was always transported in a leak-proof way while this was not always the case during the first observation. Still the toilets were not cleaned twice a day. Also the floor was not swept every shift.

4.2.5 Waste disposal

Almost all the waste was disposed by colour, only the red buckets in the second observation and the blue buckets in the first observation were not right. In both observation periods the waste was removed only once a day from the ward.

Some disposable materials were reused which happened in both observations. These were mainly the IV bottles and IV lines connected to a NG tube to release the fluids from the stomach.


5 | Conclusion

Introduction

This chapter is an answer to the central question of this project. After processing all the results the conclusions were made. They are written in this chapter. This chapter first answers the sub questions 8 and 9. After that the central question will be answered as a conclusion.

5.1 Sub questions

5.1.1 Sub question 8

What is the effect of motivation and supervision of the ICU staff in following the protocols and standards on infection prevention and control?

The effects of the motivation and supervision on the ward can not be measured in numbers. Only a limited time period was available for the observation, so it does not measure the continuous change. Together with all the other improvements, such as the introduction of alcohol based hand rub, the installing of elbow taps and execution of the teachings, this really made an impact on the team. Giving feedback is probably more effective than giving teachings, although the combination of the two is probably the best. Teachings are useful for creating awareness and gaining knowledge, but do not really change people. Motivation and supervision are helping for behaviour change on the ward. Both feedback and teachings are needed to improve adherence in following the protocols (see chapter 3.2)

The main result of motivation and supervision is that the awareness for following the protocols is increased and that people are motivated to really change. In all the situations that hand hygiene interventions are required by the protocols, the percentage of right interventions is increased, except for the situation ‘after handling
body fluids’. The effect of feedback during the period of supervision is visible in those situations. During the period of motivation and supervision the project group always gave feedback to persons who forgot hand hygiene interventions and compliments if the protocols were followed. This personal feedback made individuals change. The project group also stimulated that colleagues would give each other feedback. Some of the staff members did give feedback to colleagues, which was very good for the adherence on the ward. During the period of motivation and supervision it was checked by the project group if enough gloves and towels were ordered. Because the amount of gloves and towels changed during the project, the ICU staff needed supervision in ordering them properly.

All these aspects helped the colleagues to remember following the protocols.

5.1.2 Sub question 9

Which conclusions can be drawn from the measurements?

The comparison with the first and second observation show that the adherence of ICU staff improved in many ways.

5.1.2.1 Hand hygiene

The adherence to hand hygiene protocols is improved from 14% to 39%. Compared to worldwide numbers this rate of adherence is still low. The worldwide average is that doctors and nurses use hand hygiene interventions in 50% - 67% of the situations that hand hygiene is required (Gawande, 2007).

In the situations ‘before patient contact’, ‘between patient contact’ and ‘after patient contact’ the difference that is made during the project is significant. ‘After patient contact’ the adherence rose from 21% to 52%. ‘Before patient contact’ and ‘between patient contact’, the adherence was very low during the first observation; less than 10%. But it was better in the second observation; respectively 23% and 38%. These results show improvements in the adherence which is good for such a short time period, but it is still not good enough. The standards are not yet reached and so it
can be concluded that more attention and follow up is needed after this project (see chapter 7).

One of the reasons for the improvement is the introduction of alcohol based hand rub. The alcohol based hand rub is very easy to use because it takes less time than the hand wash procedure. Besides that the alcohol was located in a convenient place, so that colleagues could always easily do a hand hygiene intervention. The CDC also writes that rapid access to hand hygiene materials improves the adherence (CDC, 2002)

During the project, reminders and posters were located in places in the ICU where everybody would see them. The effect of the reminders was quite big. Every time when a doctor or nurse walked toward a patient, he or she would see the reminder. Many of the ICU staff, both doctors and nurses, watched the wash technique posters while washing their hands.

Hand cream was provided for the ICU. This was used to prevent dry hands as a result of regular washing hands and using alcohol based hand rub.

During the teachings the project group emphasised the hand hygiene protocols. Even in other teachings the hand hygiene protocols were recapped to make sure that the staff would have the right knowledge about hand hygiene. The effect of the teachings was mainly that awareness and knowledge of the protocols was increased. A big group of people was reached at the same time during the teachings, even people from other wards. All these factors added to the fact that the adherence of hand hygiene has increased.

5.1.2.2 Gloves
It has been observed that the ICU staff improved in wearing gloves in the situations that the protocols prescribe to wear gloves. The adherence improved from 53% to 68%. A big problem before the project started, was that the management gave a maximum of gloves that could be ordered per week, which was not sufficient to
follow the protocols. During the project the project group organized that more gloves could be ordered by the ICU nurses. So the sufficient availability of gloves made the staff to use gloves in the right way. The staff had problems in changing because gloves are expensive for the hospital. Although more gloves were provided, the staff still hesitated to order and use more gloves. The feedback during the period of supervision helped the staff to change their behaviour. For example, some staff members were not used to wear gloves while drawing blood (‘invasive procedures’). By constantly giving feedback they changed; the adherence in wearing gloves ‘during invasive procedures’ improved from 23% to 66%.

In both observations gloves were not changed ‘between patient contact’ while emptying all the urine bags. This caused no improvement in the adherence to changing gloves ‘between patient contact’.

5.1.2.3 Personal protective equipment

Only in the first observation there were situations where using ‘personal protective equipment’ was measured. In this project it is not possible to draw any appropriate conclusions about this topic.

Closed shoes were not often worn; in both measurements it was about 30% of the staff. There were not enough shoes (crocs) on the ward which meant that during the doctors’ visit there were not enough shoes for every one. In the second observation there were more doctor rounds because there were four different patient categories. This was of influence on the number of people that were not able to wear closed shoes. It can be concluded that more shoes are needed so that everybody is able to wear them.

5.1.2.4 Cleaning

Between the two observations there was not so much difference. The main cause is that the project group did not yet give a teaching to the cleaners before the second observation. The meeting with the cleaners is planned.
5.1.2.5 Waste disposal

In both the observations the waste was removed only once a day and sometimes put together. A meeting with the cleaners has not yet taken place so the cause for that is unclear.

Some disposable materials were reused. The reason why the ICU staff is doing this is to save money, which is understandable in a mission hospital.

5.2 Central question

What is the prevalence of cross contamination in the nursing station before and after supervising and improving the protocols and standards on infection prevention and control on the ICU?

The adherence to the protocols and standards has been improved after supervision, as written above. The prevalence of cross contamination is measured through the cultures. Both cultures did not show any pathogenic organisms.

The prevalence of micrococi in the environment (exposed plates) and on the telephone reduced with 50% in comparison with the first culture. The other sources did not show a progression. The results of the first culture were not very bad in terms of bacterial growth, so the result of the second culture is not shocking. The cultures mostly showed micrococci which are mainly present in dust. The prevalence of micrococci can be reduced by cleaning the ward better.

During the project, there were no patients with hospital acquired infections. The time span of the project was only one month, so it can not be a concluded that there will be no or less hospital acquired infections because of the improvements in following the protocols. It could be coincidence that in this one month no hospital acquired infections were developed in patients.
How can the staff be motivated and supervised to follow the protocols and standards on infection prevention and control?

There are different ways to motivate and supervise. In chapter 3 (choice of strategies – sub question 7) and sub question 8 (chapter 5.1.1) it is explained which strategies the project group has chosen and the reason for them.

During the project the staff is motivated and supervised in different ways. When evaluating the results of the first observation, it was very clear that a positive change in the amount of hand hygiene interventions at the right time was needed, so during the teachings the emphasis was on hand hygiene. Hand hygiene is the most important and basic intervention to prevent hospital acquired infections (WHO, 2005). The project group decided that three teachings should be given about all the protocols, because there was an obvious lack of knowledge.

Beside the teachings, the project group supervised on the ICU to give individual feedback and helped the staff implementing the protocols on the ward.

The ICU staff was motivated in an indirect way by the provision of attractive posters, hand alcohol, hand cream, soap dispensers, more towels and enough gloves.
6 | Discussion

Introduction

This chapter describes the discussion points about the method of observation, observation period, observation results and the project. This chapter is divided in factors that influenced the observation period and influencing factors during the whole project.

6.1 Observation

The project group started the observation too soon after having developed the observation list. It would have been better if the observation list was first examined by the supervisor to avoid mistakes make everything clear.

For the project group it was difficult to interpret the observation list in the same way. This had some influence on the results although most problems were solved within the pilot. The different interpretations were minimized because the project group could discuss with each other while observing.

6.1.1 Observation results

Two days of observation are not enough to draw significant conclusions about adherence to the protocols in the long term.

It is good to keep in mind that the observation will never be completely objective. The observed staff was probably influenced by noticing that they were being observed and were likely to work better than usual. For example, the use of a camera would reduce this effect. But because the method of observation is the same in the first and second observation, the conclusions drawn can be seen as reliable.

(Verhoeven, N. 2006)
Before the project started, different developments on hand hygiene were already started (e.g. a teaching on the ICU, unexpected cultures and meetings with the staff). This could have influenced the results of the first measurement.

There were not enough closed shoes (crocs) available, so sometimes during doctors visits not all the doctors were able to wear them. This increased the number of ‘not wearing closed ICU shoes’.

Some of the protocols have to be done once a week. This could not be measured, because the period of observation was only two days. Also the cleaning in the evening and night could not be observed for that reason.

During the first day of the second observation no disposable gloves were in stock so the staff used sterile gloves instead. This influenced the number of ‘unnecessary use of sterile gloves’. Because the sterile gloves are more expensive, the staff probably did not change the gloves as often as they were used to. This influenced the number of ‘use of gloves’.

### 6.2 Project

Chapter 2.3 had to be written before the observation period, but it was written after the first observation. If this paragraph was written before, it could have influenced the choices of the protocols and standards.
7 | Recommendations

Introduction

This chapter describes the recommendations that are drawn from the project. Most of the recommendations are written to reach the standards that are measured within this project. The recommendations are separated in recommendations for the organization and recommendations for further research.

7.1 Recommendations for the organization

7.1.1 Management

- The use of alcohol based hand rub is strongly recommended for all the wards in the whole hospital (see conclusion chapter 5). Alcohol makes it easier to do hand hygiene interventions. It is also better accessible than a sink if placed centrally and is faster in use. It is more likely that the staff will follow the hand hygiene protocols and therefore the prevention of hospital acquired infections is more effective. Within this four weeks at the ICU 2250 ml alcohol was used; an average of 14.6 ml per patient day. This is an indication of how much alcohol is needed at the ICU. Another study (in Geneva, with a time span of three years) showed that the consumption of alcohol-based hand rub was 15.4 ml per patient day (Pittet, 2000). So the indication of 14.6 ml per patient day is probably thrust worthy. Because the adherence was only 39% of the situations, the amount of alcohol for 100% adherence will be 37.4 ml per patient day.

- A uniform policy for waste disposal should be developed for the whole hospital.

- Replace the wooden holder for the hand alcohol in the ward for a plastic, glass or metal one to avoid the forming of fungus.

[58]
• It can be concluded that more closed shoes are needed on the ICU so that everybody will be able to wear them.

• It would be recommendable to purchase a vacuum cleaner for the ICU. Maybe it is possible use this on the other wards as well.

