

**CHALLENGES OF CLEANLINESS AND
HYGIENE FROM NURSING PERSPECTIVE IN A
HAEMODIALYSIS CARING ENVIRONMENT**

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Salina Shrestha
Irene Kibatha

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| Author/Authors | | |
| Salina Shrestha ja Irene Kibatha | | |
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| <p>ABSTRACT</p> <p>Viimeinen vaihe munuaisten peittämisessä on kriittinen ja ainoana hoitomuotona siie on dialyysi. Haemodialyysi potilaat tarvitsevat toistuvaa suoniyhteys toimenpidettä ja tällä ryhmällä ilmenee suurissa määrin kroonisia infektioita. Tämä on yhteisprojekti Metropolia ammattikorkeakoulun, Terveys- ja hoitoalan ja HUS Kirurgisen sairaalan Nefrologianklinikan kanssa.</p> <p>Tämän lopputyön tarkoituksena oli pohtia ympäristöllisen kontaminaation riskiä haemodialyysi ympäristössä. Tutkimusmenetelmänä käytettiin systemaattista kirjallisuuskatsausta. Kaikki artikkelit joita käytettiin olivat Ovid tietokannasta. Tässä työssä käytettiin 11 tieteellistä artikkelia.</p> <p>Tämän lopputyön löydökset näyttivät että ympäristölliset riskitekijät haemodialyysi yksikössä olivat epäonnistuminen välineiden ja haemodialyysi alueen puhdistamisessa, katetrien pitkä käyttö, koulutuksen alhaisuus, huono potilashygieneia, siivoushenkilökunnan puute panostaa kunnan hygieniamenetelmiin, töiden kuormitus ja sairaanhoitajapula, asenteet käsihygieneiaa kohtaan, käsien kuivuus ka kipeytyminen, roolimallien puuttuminen, ajan puuttuminen, saatavuus ja unohtuminen, ja epäkelvot käsihygieneia tekniikat. Sairaanhoitajien roolit hygienian kehittämisessä haemodialyysi yksikön ympäristössä olivat toimia roolimallina sairaanhoitajaopiskelijoille ja terveydenhuollon henkilökunnalle, potilasohjaus, siisteys tapana, ryhmätyö sairaalahygienian edistämässä, tiedon ja tekniikoiden hallitseminen infektioiden ehkäisemisessä ja niiden soveltaminen heidän päivittäisessä työssään, ja tieteellisen näyttöön perustuvan informaation toteuttaminen infektioiden hallinnassa.</p> <p>On olemassa tarve hygienian tärkeyden painottamiseen jatkuvan hoitohenkilökunnan kouluttamisen kautta. Kunnan arvostus infektioiden hallintaohjeistuksia kohtaan on tärkeää infektioiden minimoimiseksi ja hoitohenkilökunnan pitäisi seurata niitä. Sairaalaympäristö kontaminoituu ja hoituu hoitohenkilökunnan toimesta ja sen vuoksi on tarve edistää puhdasta ympäristöä terveysalalla.</p> | | |
| Keywords | | |
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| <p>ABSTRACT</p> <p>End stage renal failure is a critical stage and the only treatment is Dialysis. Haemodialysis patients require frequent vascular access undergoing procedure and there is a high prevalence of chronic infection in this population. This is a joint project of Metropolia University of Applied Science, Terveys- ja hoitoala and HUS Kirurgsen Sairaalan Nefrologian klinikka. The purpose of this project was to explore the risk of environmental contamination in a haemodialysis setting.</p> <p>The method used was applied systematic literature review. All the articles used were from Ovid database. Altogether 11 scientific articles were used for this project.</p> <p>The findings in our project showed that the environmental related risk factors in haemodialysis unit were failure to clean equipments and the haemodialysis settings, long usage of catheters, low level of education, poor patient hygiene, cleaning staff 's lack of adherence to proper hygiene practices, work overload and shortage of nurses, attitude towards hand hygiene, dryness and soreness of the hands, lack of role models, lack of time, availability and forgetfulness, improper hand hygiene techniques. The roles of nurses in promoting environmental hygiene in haemodialysis unit were acting as role models for student nurse and healthcare staff, patient education, cleanliness as a habit, teamwork in improving hospital hygiene, mastering knowledge and techniques in infection prevention and applying it into their daily work, implementing scientific evidence based information in infection control.</p> <p>Emphasis on the importance of hygiene is necessary through frequent training for healthcare personnel. The proper adherence to infection control guidelines is essential in minimizing infection and should be followed by health care personnel. The hospital environment is contaminated and handled by health workers hence there is a need to promote a clean environment in healthcare premises.</p> | | | |
| Keywords | | | |
| Asepsis, Haemodialysis, Environmental Hygiene and Nurse's role. | | | |