• To follow all the protocols will be costly and as a mission organisation it is likely that this money is not available. The management should consider if disposable materials such as IV-bottles which are connected to an IV-line and a NG-tube to release stomach fluids, can be reused if they are autoclaved or kept at the patients’ side. The IV-line should always be a new one, because of the greater risk on cross contamination.

7.1.2 On the ward

• If alcohol is placed on other wards, good locations should be chosen considering that it should be easy accessible in between patient contact and when doing rounds (both doctors and nurses).

• Use the hand alcohol wisely to minimize the costs; not too much, not too less (only one pump, 1-3 ml is enough), and only if necessary according to the protocols. The staff should be taught and shown how to use alcohol based hand rub.

• Replace the hand alcohol only when it is completely empty. For the ICU: an almost empty bottle from the ward can be placed in the nursing station, so that a full bottle can be placed in the ward again.

• If it is necessary and possible, relocate the sinks to a more accessible place so that more interventions can be done because it is better reachable.

• Wash blankets after discharge or transfer. Implement the provision of blankets in all the wards so that there is a better control on community acquired infections.

• There should be enough dry towels or disposable towels provided for every ward.
• There should be enough gloves provided on all the wards. During the project 1300 gloves were used. This was an average of 8.44 gloves per patient per day.

• It is recommended to empty the urine bag only when it is full. According to the doctors order the amount of urine can be read from the bag. In this way less gloves will be used.

• During the observation linen was transported in a leak proof way but on a trolley with visibly soiled linen from other wards. Another way of transporting should be considered such as using a leak proof bag or bin.

7.1.3 Concerning the staff

• When a staff member is having a cold, wearing a mask is advisable during patient contact and turning away from patient while coughing in the arm.

• The responsibilities of cleaners and nurses concerning cleaning should be made clear. For example it is not clear who should clean the sinks and cupboards. It is recommended that the cleaners come after the visiting hours, because visitors will bring lots of dirt on the wards.

• Nurses should be pro active in checking the cleaners work and giving feedback.

• When the floor is contaminated with blood or other body fluids the nurses should not wait for the cleaners to come, but clean it themselves.

• The stethoscope, heart monitor, saturation machine and thermometer should be disinfected after use for a patient.

7.1.4 Infection control committee and infection control team

• The existing infection control committee should keep coming together regularly and it should involve staff members that are committed and permanent. The committee should include different disciplines as described by the WHO and the NABH. The infection control committee should appoint subcommittees for the areas of cultures, teachings, cleaning waste disposal and linen.

[60]
• The infection control subcommittee for cultures should take unexpected cultures on the wards, or take a culture when a hospital acquired infection is suspected.

• The infection control manual should be finished and implemented by the infection control committee as soon as possible. This manual should consist of all aspects of infection prevention and control.

• It is advisable to have one person of the infection control committee in the infection control team as well. This person could choose one person from every ward who will be responsible for the infection prevention and control on that particular ward and who will be supervising the staff on that ward. It could be the doctor or nurse in charge but preferably someone with interest in the topic, who is willing to give other people feedback and be a role model. All the nurses/doctors responsible for the infection prevention and control should be supervised by the infection control team.

• The persons in charge of the infection prevention and control on the ward should come together regularly (for example once a month or once in two months). While meeting, the progression, problems and new ideas can be discussed with the infection control team and the members should be stimulated to continue.

• The person on the ward responsible for the infection prevention and control can organise group discussions on the ward to improve the infection prevention. This person should also be responsible for enough stock of alcohol and dry towels.

• It is recommendable to regularly give classes about all the relevant infection prevention and control subjects. This keeps the awareness high. Besides that the staff nurses are changing very often, so by giving classes regularly it can be made sure that all new colleagues know about the protocols which have to be followed. The infection control team could organise this teachings.

• If there is a patient with a hospital acquired infection, it should be investigated what the cause is within the ward and a group discussion should be held on the
ward to increase the awareness of the ‘possible’ cause(s) and to avoid the same problem in the future.

- It is recommendable to provide the developed protocol book on all the wards. For other wards the book should be checked and adjusted to the ward. Also renew the protocol book with new protocols if necessary.

- Within this project the adherence has increased during an intensive month of supervision and teachings. Other studies show that the first period of implementation usually shows the best improvement in adherence. The infection control committee should make sure that the improvements will continue and last.
7.2 Recommendations for further observations

It is not necessary to repeat these observations on other wards before starting the implementing of infection prevention and control protocols. It is more important that colleagues are stimulated to reach the standards in a practical way. But in case this observation is repeated, the following recommendations are important.

- Always before an observation is started, the observation list should be checked. A pilot can be done to check if the observation list is appropriate for use on the ward where the observation will be executed.

- In the observation list the protocol of removing towels when they are wet or dirty has to be added.

- Adjust the observation list with vacuuming instead of sweeping, because this is part of the cleaning protocol.

- It is better to separate the observation ‘fingernails short, clean and free from nail-polish’ in three different observation points, so that it will be more clear what the results are.

- If another observation is done, it can be recommended to do it for more than two days so that more reliable and significant conclusions can be drawn.

- If two observations will be done, it is recommended to have a longer time period between the two observations.

- The observation of ‘hair and shoe covers’ can be removed from the observation list, because this is only needed in the operation theatre.
Books and booklets


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9 | Attachments

9.1 Infection control

Introduction

To explain what infection prevention and control is according to the literature, this chapter starts off with an explanation about healthcare associated infections. What is the difference with hospital acquired infections? What is the actual problem? The first paragraph explains more about factors that are influencing the development of hospital acquired infections. What is the cause of the spread of these infections? Having talked about the factors causing the spread of hospital acquired infections, it is clear that there is a need for an infection prevention and control programme. In chapter 2.1 more is written about the programme of infection prevention and control. In the third and last paragraph more is described of the different aspects of an infection prevention and control programme. What does such a programme usually consist of? What are standard precautions?

9.1.1 Healthcare associated infections

Healthcare associated infections (HCAIs) are infections acquired as a result of contact with the healthcare system in its widest sense – from care provided in the home, to primary care, nursing home care and acute care in hospitals (Board of Science, 2006). Hospital acquired infections (HAIs), also called nosocomial infections, are infections that develop in a patient 48 hours or more after admission to a hospital. If the infection occurs in the patient when they come to the hospital or it develops within 48 hours, it is probably a community acquired infection (CAI).
This project is taking place in a hospital and a culture is done to measure the prevalence of microorganisms which can cause cross infection. Cross contaminations are a cause for spreading hospital acquired infections, so for this project the term hospital acquired infections is used. This paragraph though describes the problem of healthcare associated infections in a broader sense of which hospital acquired infections is a part. When things are written about healthcare associated infections, the problem described is the same for hospital acquired infections.

Bacteria’s are the most common cause for HCAIs, many of which are carried harmlessly by healthy people, but many more microorganisms, including viruses, fungi and parasites can be spread in a healthcare setting. They can produce a wide range of different diseases. Most commonly bacteria’s affect the urinary tract, lower respiratory tract, surgical wounds, skin and the bloodstream. Urinary tract infections occur most frequently, but bloodstream infections have the highest mortality rate. HCAIs affect patients in a variety of ways, from increased discomfort and pain to severe chronic illness, permanent disability and in some cases death. Infections can also lead to extended lengths of stay of affected patients, bed and ward closure, and increased diagnostic and treatment costs, especially when infection is caused by an antimicrobial-resistant micro-organism (Board of Science, 2006). Very often healthcare workers cause the spread of such infections to other patients in their care. The more sick the patient, the higher the risk of acquiring a healthcare associated infection. Among the critically ill, even in highly resourced units, at least 25% of patients admitted develop a healthcare associated infection. In some countries, this proportion may be much higher (Pittet, D., 2005). A study of the World Health Organisation, and other studies, has shown that the highest prevalence of hospital acquired infections occur in intensive care units and in acute surgical and orthopaedic wards (Ducel, G. et. al., 2002).

Healthcare-associated infections are a major patient safety problem. It affects hundreds of millions of people worldwide. It is estimated that there are over 1.4 million cases of healthcare-associated infections at any given time (Pittet, D.,
Donaldson, L., 2006), although this is likely to be a gross underestimation, due to the lack of proper surveillance according to the WHO (World Health Organisation, 2008).

Healthcare associated infections complicates the delivery of patient care, contributes to patient deaths and disability, promotes resistance to antibiotics, and it costs lots of money both for the healthcare deliverer and the patient (Pittet, D., Donaldson, L., 2006). The increased length of stay for infected patients is the greatest contributor to cost. Prolonged stay not only increases direct costs to patients but also indirect costs. The increased use of drugs, the need for isolation, and the use of additional laboratory and other diagnostic studies also contribute to costs (Ducel, G. et. al., 2002). The causes of infection are related to the systems and processes of care provision, economic constraints on systems and countries and to human behaviour (Pittet, D., Donaldson, L., 2006).

The burden of healthcare associated infections is even more important in resource-poor countries. Usually they have to deliver care to a population with lower health status and they have to cope with the lack of human and technical resources. For example, in Mexico healthcare associated infections are the third most common cause of death for the entire population. In developing countries the proportion may be as high as 40% or more, although estimates of preventable healthcare associated infections vary (Pittet, D., 2005). The last two decades has shown the greatest increase in hospital acquired infections in hospitals in developing countries where infectious diseases remain the leading cause of death (Pittet, D., 2005).

9.1.2 Factors influencing the development of hospital acquired infections

Nosocomial or hospital acquired infections are widespread. They are important contributors to morbidity and mortality. They will become even more important as a public health problem with increasing economic and human impact because of
increasing numbers and crowding of people, more frequent impaired immunity (age, illness and treatments), new microorganisms and increasing bacterial resistance to antibiotics (Ducel, G., et al, 2002). There is not a single cause for the spread of hospital acquired infections. There are a number of factors that contribute to the problem.

1. Patient susceptibility

The age, immune status, underlying disease, and diagnostic and therapeutic interventions are important patient factors influencing incurring infections (Ducel, G., et.al., 2002). Particularly patients with weaker immune systems are at risk. This includes the very young and very old, patients in intensive care units and patients undergoing complex treatment or surgery (Board of Science, 2006).

2. Therapeutic interventions

The use of medical devices such as catheters, tubes, drains and feeding lines has been identified as the second of the two strongest risk factors related to hospital acquired infections (Board of Science, 2006). Insertion creates a pathway for microorganisms to enter a patient’s system. The longer such a device dwells in a patient and where there is a lack of hygiene and device practices, the more risk there is of infection. Also surgical procedures increase the risk of infection which can be caused before, during or after the surgery (Board of Science, 2006).

3. Behaviour of healthcare professionals

Microorganisms are commonly transmitted by staff, from one patient to another or from the environment to the patient (Board of Science, 2006). Hand hygiene is the primary measure to reduce infections. Though the action is simple, the lack of compliance among healthcare providers is problematic throughout the world (Pittet, D., 2005). Therefore there is an increasing risk of cross contamination. In chapter 9.2.1 more is written about factors for poor hand washing adherence rates.
4. Environmental factors

Healthcare settings are an environment where both infected persons and persons at increased risk of infection congregate (Ducel, G., et.al., 2002). Microorganisms that cause infection enter the healthcare system in many different, often unavoidable, ways. If the healthcare environment is not cleaned thoroughly and procedures to ensure the disinfection of instruments, beds and all other appliances are not followed, then the risk of infection is greatly increased (Board of Science, 2006).

5. Organisational factors

Crowded conditions within the hospital, frequent transfers of patients from one unit to another, and concentration of patients highly susceptible to infection in one area (e.g. newborn infants, burn patients and patients on the intensive care unit/ ICU) all contribute to the development of hospital acquired infections (Ducel, G., et.al., 2002).

6. Estates and facilities

Many hospitals are operating with insufficient isolation facilities and have inadequate numbers of hand washing stations or access points. The use of alcohol-based hand rubs has a positive effect on hand washing adherence by healthcare workers, but it is often not available or affordable in resource-poor countries (Board of Science, 2006).

7. Antimicrobial resistance

Many patients receive antimicrobial drugs. Through selection and exchange of genetic resistance elements, antibiotics promote the emergence of multidrug resistant strains of bacteria. The widespread use of antimicrobials for therapy or prophylaxis (including topical) is the major determinant of resistance (Ducel, G., et.al., 2002). Resistance to antimicrobial drugs makes hospital acquired infections more difficult to treat, it slows down the recovery after surgical interventions, increases the length and severity of illness, prolongs the period of infectiousness, and lengthens hospital admissions and costs (Board of Science, 2006). The problem of antimicrobial
resistance is particularly critical in developing countries where more expensive second-line antibiotics may not be available or affordable (Ducel, G., et.al., 2002).

### 9.1.3 Aspects of infection prevention and control

Knowing more about the problem of hospital acquired infections and the factors that cause the spread of these infections, it is clear that something needs to be done. This paragraph describes about the focus and different aspects of infection prevention and control.

Infection control is the discipline concerned with preventing the spread of infections within the healthcare setting. It concerns itself with prevention which consists of hand hygiene, cleaning/disinfection/sterilization, wearing of personal protective equipment, vaccination of healthcare workers, post exposure prophylaxis and surveillance for emerging infections. Besides that it concerns itself with outbreak investigation which means investigation and management of demonstrated or suspected spread of infection within a particular healthcare setting. For this reason the common title within healthcare is ‘Infection Prevention and Control’ (Wikipedia, 2009).

There are many aspects of infection prevention and control. First there are the standard precautions in infection control practices such as hand washing/antisepsis, use of personal protective equipment, waste management etc. More is written about this in chapter 2.1 and 2.2. Additional (transmission-based) precautions include airborne, droplet and contact precautions. Another aspect of infection prevention and control to keep in mind is the patients’ placement and transportation of them.

Environmental management practices has to do with the way the facility is designed and built, with ventilation systems, with creating a protective environment, safe drinking water, cleaning of the hospital environment, waste management, handling
laundry, reprocessing of instruments and equipment, cleaning, disinfection and sterilization (Samlee Plianbangchang, M.D., P.H. Shigeru Omi, M.D. 2004).

Also the care of healthcare workers is a part of infection prevention and control. This means that healthcare workers should at least be vaccinated against Hepatitis B and it is recommended to be vaccinated against varicella and yearly against influenza. Also it means that appropriate treatment, like Post Exposure Prophylaxis should be started when there is a risk on HIV after a needle stick or other ‘sharp’ injury (Samlee Plianbangchang, M.D., P.H. Shigeru Omi, M.D. 2004).

As written in chapter 1 this project is focussed on the following aspects, more about these aspects are explained in chapter 2.

1. Hand hygiene / hand washing
2. Personal protective equipment
3. Cleaning
4. Disposable waste
9.2 Motivation and supervision

Introduction

This chapter is an answer to sub question 7: “How can the staff be motivated and supervised to follow the protocols and standards?” In the project plan and in chapter 3 the way of measuring and proving the efficacy of following infection control protocols is described. This chapter describes possible methods to improve the adherence of healthcare workers to infection control protocols and policies. The information found is mostly about how to improve hand hygiene practices, but because hand hygiene is a big part of infection prevention and control practices, this is useful for the project and to choose a strategy.

This chapter gives answer to the following questions:

- What are barriers for adherence to hand hygiene practices? (9.2.1 ‘Barriers’)
- What strategies have been effectively used for the promotion of hand hygiene? (9.2.2 ‘Strategies’)
- How does education and supervision as strategy contribute to the adherence to hand hygiene practices, and what is included in the education? (9.2.3 ‘Education and supervision’)
- What can be learned and concluded from the past regarding the strategy of education and supervision? 9.2.4 ‘Conclusion’)

In chapter 3 the strategies are specified for this project.
9.2.1 Barriers

In every project or study with the objective to reduce hospital acquired infections by improving hand hygiene practices, there will be barriers. According to literature healthcare workers (HCWs) reported some factors for poor adherence with hand hygiene themselves (Pittet, D., 2000; WHO, 2005):

- Hand washing agents cause irritation and dryness;
- Sinks are inconveniently located/shortage of sinks;
- Lack of soap and paper towels;
- Often too busy/insufficient time;
- Understaffing and overcrowding of patients and relatives;
- Patient needs take priority;
- Following hand hygiene protocols gives the healthcare worker less time for the relationships with patients;
- Low risk of acquiring infection from patients;
- Beliefs that glove use obviates the need for hand hygiene;
- Lack of knowledge of guidelines/protocols;
- Not thinking about it/forgetfulness;
- No role model from colleagues or superiors;
- Scepticism regarding the value of hand hygiene;
- Disagreement with the recommendations;
- Lack of scientific information of definitive impact of improved hand hygiene on healthcare associated infection rates.
Some of these barriers have been assessed or quantified in observational studies. It can be concluded that especially the irritation of the skin is a substantial barrier to appropriate adherence (CDC, 2002, page 26). It has been proved that alcohol-based hand rubs are less irritating to the skin than soaps or detergents. Use of hand lotions reduces skin scaling and cracking.

Other major barriers are lack of time and wrong beliefs about the use of gloves. Depending on the situation, interventions can be considered, such as easy access to hand hygiene supplies; replacement of sinks and use of alcohol based hand rub (CDC, 2002, page 26). Education about the use of gloves is very important; hand washing or disinfections should always be performed after glove removal. These facts and factors must be considered before choosing a strategy or method to improve the adherence to infection control protocols.

### 9.2.2 Strategies

A big number of hospitals have been working on the promotion of hand hygiene (CDC, 2002, page 4). According to the Centres for Disease Control and Prevention (CDC) the promotion of hand hygiene in the healthcare setting has been a challenge for the last 150 years (CDC, 2002, page 28). In this report the CDC has gathered facts of thirty studies executed from 1980-2000. These studies were all about adherence to recommended hand hygiene practices. It is interesting to see what different methods are being used to improve the adherence, and how effective these methods where in that particular study.

To improve the quality of infection control by education, there are some necessary factors. These factors need to be considered all over the project of improving adherence to infection control policies. According to Kretzer and Larson (1998) the factors necessary for change are:

- Dissatisfaction with the current situation
• Perception of alternatives

• Recognition, both at the individual and institutional level, of the ability and potential to change.

The most successful strategies, according to CDC (2002, page 28) require education, motivation and system change. The CDC listed the following strategies that have been successfully used in the past.

Strategies with a direct focus on the non-adherence with hand hygiene practices:

• Education of the healthcare staff;

• Patient education;

• Routine observation and feedback;

• Engineering control;
  
  o Make hand hygiene possible, easy, and convenient;

  o Easy access to hand hygiene supplies;

  o Replacement of sinks;

  o Make alcohol-based hand rub available (at least in high-demand situations);

• Reminders in the workplace;

• Administrative sanction and/or rewarding;

• Change in hand hygiene agent.

Strategies for indirect improvement of hand hygiene practices:

• Promote and facilitate skin care for healthcare workers’ hands;

• Obtain active participation at individual and institutional level;
• Improve institutional safety climate;
• Enhance individual and institutional self-efficacy;
• Avoid overcrowding, understaffing, and excessive workload.

This list shows a wide and broad overview of possible methods and strategies. The choice of a certain strategy is totally dependant on the situation and the investigator.

In their guideline on infection prevention and control, Pratt and Pellowe (2007) conclude that single interventions only have a short term influence on hand hygiene practices. Feedback increased the rate of hand washing but must be regularly repeated. Placing alcohol-based preparations near the patients improves the frequency with which healthcare workers clean their hands. Most importantly, Pratt and Pellowe (2007, page 25) stressed that multi-faceted approaches have a more marked effect on hand hygiene and rates of HCAI.

But there are certain preconditions for choosing a strategy: “On the basis of both these hypothetical considerations and successful, actual experiences in certain institutions, strategies to improve adherence to hand-hygiene practices should be both multimodal and multidisciplinary” (CDC, 2002, page 28).

More specific interventions within these strategies can be very practical; for example relocating sinks, use of memos and posters, movies and brochures, introduction of hand-rub alcohol or alcohol gel (CDC, 2002). Other interventions can be; feedback and verbal reminders, lectures and demonstrations. Supervising the staff, promoting using protocols through classes, clarifying protocols and putting them in a visible place and letting colleagues remind each other.
9.2.3 Education and supervision

As described above education has been a major strategy to improve adherence to hand hygiene practices in the past. The Centres for Disease Control and Prevention (2002) describe that education is ‘the cornerstone for improvement with hand hygiene practices’. So education is very important when trying to reduce the number of HAIs. But when choosing for the strategy of education, one should always keep in mind that only education is not enough to make a change. The most effective ways of changing healthcare workers’ behaviour in following infection control protocols, are a combination of strategies.

The CDC (2002, page 25) describes that the following topics must be addressed in educational programmes;

1) Scientific information for the definitive impact of improved hand hygiene on healthcare–associated infection and resistant organism transmission rates;

2) Awareness of guidelines for hand hygiene and insufficient knowledge concerning indications for hand hygiene during daily patient care;

3) Knowledge concerning the low average adherence rate to hand hygiene by the majority of HCWs;

4) Knowledge concerning the appropriateness, efficacy and understanding of the use of hand hygiene and skincare protection agents.
9.2.4 Conclusion

As described in this chapter, there are a lot of factors that influence the effect of the educational strategy. As written it is necessary that there is dissatisfaction with the current situation, knowledge about the alternatives and recognition of the ability and potential to change (Kretzer and Larson, 1998).

According to the same authors requirements for a successful change are that the investigator questions basic beliefs, continuously monitors the process of behavioural change, takes the right interventions for long-term change and supports creativity for the individual and the group.

Throughout history it is clear that a process of change is very complex. Single interventions usually fail. That is why a multimodal and multidisciplinary strategy is necessary (CDC, 2002, page 26).

In all the strategies to improve adherence to hand hygiene, there is one basic value; the patients’ safety. Without this value which should be commonly shared, none of the strategies will work. The patients’ safety is the shared objective for all these strategies.
9.3 Protocols and guidelines used for the project

Introduction

As read in the literature study we choose to integrate guidelines described by two big organisations (see chapter 2.1). This chapter gives an overview of the guidelines. This information, together with the existing EHA protocols, is used to develop the observation list.

General

- Before a shift of clinical work begins, all wrist and ideally hand jewellery should be removed;
- Cuts and abrasions must be covered with waterproof dressings;
- Fingernails should be kept short, clean and free from nail polish. False nails and nail extensions must not be worn by clinical staff.

Hand hygiene

Appropriate hand hygiene can minimize microorganisms acquired on the hands during daily duties and when there is contact with blood, body fluids, secretions, excretions and known and unknown contaminated equipment or surfaces.