CONTENT

| | |
|---|----|
| 1. INTRODUCTION | 1 |
| 2. KEY CONCEPTS AND PREVIOUS STUDIES | 3 |
| 2.1 Asepsis | 3 |
| 2.2 Haemodialysis | 4 |
| 2.3 Environmental hygiene | 5 |
| 2.4 Role of Nurses in prevention of infection..... | 6 |
| 3. PURPOSE AND RESEARCH QUESTION..... | 9 |
| 4. METHODOLOGY | 9 |
| 4.1 Systematic literature review..... | 9 |
| 4.2 Data Collection..... | 10 |
| 4.3 Data Analysis | 12 |
| 5. FINDINGS | 13 |
| 5.1 Environmental related risk factors in the haemodialysis unit | 13 |
| 5.2 Role of nurses in promoting environmental hygiene in a haemodialysis unit | 15 |
| 6. DISCUSSIONS..... | 18 |
| 6.1 Ethical considerations..... | 18 |
| 6.2 Validity and Limitations | 19 |
| 7. CONCLUSION..... | 20 |
| REFERENCES..... | 22 |
| APPENDIX I..... | 25 |
| APPENDIX II..... | 36 |
| APPENDIX III | 37 |

1. INTRODUCTION

Hygiene and environmental asepsis are always an important issue when dealing with patients with invasive surgical procedure and especially during haemodialysis. There is a high risk for serious infection because of the prolonged vascular access when withdrawing and replacing blood during the procedure. Haemodialysis allows microorganisms to have a higher probability of bloodstream invasion due to the access to the circulation. Infections are the most important causes of the loss of vascular access for dialysis. Infections may also lead to devastating consequences, including sepsis with multi-organ failure, endocarditis, metastasis infections, or even death. Overall, dialysis-related bloodstream infections are the second leading cause of death in patients undergoing haemodialysis. Research shows that outbreaks of bloodstream infections have occurred because of dialyzer contamination during processing, inadequate disinfection of machinery, leaks in the dialyzer membrane, contamination of bloodstream tubing by bacteria in priming fluids, contamination of single vial medications during repeated use, and inadequate hand washing by dialysis staff. (Price, Hacek, Noskin and Peterson 2002: 23.)

End stage renal failure is a critical stage and the only treatment is Dialysis. There has been increase in numbers of haemodialysis patient every year. This increases the workload of the haemodialysis nurses as nursing accounts for 80% of the direct care in providing care and fulfilling their needs. Diabetes mellitus was the most common etiology of renal failure, followed by hypertension, urinary tract infection, and congenital malformation. (Ghazi, Saleh, Ghazi and Badadweh 2008: 101.)

The statistical report from Finnish Registry for Kidney Disease shows the prevalence of 722 renal problem patients per million inhabitants (2006). The most identified risk factors for infection include diabetes, *Staphylococcus aureus* nasal carriage, patient hygiene, iron overload, hypoalbuminemia, hepatitis B, C, Vancomycin-Resistant Enterococci, HIV. (Finnish Registry for Kidney Disease 2004.) According to the centre of diseases control (2003), there is a higher chance of person-to-person transmission of infectious agents in an environment where many patients receive dialysis frequently. The transmission can be directly or indirectly

through contaminated equipment and supplies, environmental surfaces and hands of personnel. Because haemodialysis patients require frequent hospitalization and surgeries there is an increase in their chances of exposure to nosocomial infections.