Hands should be washed or decontaminated:

- After handling any blood, body fluids, secretions, excretions and contaminated items;
- Before and after each episode of patient contact and between contact with different patients;
- When hands are visibly soiled or potentially grossly contaminated with dirt or organic material;
• Between tasks and procedures on the same patient to prevent cross contamination between different body sites;

• Immediately after removing gloves;

• After several consecutive applications of alcohol-based hand rub.

When decontaminating hands with the use of an alcohol based hand rub, hands should be free of dirt and organic material. The hand rub solution must come into contact with all surfaces of the hands. The hands must be rubbed together vigorously, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers, until the solution has evaporated and the hands are dry.

Alcohol based hand rub should be made available near patients in all healthcare facilities. Hand hygiene resources and individual practices should be audited at regular intervals and the results given back to the healthcare workers. Education and training in risk assessment, effective hand hygiene and glove use should form part of all healthcare workers’ annual updating.

**Use of personal protective equipment**

Using personal protective equipment provides a physical barrier between microorganisms and the wearer. It offers protection by helping to prevent microorganisms from contaminated hands, eyes, clothing, hair and shoes, being transmitted to other patients and staff.

Personal protective equipment includes gloves, protective eye wear (goggles), masks, aprons, gowns, boots/shoe covers and cap/hair covers.

Personal protective equipment should be used by:

• Healthcare workers who provide direct care to patients and who work in situations where they may have contact with blood, body fluids, excretions or secretions;
• Support staff, including medical aides, cleaners, and laundry staff in situations where they may have contact with blood, body fluids, secretions and excretions;

• Laboratory staff who handle patient specimens;

• Family members who provide care to patients and are in a situation where they may have contact with blood, body fluids, secretions and excretions.

**Principles for use of personal protective equipment**

Personal protective equipment reduces but does not completely eliminate the risk of acquiring an infection. It is important that it is used effectively, correctly, and at all times where contact with blood and body fluids of patients is anticipated. Continuous availability of personal protective equipment and adequate training for its proper use are essential. Staff must also be aware that use of personal protective equipment does not replace the need to follow basic infection control measures such as hand hygiene. The following principles guide the use of personal protective equipment:

• Personal protective equipment should be chosen according to the risk of exposure. The healthcare worker should assess whether they are at risk of exposure to blood, body fluids, excretions or secretions and choose their items of personal protective equipment according to this risk;

• Avoid any contact between contaminated (used) personal protective equipment and surfaces, clothing or people outside the patient care area;

• Discard the used personal protective equipment in appropriate disposal bags, and dispose according to the hospital policy;

• Do not share personal protective equipment;

• Change personal protective equipment completely and thoroughly wash hands each time you leave a patient to attend to another patient or another duty;
• Everyone involved in providing care should be educated about standard principles and trained in the use of protective equipment.

Gloves

Wear gloves (clean, non-sterile) when touching blood, body fluids, secretions, excretions or mucous membranes.

• Change gloves between contacts with different patients;
• Change gloves between tasks/procedures on the same patient to prevent cross contamination between different body sites;
• Remove gloves immediately after use and before attending to another patient;
• Wash hands immediately after removing gloves;
• Use a plain soap, antimicrobial agent or waterless antiseptic agent;
• Disposable gloves should not be reused but should be disposed according to the healthcare facility protocol;
• Sensitivity to natural rubber latex in patients, carers and healthcare personnel must be documented and alternatives to natural rubber latex must be made available.

Masks

• Wear a mask to protect mucous membranes of the mouth and nose when undertaking procedures that are likely to generate splashes of blood, body fluids, secretions or excretions. An example of an action can be the insertion of a central line;
• Wear surgical masks rather than cotton material or gauze masks. Surgical masks have been designed to resist fluids to varying degrees depending on the design of the material in the mask;
• Do not reuse disposable masks. They should be disposed according to the healthcare facility protocol.

Protective eyewear/goggles/visors/face shield

Wear protective eyewear/goggles/visors/face shields to protect the mucous membranes of the eyes when conducting procedures that are likely to generate splashes of blood, body fluids, secretions or excretions. If disposable, discard appropriately. If they are reusable, decontaminate them according to the manufacturers’ instructions.

Gowns and plastic aprons

• Wear a gown (clean, non-sterile) to protect the skin and prevent soiling of clothing during procedures that are likely to generate splashes of blood, body fluids secretions or excretions;

• Impermeable gowns are preferable;

• Remove a soiled or wet gown as soon as possible;

• A plastic apron may be worn on top of the gown to protect exposure to blood, body fluids, secretions and excretions;

• Launder gowns and aprons appropriately if they are reusable according to the hospital guidelines;

• Do not reuse disposable gowns and aprons. They should be disposed according to the healthcare facility protocol.

Caps and boots/shoe covers

• Wear caps and boots/shoe covers when it is likely that the patient’s blood, body fluids, secretions or excretions may splash, spill or leak onto the hair or shoes;
- Launder caps and shoe covers appropriately if they are reusable according to the hospital guidelines;

- Do not reuse disposable caps/shoe covers. They should be discarded according to the healthcare facility protocol;

- Clean and disinfect reusable boots.

**Patient care equipment**

Handle patient care equipment soiled with blood, body fluids secretions or excretions with care in order to prevent exposure to skin and mucous membranes, clothing and the environment. Besides, ensure that all reusable equipment is cleaned and reprocessed appropriately before being used for another patient.

**Linen**

Handle, transport and process used linen that is soiled with blood, body fluids, secretions or excretions with care to ensure that there is no leaking of fluid. For the transport of soiled linen a leak proof bag should be used in order to prevent leaking on the floor.

**Management of healthcare waste**

Uncollected, long stored waste or waste routing within the premises must be avoided. A sound waste management system needs to be developed and closely monitored.
**9.4 Results first observation**

**9.4.1 Culture report**

The following microbiological surveillance was taken from the nursing station in the intensive care unit.

<table>
<thead>
<tr>
<th>SNO</th>
<th>SOURCE</th>
<th>ORGANISM</th>
<th>PATHOGENS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Desk</td>
<td>1 fungal colony</td>
<td>Nil</td>
</tr>
<tr>
<td>2.</td>
<td>Telephone</td>
<td>4 Micrococci colonies</td>
<td>Nil</td>
</tr>
<tr>
<td>3.</td>
<td>File / case register</td>
<td>No growth</td>
<td>Nil</td>
</tr>
<tr>
<td>4.</td>
<td>Injection rack</td>
<td>No growth</td>
<td>Nil</td>
</tr>
<tr>
<td>5.</td>
<td>Clothes cupboard</td>
<td>No growth</td>
<td>Nil</td>
</tr>
<tr>
<td>6.</td>
<td>Exposed plates</td>
<td>16 colonies of Micrococci</td>
<td>Nil</td>
</tr>
</tbody>
</table>
9.4.2 Observation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length:</td>
<td>2x 12h</td>
</tr>
<tr>
<td>Amount of staff members:</td>
<td>36 (18 doctors, 12 nurses, 6 others)</td>
</tr>
<tr>
<td>Amount of patients:</td>
<td>15 patients, 1 admission and 5 transfers</td>
</tr>
</tbody>
</table>

9.4.2.1 Hand hygiene

The total amount of hand hygiene interventions was 592 and in only 14% of the situations a hand hygiene intervention was done (see table below). Hand alcohol was never used, because it was not yet available on the ward. So in all these 14% hand washing was done.

![Hand hygiene interventions 1](image)
The following table shows all the situations that have been observed within the 24 hours of the first observation. It gives an indication of which situations require most attention at the moment of the first measurement.

<table>
<thead>
<tr>
<th>Situations for hand hygiene intervention during observation period 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>before patient contact total 23%</td>
</tr>
<tr>
<td>between patient contact total 2%</td>
</tr>
<tr>
<td>after patient contact total 3%</td>
</tr>
<tr>
<td>after handling body fluids (blood, secretions, excretions) total 2%</td>
</tr>
<tr>
<td>after handling contaminated items total 4%</td>
</tr>
<tr>
<td>Between tasks and procedures on the same patient total 8%</td>
</tr>
<tr>
<td>after removing gloves 67%</td>
</tr>
<tr>
<td>after using the toilet 42%</td>
</tr>
<tr>
<td>before patient contact 4%</td>
</tr>
<tr>
<td>between patient contact 3%</td>
</tr>
<tr>
<td>after patient contact 2%</td>
</tr>
<tr>
<td>after handling body fluids (blood, secretions, excretions) 44%</td>
</tr>
<tr>
<td>after handling contaminated items 36%</td>
</tr>
</tbody>
</table>
| 'Before an aseptic task' (0%) and 'between tasks/procedures on the same patient' (0%) hand hygiene interventions were never done.

It has been observed that the ICU staff followed the hand hygiene protocols the best in the following situations: ‘after handling body fluids’ (44%), ‘after handling contaminated items’ (36%), ‘after removing gloves’ (67%) and ‘after using the toilet’ (42%).

During the observation 54% of the ICU staff did not ‘remove their jewellery’. One person (5%) had a cut/abrasion and had covered this. Six persons (25%) had long fingernails or nail polish.
9.4.2.1.1 Percentage of right interventions per observation

- before patient contact total
- between patient contact total
- after patient contact total
- After contact with patients environment total

- after handling body fluids (blood, secretions, excretions) total
- after handling contaminated items total
- between tasks and procedures on the same patient total
- immediately after removing gloves total
- before aseptic task total

- after using the toilet total
- before eating total
- after eating total

[90]
9.4.2.2 Gloves

Gloves were worn in 53% of the total amount of situations that the use of gloves was required (see first table on this page). In 19% of the total amount of situations that gloves were used, gloves were worn unnecessarily. In 38% of the situations gloves were not worn. Sterile gloves were not worn at all during this observation.
The table on this page shows every situation that is observed during the 24 hours of observation and the results. The results show the adherence to the protocol of wearing gloves in that particular situation.

Gloves were never changed ‘between contact with different patients’ (0%). Also the gloves were never ‘changed between tasks/procedures on the same patient’ (0%) although there were only seven situations. For the situations ‘touching mucous membranes’ gloves were always worn (100%), but there were only two situations. In 55% of the situations with ‘a risk of exposure to body fluids’ gloves were worn. In this situation the gloves protocol was observed the best.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not Applicable</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed shoes are worn</td>
<td>13</td>
<td>23</td>
<td>0</td>
<td>36</td>
</tr>
<tr>
<td>%</td>
<td>36.1</td>
<td>63.8</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Jewellery (hand and wrist) removed</td>
<td>11</td>
<td>13</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>%</td>
<td>45.8</td>
<td>54.1</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Cuts and abrasions covered</td>
<td>1</td>
<td>0</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>%</td>
<td>5</td>
<td>0</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Fingernails short, clean and free from nail-polish</td>
<td>18</td>
<td>6</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>%</td>
<td>75</td>
<td>25</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>
9.4.2.3 Personal protective equipment

The 'use of personal protective equipment' (mask, protective eyewear, gown/apron and covers shoe/hair) was observed in only two situations. The 'closed ICU shoes were used' by 36% of all the staff who had patient contact (see table page 92)

<table>
<thead>
<tr>
<th>Equipments used during procedures that are likely to cause splashing, spilling or leaking</th>
<th>Mask</th>
<th>Mask</th>
<th>Protective Eyewear</th>
<th>Protective Eyewear</th>
<th>Gown</th>
<th>Gown</th>
<th>Covers</th>
<th>Covers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Soiled or wet equipments are immediately removed</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Covers</td>
<td>Covers</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Unnecessary use</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[93]
9.4.2.4 Cleaning

The soiled linen was not always ‘transported in a leak-proof way’ (two out of three times). The ‘soiled linen was immediately removed from the bedside’, although this was only one situation. The ‘toilets’ and ‘bathrooms’ were cleaned once a day as required, and the ‘sinks’ and the ‘outside bed side lockers’ were never cleaned during the first observation. Beds were cleaned in case they were ‘dirty’ and ‘after discharge or transfer’. ‘Floors were swept’ once a day, while this should be done every shift, which means three times a day. The ‘damping of the floor’ was done enough times according to the protocol; once a day.