This project is part of a wider project called "Improving the Quality of Hand Hygiene and Asepsis in the Care of Nephrological Patients". It is a joint project of Metropolia University of Applied Science, Terveys- ja hoitoala and HUS Kirurgisen Sairaalan Nefrologian klinikka. The aim of this broad project is to improve the hand hygiene and asepsis in the care of nephrological patients and to develop the evidence based care in HUCH Surgical Hospital's Nephrology Clinic. There has already been some investigation done by earlier graduated nursing students on the topic "hand hygiene". However, the environmental hygiene in a haemodialysis unit has never been studied so far. Thereby, our focus is environmental hygiene in this final project.

We chose this topic for our final project because it is related to the nursing field and health. According to the Finnish Registry of Kidney Disease, over the last 10 years (1995-2005) the number of people going for haemodialysis in Finland has increased by 80% and due to this fact; there is an increase in the risk of infection. For the above-mentioned reason, the topic is interesting for us to explore our knowledge and to gain more knowledge about the aseptic environment, hygiene and haemodialysis. We have never been exposed to haemodialysis settings and our knowledge regarding this topic is limited. While working on this project, we hope to gain more knowledge about haemodialysis and the importance of asepsis in the haemodialysis settings. Consequently, in the future we can work in such an environment with confidence and apply our knowledge that we will gain from this project in caring clients.

The purpose of this project is to explore the risk of environmental contamination in a haemodialysis setting.

2. KEY CONCEPTS AND PREVIOUS STUDIES

2.1 Asepsis

Asepsis can be defined as the condition of being free from disease causing microorganisms (Kneeler and Dodge 1994: 298).

Asepsis is of two types. They are medical asepsis and surgical asepsis. The use of practices as hand washing, disinfecting contaminated surfaces and cleaning in general are medical asepsis but this is not fully sterile. This technique can clean microorganisms but not their spores. For instance, skin cannot be sterilized or disinfected. Where as in surgical asepsis all microbial life is destroyed including spores. Surgical asepsis is a sterile technique that is performed by the health professionals using different precautions than in medical asepsis. Surgical asepsis is carried out to prevent organisms from entering the body during an invasive procedure. Therefore, all equipment used in this process is sterilized. Thus, this procedure is fully sterile. (Medical & Surgical Asepsis, 2009)

All materials such as instruments, needles, gloves and solutions that come in contact while haemodialysis must be clean and disinfected. Asepsis also involves the staff and anyone else visiting the ward following the proper procedures of hand hygiene and protection to avoid carrying of pathogens from outside to the ward. In this way both the staff and the patients are protected from infections. It is important that the nurse's knowledge of the infection process, application of infection control principles and the use of common sense help protect patients from infection. (Brunner & Suddarth 1999: 330).

Asepsis includes disinfection, which reduces the number of microorganisms. Disinfectants chemicals are used where possible to achieve sterile conditions such as soap for hand washings, disinfection liquids used after hand washing and whenever possible before and after contact with a patient. The most common disinfectants, alcohol and chlorhexidine, are mostly used on the hands and phenolic disinfectants for cleaning surfaces (Gillespie & Bamford 2000: 8)

2.2 Haemodialysis

Haemodialysis is a procedure that uses a special machine to filter waste products from the blood and restore normal constituents to it where the kidney is unable to do so. It is usually done for chronic renal diseases and for acute kidney failure. (Medline plus dictionary 2005.)

Nephrological diseases such as chronic kidney disease and acute renal failure cause the kidneys to lose their function to filter and remove waste and extra fluid from the body. Haemodialysis is a process that uses a dialyzer to remove waste products such as urea from the blood. It also helps in restoring and balancing the electrolytes in the blood and remove extra fluids which are not needed by the body. (Curtis 2007.)

In the process of haemodialysis first of all patients are connected to a filters by tubes which are then connected to the blood vessels. Slowly all the bloods are pumped into the dialyzer from the body and are purified by removing waste materials and excessive fluids. The filtered blood is then pumped back into the body. This process is usually done three times per week and it takes three to five hours or even longer depending upon the amount of waste products in the body. During this session patients can watch television, read newspaper or even relax or sleep. Dialysis access is processes to create a way for the flow of the blood in and out from the body during the dialysis session. They are of three different types as mentioned below. (Curtis 2007.)