<table>
<thead>
<tr>
<th>Observation</th>
<th>Percent No</th>
<th>Percent Yes</th>
<th>Situations No</th>
<th>Situations Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soiled linen is transported in a leak-proof way</td>
<td>33.3</td>
<td>66.7</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Soiled linen is immediately removed from the bedside</td>
<td>100.0</td>
<td>0.0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Toilets are cleaned</td>
<td>100.0</td>
<td>0.0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Bathrooms are cleaned</td>
<td>100.0</td>
<td>0.0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Sinks are cleaned</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Outside of bed side lockers are cleaned</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dirty beds are cleaned</td>
<td>100.0</td>
<td>0.0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Beds are cleaned after discharge or transfer</td>
<td>25.0</td>
<td>75.0</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Excretion on the floor is immediately cleaned with a chemical disinfectant</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Walls and ceilings are swept*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bed side lockers are thoroughly cleaned*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ward is carbolized*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Floors are swept</td>
<td>100.0</td>
<td>0.0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Floors are damped</td>
<td>100.0</td>
<td>0.0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
9.4.2.5 Waste disposal

Most of the waste was disposed by colour, but especially the blue bucket was not rightly disposed; there was waste from other ‘colours’ in this bucket. Only once a day, the waste was removed. The materials were disposed by the one that used it in all the 14 situations. Disposable materials have been reused in four situations.

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
<th>Absolute</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yellow</td>
<td>66.7</td>
<td>33.3</td>
</tr>
<tr>
<td>Red big</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Red small</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Blue big</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Blue small</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>White</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Closed container</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Waste is removed from ward</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Materials (syringes, sharps and needles) are disposed by the one that used it</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Disposable materials are not reused</td>
<td>0.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
9.5 Results second observation

9.5.1 Culture

The following microbiological surveillance was taken from the reception section of the intensive care unit from the same places as the first measurement (see 9.4).

<table>
<thead>
<tr>
<th>SNO</th>
<th>SOURCE</th>
<th>ORGANISM</th>
<th>PATHOGENS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Desk</td>
<td>4 Micrococci colonies</td>
<td>Nil</td>
</tr>
<tr>
<td>2.</td>
<td>Telephone</td>
<td>2 Micrococci colonies</td>
<td>Nil</td>
</tr>
<tr>
<td>3.</td>
<td>File / case register</td>
<td>1 fungal colony</td>
<td>Nil</td>
</tr>
<tr>
<td>4.</td>
<td>Injection rack</td>
<td>4 Micrococci colonies</td>
<td>Nil</td>
</tr>
<tr>
<td>5.</td>
<td>Clothes cupboard</td>
<td>10 ASF colonies</td>
<td>Nil</td>
</tr>
<tr>
<td>6.</td>
<td>Exposed plates</td>
<td>8 cols of Micrococci 1 ASF</td>
<td>Nil</td>
</tr>
</tbody>
</table>

9.5.2 Observation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length:</td>
<td>2x 12h</td>
</tr>
<tr>
<td>Amount of staff members:</td>
<td>44 (19 doctors, 16 nurses, 9 others)</td>
</tr>
<tr>
<td>Amount of patients:</td>
<td>13 patients, 2 admissions and 2 transfers</td>
</tr>
</tbody>
</table>
9.5.2.1 Hand hygiene

In the first table on this page it is visible that during the second observation the total amount of situations for hand hygiene interventions was 722. In 39% of all the situations the staff did a hand hygiene intervention. The alcohol based hand rub was used in 59% and the soap in 41% of the situations.

![Total amount of hand hygiene interventions 1](image)

![Use of hand alcohol or handwash](image)
The following protocols of hand hygiene had the best adherence. In 52% of the situations ‘after patient contact’ the ICU staff followed the protocols (all the tables about the adherence per situation can be found on the next page, with the results of using hand alcohol or hand wash). For the situations ‘after handling contaminated items’ the staff followed the protocol for 84%. In 83% of the situations ‘after removing gloves’ a hand hygiene intervention was done. ‘After using the toilet’ the staff washed their hands in 93% of the cases.

In the situations ‘before patient contact’ 24% of the staff used an intervention. In 32% of the situations ‘after handling body fluids’ the ICU staff observed the protocol. ‘Between tasks and procedures on the same patient’ in 17% of the cases the staff used a hand hygiene intervention. The adherence was 15% ‘before an aseptic task’. In these situations the adherence was the lowest in comparison with all the hand hygiene protocols.

In five situations the staff ‘washed their hands after several applications of hand alcohol’; this was mostly after the vital rounds.

In all the interventions done, the hand alcohol was used right; the hands were not visibly soiled or dirty when applying the alcohol.

Of all the ICU staff 53% did not remove their jewellery. One person (2%) did not cover a cut/abrasion. Three persons (7%) had long fingernails or nail polish.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed shoes are worn</td>
<td>13</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>%</td>
<td>30</td>
<td>70</td>
<td>-</td>
</tr>
<tr>
<td>Jewellery (hand and wrist) removed</td>
<td>20</td>
<td>23</td>
<td>-</td>
</tr>
<tr>
<td>%</td>
<td>47</td>
<td>53</td>
<td>-</td>
</tr>
<tr>
<td>Cuts and abrasions covered</td>
<td>0</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>%</td>
<td>0</td>
<td>2</td>
<td>97.67</td>
</tr>
<tr>
<td>Fingernails short, clean and free from nail-polish</td>
<td>40</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>%</td>
<td>93</td>
<td>7</td>
<td>-</td>
</tr>
</tbody>
</table>
9.5.2.2 Gloves

In 36% of the situations gloves were used right and in 16% of the situations no gloves have been used (see first table on this page). Gloves have been used unnecessarily in 48% of the situations; 23 pairs of sterile gloves and 12 pairs of disposable gloves have been used unnecessarily (second table on this page). In most of the situations that sterile gloves were used, disposable gloves were required.

The adherence to the glove protocols has been measured separately in different situations. The following numbers show the adherence to that particular situation and can be seen in the table on page 101. Gloves were regularly used ‘during invasive
procedures’ (66%), ‘when risk of exposure to body fluids’ (82%) and ‘when touching mucous membranes’ (100%; these were only two situations).

The ICU staff almost never changed their gloves ‘between contact with different patients’ (2%) and ‘between tasks/procedures on the same patient’ (6%). In more than 60% of the situations ‘gloves were immediately removed after use’.
9.5.2.3 Personal protective equipment

During this second observation, there was no need and use of ‘personal protective equipment’ (mask, protective eyewear, gown/apron and covers shoe/hair). Of the ICU staff who had patient contact, 30% was ‘wearing the closed ICU shoes’ (see page 98).

9.5.2.4 Cleaning

The soiled linen was always (both days) transported in a leak-proof way on a trolley. The toilets were only cleaned once a day. One out of four times the staff did not clean the beds with a disinfectant after discharge or transfer of patients. Floors were swept once or twice a day. shift. See chapter 9.6.4 for the table.

9.5.2.5 Waste disposal

Most of the waste was disposed by colour, except for the two red buckets. During the observation period the waste was removed only once a day, while it should be done twice a day. In 2% of the situations the materials (syringes, sharps and needles) were not disposed by the one that used it. Only in two situations disposable materials were reused. See chapter 9.6.5 for the table.
9.6 Comparison first and second observation

9.6.1 Right hand hygiene interventions

These tables show the difference between the first and second observation with the different hand hygiene protocols. The results are described in chapter 4.
9.6.2 Right use of gloves

- **First observation**
- **Second observation**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>First Observation</th>
<th>Second Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worn during invasive procedure total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worn when risk of exposure to body fluids total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worn when touching mucous membranes total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Scenario**
- **First Observation**
- **Second Observation**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>First Observation</th>
<th>Second Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changed between contacts with different patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changed between tasks/procedures immediately after use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Removed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 9.6.3 Others (personal protective equipment and hand hygiene)

<table>
<thead>
<tr>
<th>Number of observation</th>
<th>Yes</th>
<th>No</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed shoes are worn</td>
<td>13</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>36.1</td>
<td>63.8</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed shoes are worn</td>
<td>13</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>%</td>
<td>30</td>
<td>70</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jewellery (hand and wrist) removed</td>
<td>11</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>45.8</td>
<td>54.1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jewellery (hand and wrist) removed</td>
<td>20</td>
<td>23</td>
<td>-</td>
</tr>
<tr>
<td>%</td>
<td>47</td>
<td>53</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuts and abrasions covered</td>
<td>1</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>%</td>
<td>5</td>
<td>0</td>
<td>95</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuts and abrasions covered</td>
<td>0</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>%</td>
<td>0</td>
<td>2</td>
<td>97.67</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fingernails short, clean and free from nail-polish</td>
<td>18</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>75</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fingernails short, clean and free from nail-polish</td>
<td>40</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>%</td>
<td>93</td>
<td>7</td>
<td>-</td>
</tr>
</tbody>
</table>
### 9.6.4 Cleaning

<table>
<thead>
<tr>
<th></th>
<th>First measurement</th>
<th>Second measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Soiled linen is transported in leak-proof way</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Soiled linen is immediately removed from the bedside</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Toilets are cleaned</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Bathrooms are cleaned</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sinks are cleaned</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Outside of bed lockers are cleaned</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Dirty beds are cleaned</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Beds are cleaned after discharge or transfer</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Excretion on the floor is immediately cleaned with a chemical disinfectant</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Walls and ceilings are swept*</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bed side lockers are thoroughly cleaned*</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ward is carbolized*</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Floors are swept</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Floors are damped</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
### 9.6.5 Waste disposal

<table>
<thead>
<tr>
<th></th>
<th>First measurement</th>
<th></th>
<th></th>
<th>Second measurement</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yellow</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red (big)</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red (small)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue (big)</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue (small)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed container</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste is removed from ward</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials (syringes, sharps and needles) are disposed by the one that used it</td>
<td>14</td>
<td>0</td>
<td>47</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disposable materials are not reused</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[107]
### 9.7 Observation list

#### 1. Hand hygiene

<table>
<thead>
<tr>
<th>Total amount of hand hygiene interventions done:</th>
<th>Alcohol</th>
<th>Hand wash</th>
<th>No action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right use</td>
<td>Wrong use</td>
<td>Right use</td>
</tr>
<tr>
<td>before patient contact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>between patient contact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>after patient contact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>after contact with patients' environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>after handling body fluids (secretions, excretions and blood)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>after handling (possible) contaminated items</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>between tasks and procedures on the same patient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>immediately after removing gloves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>after using the toilet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>before aseptic task</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>before eating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>after eating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>after several consecutive applications of alcohol-based hand rub</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[108]
## 2. Personal protective equipment

### 2.1 Gloves

<table>
<thead>
<tr>
<th>Total of gloves (disposable and sterile):</th>
<th>Situations that disposable gloves are used:</th>
<th>Situations that sterile gloves are used:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right</td>
<td>Unnecessary use</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gloves are:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>used during invasive procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>used when risk of exposure to body fluids (secretions, excretions, blood)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>used when contact with the mucous membranes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>changed between contacts with different patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>changed between tasks/procedures on the same patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>removed immediately after use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2.2.2 Other personal protective equipments

<table>
<thead>
<tr>
<th>Mask</th>
<th>Protective eyewear</th>
<th>Gown/apron</th>
<th>Covers (shoe/hair)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipments used during procedures that are likely to cause splashing, spilling or leaking blood, body fluids, secretions or excretions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soiled or wet equipment is immediately removed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unnecessary use of equipment</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

[109]
### 2.2.3 Others (personal protective equipment and hand hygiene)

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed shoes from ICU are worn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jewellery (hand and wrist) removed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuts and abrasions covered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fingernails short, clean and free from nail-polish</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3. Cleaning

N = Night duty, M = Morning duty, E = Evening duty

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soiled linen is transported in leak-proof way</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soiled linen is immediately removed from the bedside</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleaning of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathrooms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sinks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outside of bed side lockers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dirty beds are cleaned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beds are cleaned after discharge or transfer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excretion on the floor is immediately cleaned with chemical disinfectant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walls and ceilings are swept*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bed side lockers are thoroughly cleaned*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward is carbolized*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floors are swept</td>
<td>N</td>
<td>M</td>
</tr>
<tr>
<td>Floors are damped</td>
<td>N</td>
<td>M</td>
</tr>
</tbody>
</table>
4. Disposable waste

<table>
<thead>
<tr>
<th>Waste is disposed by colour</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red (big)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red (small)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue (big)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue (small)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed container</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Waste is removed from ward

Materials (syringes, sharps and needles) are disposed by the one that used it

Disposable materials are not reused
9.8 Explanation observation list

Instructions for
Infection prevention and control observation list

Introduction
The observation list is developed by using information written by international accepted organizations, like the World Health Organization (WHO) including the five moments developed by the WHO. Besides that specific standards for EHA are used. The observation list is developed especially for the ICU, but can be easily used for other wards as well. When used for another ward, the observation list needs to be evaluated before use.

Purpose of the observation list
To determine the staffs compliance to protocols and standards for infection prevention and control.

Period
During a period of two days, for 12 hours a day all the staff (and the cleaner) who enters the ward and has patient contact will be observed. The number of observing persons is dependent on the time and the number of colleagues working, but should be at least two at the time to miss as little situations as possible.

Instructions
The following instructions explain each table in the observation list.
On each sheet of the observation list, the date has to be recorded.

1. Hand hygiene
In the first box the total amount of hand hygiene interventions done by the staff has to be recorded. It is possible that for one situation several boxes can be marked, therefore the exact amount of interventions has to recorded in the first
box. For the option ‘no action’ though, only one option can be recorded per situation to make the total amount of missed opportunities visible.

When a staff member leaves the patient during a procedure to do something else such as getting some gauzes and comes back, it has to be counted as a new patient contact situation.

The first column shows the possible situations. The undertaken interventions by the staff can be recorded in the next columns. For example if a staff member is using hand alcohol after removing gloves, the box in the column ‘hand alcohol’ has to be marked in the row ‘immediately after removing gloves’.

‘Right use’ and ‘wrong use’ refers to the rule that hand washing has to be done if the hands are visibly dirty, so these columns show if the staff is choosing the right intervention (hand alcohol or hand washing) at the right time.

The column ‘no action’ refers to all the situations where the staff should have done an intervention, but missed this opportunity.

Some of the situations are explained below:

**Before, between, after patient contact:** every time before and after patient contact hands should be washed or hand rubbed with alcohol. When a staff member does or does not clean the hands in between patient contacts, for example while checking the vitals of all patients, it should only be marked behind the situation ‘between patient contact’ and not before and/or after patient contact.

**After contact with patient environment:** patient environment means everything surrounding the patient or things that the patient is using such as the blankets, the IV standard and IV-lines, heart monitor etc.

**After handling body fluids:** examples are oral/dental care, secretion aspiration, drawing and manipulating blood, clearing up urine, faeces, handling waste.

**After handling (possible) contaminated items:** examples are tubes in which blood is collected and contaminated instruments.

**Between tasks and procedures on the same patient:** an example is when mouth care and wound dressing is done on one patient. The hands should be cleaned in between these two tasks.

**Before aseptic task:** before every task where working in a aseptic way is very important such as: oral/dental care, secretion aspiration, wound dressing, catheter insertion, preparation of food, medications.
Before and after eating: record only when food or snacks are eaten on the ward.

After several consecutive applications of alcohol based hand rub: It has to be marked if the hands are washed after several applications if it is happening or not and the amount of times.

2. Personal protective equipment
2.1 Gloves
In the first line of the first table the total amount of gloves (sterile and disposable gloves together) that are used has to be recorded. The rest of the first table is meant for all the situations that disposable and sterile gloves are used. It has to be recorded if a staff member wore the gloves in the right situation. If it was unnecessary or the gloves were not worn at all when it was required, this has to be recorded for the disposable and sterile gloves separately.

The second table is to record every time the staff is using gloves (disposable or sterile) in that specific situation. If a staff member is not wearing gloves in a specific situation mentioned, it has to be marked in the ‘no’ column. It is possible that for one situation several boxes can be marked. If gloves are not removed in between contact with several patients, record this behind the row ‘changed between contact with different patients’. Only after contact with the last patient, record that the staff member has not removed the gloves immediately.

An invasive procedure means every situation where body cavities are entered such as catheter insertion and intravascular procedures.

Do not forget to include the cleaner in recording the use of gloves. The cleaners have to use gloves when handling waste and laundry because of the risk of exposure to body fluids.

2.2 Other personal protective equipment
In this table the possible answers are ‘mask’, ‘protective eyewear’, ‘gown/apron’ or ‘covers for shoe/hair’. For every situation that can cause splashing, spilling of leaking it has to be observed what is used by the staff. For example, when somebody is wearing protective eyewear in a situation in which protective eyewear is not necessary, the row ‘unnecessary use of equipment’ has to be marked. It will not be recorded when cleaners are wearing linen masks because the usual purpose is to protect against dust and not to protect against body fluids.

2.3 Others (personal protective equipments and hand hygiene)
These four rows have to be marked one time for every person coming to the ward and only if that person has patient contact. This is done to be able to show how many people are following these particular rules. Officially closed shoes have to be worn on the ward. Because these are not available at ICU, the closed shoes (crocs) have to be chosen in stead of slippers when observing the ICU. For other wards, closed shoes are right.

3. Cleaning
Every situation has to be recorded. The sign * that is written in several boxes indicates that this particular observation might be missed during the observation period. This is because the bed side lockers only have to be washed thoroughly twice a week, and the ‘walls and ceilings’ and ‘carbolization’ has to be done once a week. So after the observation period, it has to be asked to a staff member if this has happened in the five days before the observation period. Then these boxes can be filled in. The boxes ‘floors are swept’ and ‘floors are damped’ are separated into the several shifts because the sweeping has to be done every shift.
N= night duty, M = morning duty and E = evening duty.

4. Disposable waste
In this table the box ‘waste’ is divided by the colours of the waste bins. Before the waste bins are emptied, the observer has to check the waste bins to see if the waste is separated in the right way. So every colour has to be checked and recorded separately.
The recording has to be done at the moment of emptying the waste bins. This is a precaution of double marking when the observers change during the time of observation. If the waste bins are not emptied by the end of the day, the bins have to be checked on correct disposal. At the end of the day, the observer will check all the bins and write ‘not removed from ward’.

The materials that should be ‘disposed by the one that used it’ can be recorded every time this situation occurs.

**Processing of data**
After the observation period, the data have to be processed in Excel. Then conclusions can be drawn and the results can be presented to the staff on the ward.
9.9 Teachings

Introduction

This chapter contains the teaching plans that were made for all the teachings or presentations. After every teaching an evaluation is written, which is included in this paragraph.

9.9.1 Orientation meeting

Objectives

1. After the orientation meeting the ICU staff is informed about the project and willing to cooperate during the project.

2. After the orientation meeting the ICU staff is motivated for improvement of the ICU in the aspect of infection prevention and control.

Teaching plan

Start of with a story of hand hygiene in USA (Leonard)

Introduction (Astrid)

- Objectives meeting,

- World wide problem, not blaming the Indian ICU at HCH

Explain project (Miriam)

- Explain Infection prevention and control - HAIs

- Focus of project on the four subjects

- Objectives project (To measure and prove the efficacy of infection prevention and control protocols and standards. To motivate the staff on the ICU to follow infection prevention and control protocols and standards.)

- Methodology (our project step by step)
Results (Leonard)

- Presenting results of the culture
- Presenting results of the observation for hand hygiene and gloves

Follow up, how to continue (Astrid)

- Teaching, motivation.
- Provision of hand alcohol, soap dispensers, elbow tap, protocol book, order of gloves, posters

Conclusion (Astrid)

- Summary
- Question
- Picture of all attendants and tea

Evaluation

On the 10th of February we had an introduction meeting about our project in the library. We started to read a paragraph from first chapter of the book ‘Better’ by Atul Gawande. In the introduction it was explained what the goals of this meeting were and that this project is not to blame anyone but just to help. In the body of the presentation, the project was explained by telling about HAIs and the focus, objectives and methodology of our project. After this the results of the observation were shown and explained. To reach the objectives, the last part of the body was to tell about how this project would continue the coming weeks. So in this part the coming teachings and the provisions on the ICU were explained. In the conclusion the meeting was summarized and there was time for questions.
Although the meeting started the Indian time, twenty minutes later than planned, the class seems to be a success; people were listening, were interested and even more people then we expected joined the class. In fact twenty-one people were there; nurses from ICU and OT, senior doctors, DNB-doctors and the microbiologist joined the meeting. It was a little bit sad that only four nurses of ICU could join the meeting.

During the time for questions only the senior doctors asked questions. One question was about the methodology of observation, that it was maybe better to change the way of observing, so that the staff would not know that the observation was going on. Afterwards we talked with this doctor, Dr. Biswas, to understand more of his feedback. His feedback was that the observation should be done more silently, in a way that the colleagues do not know that they are being observed. An example from him was to help in the work and in the meantime do the observations. We said that to observe in such a way is impossible, because you have to be very exact in observing. The next problem is that the ICU is very small, so you can’t find a quiet corner to observe, when you are there, everybody will see you. He left us with the advice to think about improvement in observation.

There were also questions about the culture. The microbiologist made a report about the cultures, but before we could have the report it had to be signed by Dr. Mitra. Because that was not yet done, we didn’t have the exact outcomes of the report, which made it difficult to answer the question. It was good that the microbiologist himself attended the meeting, so that he could answer these questions (it is not in our profession).