Fistula- A fistula is most effective and most durable method because the chances of blood clotting are rare in this method. Fistula is made by joining one of the arteries to one of the vein in a lower arm which takes 6 to 12 weeks to form. Although a fistula allows repeated access for each dialysis session, it has complications such as infections at the access site and blood clotting. (Curtis 2007.)

Graft- A synthetic tube is planted under the skin in an arm to produces a vascular access known as graft. This tube acts as an artificial vein for the use of needle and passage for the blood during the haemodialysis process. This method is usually adopted when patients have small veins. Graft can be use right after 1 week of plantation however it can create more clotting and infections problems therefore it should be replaced sooner. (Curtis 2007.)

Venous catheter - This is usually placed in neck, chest and groin of patient for the temporary use in case of patient who does not have any permanent access or until the permanent access develops. Blood clotting and infection chances are higher therefore cannot be used routinely. (Curtis 2007.)

2.3 Environmental hygiene

This includes the removal or reduction of pathogens in the surrounding settings of the haemodialysis unit. The sources of contamination might be shedding of resident and transient flora from the skin and hair of patients and health personnel, inadvertent use of unsterile equipments, airborne bacteria, and endogenous bacteria from the patient's blood. (Kneedler and Dodge 1994: 298.)

Environmental asepsis address such as health of the staff, cleanliness of the room, sterility of equipment and surfaces, processes for scrubbing, gowning, gloving, and haemodialysis room attire. Floors and horizontal surfaces are cleaned frequently with disinfectants. All equipments that come in contact with the client must be sterile. Air borne infections are common. To decrease amount of bacteria in the air, standard room ventilation that provide air exchange should be maintained. A sterile object remains sterile only when touched by another sterile object. Only sterile objects may be placed on a sterile field. A sterile field out of the range of vision or an object held below a person's waist is contaminated. The edges of a sterile field are considered contaminated. By prolonged exposure to air a sterile field becomes contaminated. When a sterile surface comes in contact with a wet contaminated surface, the sterile object or field becomes contaminated by capillary action. (Brunner & Suddarth 1999: 331.)

The potential for person-to-person transmission of organisms within hospitals is enormous and the patients being the most susceptible to infection because of underlying illness and treatments e.g. Haemodialysis patients. Maintaining adequate dressings such as gloves and masks and ensuring good staff hygiene while working is important in prevention of infections. (Gillespie & Bamford 2000: 7.)

While in the operation theatre within the renal unit, staff members should ensure that high standards of asepsis are maintained such as staff movement during

procedure should be minimized to reduce air disturbance in the room and changing of dressings regularly reduces transmission of organisms from the ward. (Gillespie & Bamford 2000: 7)

2.4 Role of Nurses in prevention of infection

Nurses are also increasingly working to promote people's health and to prevent illness. There are many roles in nursing. The nurse focuses on the holistic cares of the patient and carries out procedures ordered by the doctor. Nurses in collaboration with the doctor and other team members, assesses the patient and treats his or her problems. The nurse not only focuses on the patient's wellbeing but also involves the patient's family in the treatment process. The nurse also protects the patient, working to prevent infection and ensure a safe, healthy environment in the hospital. The nurse teaches the patient and family about health-related matters and promotes patients' well-being and when needed they also act as advocates. Thus the nurses play many roles on the health care team. (World Health Organisation 1997.)

An infection is the invasion of the body tissues by microorganisms and their growth in the tissues. Transmission of these infections may occur in several ways but mainly the health care personnel hands which represent a reservoir for anti-microbial pathogens. (Kozier and Erb 2008: 668.)

Nurses act as a role model for both the patients and the rest of the staff in the ward in prevention of infection. They also take part in educating patient about proper hand hygiene practices both in and out of the ward. Since nurses act as a "middlemen" between the physician and the patient, it is important that they adhere to proper hygiene practices to prevent cross infection between patients, nurses and also physicians. Nurses assess common risk areas and causes of infection in order to minimise and prevent infection. Nurses also work hand in hand with the hygiene nurses and hygiene departments in assessment and evaluation of proper hand hygiene practices. Since they are in contact with the patients mostly, they are more aware of the areas that need to be emphasized on and improved, such as shaking of hands and picking noses. Nurses also work with the hygiene departed when making suggestions about areas that they would wish to be improved and also factors

affecting proper hygiene practices in the wards and operating rooms. (Kozier and Erb 2008: 668.)

Infection prevention can be referred to as the process of protecting individuals from harmful microorganisms or bacteria and this includes patients, staff and the environment. The processes include environmental, chemical and physical. Microorganisms are spread from one patient to another directly or indirectly. In hospitals the most common infection mode is cross infection or patient-nurse-patient infection especially due to poor hand hygiene after being in contact with one patient. Below is an example of a chain of infection in a ward (See Fig I). (Kozier & Erb 2008: 671.)

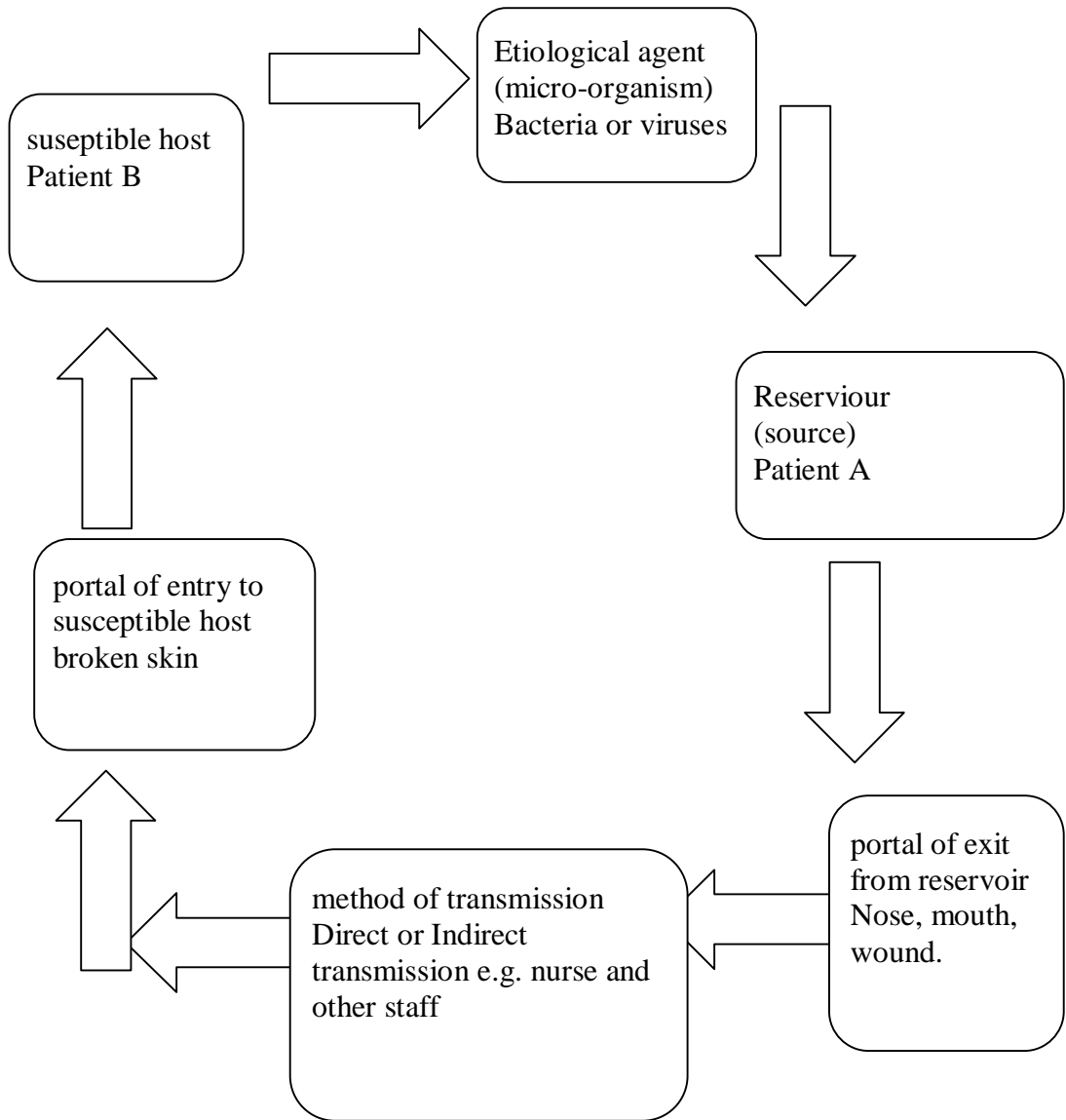


Figure I. Chain of Infection.