After the presentation, people were thankful and said they found it very interesting. Some asked questions about a personal situation in the ward, and what intervention would be appropriate.

The group picture (and the tea) at the end of the meeting, worked out very well. Indians like to be in a picture and hopefully this will give a bond between the staff. So that they feel, they work together to get a higher level of hygiene on the ICU.
In this presentation, there was not much interaction; only at the end we had questions. For the next meetings we will keep in mind to interact more with all the staff, not only with the seniors. In the next meetings interaction is very important to make them familiar with the protocols. Also during the question at the end, we should encourage the other staff members more to ask questions as well.

**After the orientation meeting the ICU staff is informed about the project and willing to cooperate during the project.**

During the meeting we explained our project, the relation with hospital acquired infections and what our objectives within the project are. Also we talked about the methodology and about ‘how to continue’, so every one now knows what the plans are for the coming month. Especially the picture and the tea helped to get cooperation between the staff and also between the staff and us.

**After the orientation meeting the ICU staff is motivated for improvement of the ICU in the aspect of infection prevention and control.**

After a theoretical part about HAIs we brought the subject closer to the staff by presenting the results and explaining how they are involved in the rest of the project.

We announced the several materials which will be provided on the ICU. This included hand alcohol, more dry towels, elbow taps, soap dispensers, development of a book with protocols, more gloves and hand cream. This will help to motivate them more, because they have the idea that everything for improvement is available. During the meeting, the attendants seemed to be interested and listening.
9.9.2 Teaching about hand hygiene

Objectives

1. After this meeting the ICU staff has knowledge about hand hygiene protocols.

2. After the meeting the ICU staff is motivated to put the protocols into practice in the daily work at the ICU.

Presentation

Introduction (Leonard)

- Summarize orientation meeting
- Importance of hand hygiene
- Show results hand hygiene

Teaching about the hand hygiene protocols (Astrid)

- Hand washing
- Use of alcohol based hand rub
- When hand washing, and when alcohol based hand rub
- Hand cream
- Show book of protocols
- Introduce elbow tap and explain right use

Practice of the protocols (interaction) (Miriam)

- Hand washing technique
- Alcohol technique

Question and answer? (Miriam)
On the 12th of February we gave an education class on the subject of hand hygiene. This time six nurses from the ICU were present, the nurse superintendent, two senior doctors, about ten junior doctors and a few people from other departments. Some of them though came only halfway our presentation.

Leonard started the presentation with describing a MRSA case in Holland and the interventions that had taken place. After that he gave an introduction of the class, described the objectives and gave a summary of the orientation meeting. He asked the attendants if they could remember the definition of Hospital Acquired Infections, but no one responded. He summarised the importance of infection prevention and control and presented the most important results of the observation.

Astrid explained the protocols on hand hygiene and why they are important. She explained the situations when hand hygiene interventions have to take place and when hand washing or the use of alcohol based hand rub is required. After that she mentioned the provisions we had taken care of.

Miriam explained the technique of hand washing or using alcohol based hand rub in an interactive way. For the PowerPoint presentation Astrid and Leonard had taken pictures of several nurses acting one of the steps of the hand washing technique. Together with official drawings we had put the photos with it on each slide. Each step of the technique was presented separately and acted out by Miriam while she
encouraged the attendants to act out as well. Most of the attendants were actively participating although with the first step more people were participating than with the last step. After practicing the technique, several questions were asked to help people remember in which situations they have to clean their hands. They were asked to stand up if they thought the answer was yes and they could stay on their seats if they thought the answer was no. Most answers were yes, so people had to stand up quite a bit what not everyone was doing. Some people preferred to raise their hands instead. At least the attendants were participating very actively. After each question Miriam gave a short explanation. After the class we received from many people positive feedback. Some of the junior doctors were practicing the steps of hand cleaning technique again during the tea break, some were asking scientific questions, others told us that this teaching should be given for the whole hospital. The anaesthetist was very positive about our presentation. He asked us where we had learned to give presentations, because he found the order of the presentation very good, the use of visual aids and the interactive part. The only comment he had, was that after each question a next slide should present the answer so that it would even stick more in people’s mind.

*After this meeting the ICU staff has knowledge about hand hygiene protocols.*

In order to reach this objective, a presentation in PowerPoint was given to explain the hand hygiene protocols. First the importance was explained and then all the rules. Beside explanation of the rules, also the use of alcohol based hand rub and soap was explained. To check whether the ICU staff has understood and remembered the most important information and also to help them remember the most important information even more, questions were asked. To help them remember the hand hygiene protocols even more, a poster with the 5 moments of hand washing is put on the ward and a book with the protocols are kept on the ward.
After the meeting the ICU staff is motivated to put the protocols into practice in the daily work at the ICU.

We explained the results of the observation and used that to encourage them to improve. Besides that we explained that the patient’s safety should be a motivation to apply proper hand hygiene. We encouraged them to improve. During the meeting the ICU staff showed motivation by actively participating in practicing the hand hygiene technique and answering the questions. The response after the meeting was positive of several doctors and nurses which is a good sign of motivation to follow up the protocols. To find out if the ICU staff is really motivated to put the hand hygiene protocols into practice though, we will discover in the next weeks.

9.9.3 Teaching about personal protective equipment

Objectives

1. After this meeting the ICU staff has knowledge about the personal protective equipment protocols and the right use of gloves.

2. After the meeting the ICU staff is motivated to put the protocols into practice in the daily work at the ICU.

Presentation

Introduction (Miriam)

- Summarize hand hygiene meeting
- Objectives
- Movie

Personal protective equipments (Astrid)

- Protocols
• Results

Gloves (Leonard)

• Explain glove – protocol
• Unnecessary use of sterile and non sterile gloves
• Results of observation
• Order more gloves if necessary

Conclusion (Astrid)

• Summary
• Next meeting (Thursday 5th March - 3.00pm)
• Week community health, after that back on the ward
• Questions

Evaluation

Six nurses, the nursing superintendent, four doctors, and some other people were present, but especially the doctors came in late because the OPD was very busy. The nursing superintendent forgot the meeting and organized a meeting for some nurses with Mr. Johnson at 4.00pm. When we phoned her at 3.15 she had to cancel that meeting and call the nurses again, but at 3.45pm the nurses were present in the library and we could start.

Miriam started with summarizing last class about hand hygiene. The attendants were asked at what moments hand hygiene interventions should be done, and they knew about 7 of the 10 moments. By asking this we could see if the attendants could still reproduce the information we gave in the last class. At the same time interaction was stimulated in this way, and it worked also because the answers started coming.

Rest of the presentation??
After this meeting the ICU staff has knowledge about the personal protective equipment protocols and the right use of gloves.

We separated the personal protective equipments (mask, protective eyewear, gown/apron shoe-/hair cover) with the gloves, so that the topic of gloves could be emphasized. We have chosen this because gloves are used very commonly, and because the right use is also very important. The results of the first observation were that there are a lot of missed opportunities, but also a lot of unnecessary use of gloves. That is why it is chosen to give more emphasis to the right use gloves. After the meeting an American visitor (also a nurse) gave the feedback that the information was very clear. According to her we summarized properly so that the information became clear to the attendants. One of the nurses told us that she found we brought the information in an interesting way, so that the information became clear.

After the meeting the ICU staff is motivated to put the protocols into practice in the daily work at the ICU.

For both of the topics (PPE and gloves) we first explained the protocol and then showed the results. We did this to give them a change to both get the knowledge about the protocols, but at the same time see the change that is needed at the ward to reach the standards.

At the moment the results about gloves were presented, we tried to encourage them to reach 100% adherence to glove protocol. In the time to come it has to be observed if the staff is really motivated, and continuous encouragement at the ward is needed.
9.9.4 Meeting about all four subjects (incl. cleaning and waste disposal) - summary

Objectives

1. After this meeting the ICU staff has knowledge about all the infection protocols, including waste disposal and cleaning.

2. After this meeting the ICU staff is motivated to put the protocols into practice in the daily work at the ICU.

Teach plan

Introduction (Astrid)

- News article Hepatitis B outbreak
- Objectives meeting
- Good progress on ICU and follow protocols for patients' safety

Hand Hygiene protocol (Astrid)

- Main reasons and general rules
- Situations (five moments)
- Hand rub or hand washing

Personal protective equipment (Leonard)

- General principles
- Protocol gloves
- Why and when using gloves

Waste disposal (Miriam)

- Protocol
Results

Cleaning (Miriam)

- Protocol
- Results

Conclusion (Leonard)

- Movie; Am I at risk?
- Summary
- Meeting with ICU nurses afterwards and final presentation
- Questions

Evaluation

On the 10th of March we had our fourth meeting for the ICU staff, this time it would include all the protocols concerning infection prevention and control. The meeting started with the news article about a hepatitis outbreak in Ahmedabad on the 22nd of February. To show the importance of good waste disposal and the use of sterile needles through this article. Further in the introduction we explained that using the protocols is for the patients' safety and not for us or this project. And we gave a compliment that there was a good progress and that we saw an improvement on the ICU.

After that we started with talking about hand hygiene, it was the third time that we talked about this topic. For that we used a lot of interaction and asked the nurses what they knew. Only some of the nurses were reacting on the questions; they did know the right answers. The protocol of professional protective equipment was also explained, with the help of interaction.

After this we introduced the two new protocols; waste disposal and cleaning. We first explained the protocol and after that showed the results of the observation.
In the conclusion we showed a movie (‘Am I at risk?’) from an Indian hospital about infection control. One bad thing about the movie was that they were wearing jewellery. We asked what was wrong in the movie, but the nurses couldn’t answer, when we told them ‘jewellery’ they all totally agreed and saw that it was wrong.

Then we summarized the meeting and gave time for questions. There was one question from the maintenance manager if it was possible that the nurses would remind the cleaners in there work if they forget something. We said that the nurses had to take responsibility in this and remind the cleaners. Another question was about the movie; why you should not squeeze your finger after a needle-injury. Actually this was not part of our project, and we also didn’t know the answer (also nobody else knew the answer).

The presentation was a success if you look at the interaction. Although only a few nurses were interacting, but they knew the right answers.

It was a little bit disappointing that only eight nurses (also from other wards), the nurse superintendent, one doctor and maintenance manager where attending. Maybe it was good that not so much people were there so that the nurses feel more comfortable to interact and ask questions. It was very good that the maintenance manager was there; he can explain the protocols to the cleaners and talk with them about it. (We gave him a copy of the cleaning and waste protocols)

We had planned a group discussion after the meeting, but the ICU nurses did not appear. So we shifted the discussion to the day after the meeting.

*After this meeting the ICU staff has knowledge about all the infection protocols, including waste disposal and cleaning*

During the meeting we talked about all the protocols. And through the interaction we could know that the nurses knew the main rules of the protocols. Also during our supervision on the ward we can test and see if the staff has the knowledge about the protocols. And give feedback if they do not do an intervention at the right time.
After this meeting the ICU staff is motivated to put the protocols into practice in the daily work at the ICU.

We tried to motivate the staff through the article, interaction and the movie at the end. Also we encouraged them to work on the patients’ safety. And gave a compliment about what they already reached; hopefully this will make that they continue improving and stay motivated. The most important thing is to give feedback in a positive way, that they don’t feel blamed.

It is also possible to test their motivation while supervising them, through talking and discussing the protocols. And see during the supervision if they put the protocols into practise.

9.9.5 Final presentation

Objectives

1. After this presentation all the attendants are informed about the process and the results of the project.

2. After this presentation all the attendants are aware of infection prevention and control.

3. After this presentation the attendants are motivated to continue following the protocols and stimulated to implement the recommendations.

Teach plan

Introduction (Astrid)

- Pictures-movie-music

- Objectives meeting
Evaluation

About 35-40 people attended the final presentation of our project. It was less than we hoped and expected, but still the number is quite high compared with other classes. Even some doctors told us that this number of people in a class is very good. We wanted everyone to come so that the whole hospital will get to know the project, but also to make sure that the effect of the project will also spread to others wards after we leave. We were glad that people from a lot of different disciplines came; not
only doctors and nurses, but also dentists, the microbiologist, a quality worker and a manager. At the time of the presentation the OPD was still busy at Family Medicine.

Dr. Mitra started the presentation with saying something about us and the project, giving her word of thanks and introducing us as great students, which we did not expect. We were glad to hear that she was very positive about the project. After that Astrid introduced the topic, and started the movie we made for this presentation. Attendants were really enjoying the movie, and liked the pictures that were used for the movie. It was good to show this at the beginning, because by this the attendants got to know a bit about the project already. Most of attendants already attended other classes, but for some of the attendants it was the first time they heard about the project. After the movie Miriam explained the cause for the project, the framework and the process of the project.

Leonard presented the results and the conclusions. Most of the attendants were really interested to see the change that was established during the project. We tried to make clear that we have seen progression at the ward, but that more improvement is needed to reach the standards. So we complimented the ICU nurses for their good change, and encouraged everybody to keep improving. Astrid finished the presentation with sharing the recommendations.

After the presentation we wanted to discuss the project. At first it was a little bit hard to get the attendants to ask questions or to share their comments. We asked the ICU nurses to share what they thought of the results and the project, but they did not say anything. Probably they feel shy in such a big group. But after some time the question came, especially about the use of alcohol based hand rub. One person asked about the difference with antiseptic and alcohol based hand rub. So (again) we explained that moisturizer is included in alcohol based hand rub. Also questions were asked about the costs of alcohol. It is a good sign that they think about the price, because that shows their interest. While discussing this, Dr. Mitra joined in to share the use of alcohol based hand rub is probably very cost effective, because the number of hospital acquired infections will decrease. She argued that even for use of
water the hospital has to pay, so when implementing hand alcohol, the staff will probably start doing more hand hygiene interventions, and the costs of water will be less. Then one doctor asked in which situations we have seen that gloves are used unnecessarily. We thanked all the people who helped us during the project and Dr. Laji closed the meeting with thanking God.

After this presentation all the attendants are informed about the process and the results of the project.

Before presenting the results we presented the starting point and the framework of the project. We also informed about the process and the results of the project. The attendants were very interested in seeing the results. Also afterwards they asked questions about the results and the project, which is a sign that the message was clear. And on the ward we got feedback about the hand out that we gave and that they washed their hands more often.

After this presentation all the attendants are aware of infection prevention and control. After this presentation the attendants are motivated to continue following the protocols and stimulated to implement the recommendations.

The awareness rose by this presentation. The best proof of this is a question of one of the attendants: ‘Usually the awareness after a presentation like this is very high. Everyone will follow the recommendations and the level will be very high. But after some time this decreases. What can we do about that?’ This question shows that people are thinking about how to maintain and improve the current level of infection prevention and control. We recommended that there should be some people responsible for infection prevention and control on their own ward, who could keep all their colleagues motivated to follow the protocols. Also the awareness should be constantly kept high by giving classes etc. These questions showed their motivation to really change. Also there came a discussion about the possibilities for alcohol based hand rub, about the costs etc. That showed that people were really thinking about it, and motivated to implement it on other wards as well.
9.10 Protocol book for the ICU

INFECTION
PREVENTION
AND CONTROL

Protocols developed for:

The Intensive Care Unit of HCH (1st edition)

Hand hygiene
Personal protective equipment
Disposable waste
Cleaning
**Introduction**

As you will probably know, we are doing a project about infection prevention and control. This project is our last requirement for our study BSc in Nursing at a Dutch university (‘Christelijke Hogeschool Ede’).

But the most important reason for this project is that better quality of the infection prevention and control is needed to improve the care for the patients.

Not having clean hands in contact with your patients can be life threatening for them. Especially on the ICU the general condition of patients is usually very poor. Patients in poor conditions are infected very easily, so the need of following the protocols on infection prevention and control is very high.

Our project includes an observation of 12 hours for two days. After the observation one month will be used for education and motivation, this includes an orientation meeting, a teaching about hand hygiene, one about personal protective equipment, and the last meeting will be about cleaning and waste but also about all the protocols. After that there will be a second observation of 12 hours for two days and a final presentation of the results.

After the first observation it is clear that more attention of the staff to follow the protocols about infection prevention and control is needed mainly in the area of hand hygiene and using gloves. This booklet is developed as a part of the education, after the first observation, and is meant as a reference for all the colleagues working on the ICU. These protocols are internationally accepted (WHO, NHS).

The problem of poor compliance with hand hygiene protocols is a world wide problem. Even in developed countries, where usually more resources and money is available, health care workers fail to observe the protocols properly. So you are not the only one working on this problem, every country deals with the same problem and should make following the protocols on infection prevention and control a priority.

Hopefully this project stimulates and motivates you to provide quality care to your patients, and that you become more conscious of spreading infections and what causes this spread.

With kind regards,

Astrid Klomp
Leonard de Vos
Miriam Groenendijk
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1 | Hand hygiene

1.1 Protocol

General:
- All wrist and ideally hand jewellery should be removed.
- Cuts and abrasions must be covered with waterproof dressings.
- Fingernails should be kept short, clean and free from nail polish.
- False nails and nail extensions are not allowed in the ward.
- Make sure that the towel used for drying the hands is always clean and dry! Replace in time at least every shift once.

Two main reasons why you should practice hand hygiene:
- To protect yourself and the healthcare environment from harmful patient microorganisms
- To protect the patient against harmful microorganisms (from environment, other patients and himself) entering his/her body

Hands should be washed or alcohol based hand rub used:
- After contact with blood, body fluids, secretions, excretions, non-intact skin and mucous membranes. For example, drawing blood, handling waste, oral care, secretion aspiration, clearing up urine or faces.
- Before and after each patient contact.
- Between contact with different patients.
- After contact with the patients' environment and (possible) contaminated items. For example; bed, blankets, IV-line, IV-standard, heart monitor.
- Between tasks and procedures on the same patient to prevent cross contamination between different body sites.
- Immediately after removing gloves.
- Before and after an aseptic task such as; secretion aspiration, inserting catheters, preparation of food, preparing and giving (IV) medications.
- Before eating.
- After using the toilet.

Hand rub or hand washing?

Alcohol-based hand rub
- Only when hands are free of dirt and organic material.

Hand washing
- When hands are visibly soiled or potentially grossly contaminated with dirt or organic material.
- After several consecutive applications of alcohol-based hand rub.
1.2 Technique

The pictures on this page show the technique for a hand rub with alcohol based hand rub the technique for washing your hands, the standard procedures. These pictures are also shown as posters on the ward.
2 | Personal protective equipment

Personal protective equipment includes:

Gloves, protective eye wear (goggles), mask, apron/gown, boots and shoe covers and cap/hair cover.

General principles for using personal protective equipment:

- Choose the personal protective equipment according to the risk of exposure.
- Avoid all contact between contaminated (used) personal protective equipment and surfaces, clothing or people outside the patient care area.
- Dispose all used personal protective equipment in the right bin.
- Dispose personal protective equipment immediately if it is wet or soiled.
- Do not share the personal protective equipment with others.
- Change the equipment before going to another patient.
- Closed shoes should be worn on the ward. This is because of the contaminated floor and to protect you from falling needles and spilling or leaking body fluids.

Disposable gloves should be:

- Worn when (risk of) exposure to blood, body fluids, secretions, excretions or mucous membranes.
- Worn during invasive, exposure-prone procedures, such as inserting an IV-canula and blood sampling.
- Changed between contacts with different patients.
- Changed between tasks and procedures on the same patient to prevent cross-contamination between different body sites.
- Removed immediately after use and before approaching another patient.

Sterile gloves

- Wear only during an aseptic or sterile procedure such as inserting a urine catheter.

Masks

- Wear a mask when undertaking procedures that are likely to generate splashes of blood, body fluids, secretions or excretions.
- Wear a mask to protect mucous membranes of the mouth and nose.

Protective eyewear (goggles/visors/face shield)
o Wear when conducting procedures that are likely to generate splashes of blood, body fluids, secretions or excretions.

o Wear protective eyewear to protect the mucous membranes of the eyes.

Gowns and plastic aprons

o Wear during procedures that are likely to generate splashes of blood, body fluids secretions or excretions.

o Wear a gown (clean, non-sterile) to protect the skin and prevent soiling of clothing.

o A plastic apron may be worn on top of the gown to protect the exposure to blood, body fluids, secretions and excretions.

Hair and boots/shoe covers

o Wear caps and boots/shoe covers when there is a possibility that the patient’s blood, body fluids, secretions or excretions may splash, spill or leak onto the hair or shoes.
3  |  Cleaning

General rules are:

- Soiled linen should be immediately removed from the bedside (floor or bed).
- Soiled linen (with blood, body fluids, secretions or excretions) should be transported in a leak-proof way.
- Dirty beds have to be cleaned with a chemical disinfectant.
- Beds have to be cleaned with a chemical disinfectant after discharge or transfer of the patient to another ward/bed.
- Excretion on the floor has to be cleaned immediately with water and in succession with a chemical disinfectant.
- Wet or dirty towels for drying the hands after washing, have to be changed directly.
- The cleaners should wear gloves when they have (possible) contact with contaminated items such as soiled linen and the toilets.
- The toilets, bathrooms, sinks and the outside of bed side lockers have to be cleaned daily.
- The floor has to be vacuumed every shift.
- The floor has to be mopped daily.
- The bed side lockers have to be thoroughly (inside and outside) cleaned once a week.
- The walls and ceilings have to be vacuumed or wet mopped weekly.
- The ward has to be carbolized weekly.
4 | Disposable waste

4.1 General rules

- All the waste should be removed twice a day from the ward by the cleaners.
- Disposable materials should not be reused for the same or another patient. They should be immediately disposed.
- Materials (syringes, sharps and needles) should be disposed by the person that used it.
- Waste should be disposed by their colour (yellow, red big, red small, blue big, blue small, white or the closed container)

4.2 Waste disposed by colour

**Yellow bucket:**

Solid waste; items contaminated with blood, and body fluids such as cotton, dressings, solid plaster casts, IV-lines, beddings and other materials.

**Red bucket:**

Solid waste; waste generated from disposable items (except of the sharps waste) such as NG-tubes, catheters, intravenous sets etc.

**Big blue bucket:**

IV-bottles

**Small red bucket**

Ampoules

**White bucket**

Vials that are reused within the hospital

**Closed bucket:**

Sharps and needles

**Dustbin (blue bucket):**

For all the other garbage which is not bio-medical.

*This does not require containers/bags:* Liquid waste; waste generated from washing, cleaning, house keeping and disinfecting activities. This needs to be disposed in toilet.