* Source: Adapted from Kozier & Erb pp. 671.

3. PURPOSE AND RESEARCH QUESTION

The purpose of this final project is to explore the risk of environmental contamination in a haemodialysis setting.

Research questions

- What are the environmental related risk factors in the haemodialysis unit?
- What is the role of nurses in promoting environmental hygiene in a haemodialysis unit?

4. METHODOLOGY

4.1 Systematic literature review

The method used was applied systematic literature review. A research literature review is a written summary of the state of existing knowledge on the research problem. The task of reviewing research literature involves the identification, selection, critical analysis, and written description of existing information on a topic. (Polit and Beck, 2003: 111). The purpose of the literature review is to:

1. To develop ideas.
2. To determine knowledge on a topic of interest.
3. To provide a context for a study.
4. To justify the need for a study.
5. Review and synthesize evidence-based information to gain knowledge and improve nursing practices (Polit and Beck, 2003: 111).

4.2 Data Collection

We searched our articles from electronic databases such as: OVID databases (Journals@Ovid Full Text). All the articles used were evidence based. The data search was limited to years 2000-2009 to acquire up to date and relevant information for our research. The articles are all full texts. The keywords used are asepsis, environmental hygiene, haemodialysis and nurse's role in improving environmental asepsis. We used Mapping which is a feature that allows one to search for topics in their own words rather than having to enter a term that is exactly the same as a subject heading in the database (Polit & Beck,2003: 92). The British English spelling keywords were used while searching data and throughout the process. We searched our articles using the keywords, and then we selected the articles according to its topic. We read the introduction, abstract and findings part of these articles and tried to find the answers for our research questions. Some articles did not have any related information. So, we excluded them and included the articles which were related to our search and answers our study questions. We again read thoroughly the selected articles and included the articles those exactly gave some information we were searching for.

The literature search performed through OVID database (Your Journals@Ovid) done on 24.2.2009 using keywords environmental hygiene and haemodialysis showed 1493 hits which was limited to last 9 years and full texts articles and showed 246 hits of which 2 articles was used in this literature review. Using the keyword nurses role in hand hygiene in haemodialysis on 17.8.2009 gave 2382 hits and with the same above limitation showed 212 hits, out of which only 2 article were found relevant. By using the keywords haemodialysis, asepsis and infection on 11.9.2008, gave 1699 hits and when limited with inclusion criteria showed 297 hits out of which 3 articles were used. With the keyword nurse's role in infection prevention on 15.8.2009 showed 303 hits and with the inclusion criteria showed 172 hits, 1 article was used. Using the keyword nurses and hand hygiene on 25.2.2009, showed 4438 hits and after limiting with inclusion criteria showed 198 hits, 2 articles were used. From the same database, using keyword Nurses Role in preventing infection on 18.8.2009 gave 2062 hits and considering inclusion criteria, showed 243 hits and only 1 article was used.

In addition, we visited and observed a nephrological unit and the haemodialysis units on surrounding environment. The purpose is to familiarize ourselves with haemodialysis settings.

Table 1: Database search and Relevant Hits

| Database Search | Keyword | Hits | Hits by inclusion criteria | Relevant Hits |
|-------------------------------|---|------|----------------------------|---------------|
| OVID(journal@ Ovid Full Text) | Environmental Hygiene and Haemodialysis | 1493 | 246 | 2 |
| OVID(journal@ Ovid Full Text | Nurses Role in Hand Hygiene in Haemodialysis. | 2382 | 212 | 2 |
| OVID(journal@ Ovid Full Text | Haemodialysis, Asepsis and Infection | 1699 | 297 | 3 |
| OVID(journal@ Ovid Full Text | Nurses roles in infection prevention | 303 | 172 | 1 |
| OVID(journal@ Ovid Full Text | Nurses and hand hygiene | 4438 | 198 | 2 |
| OVID(journal@ Ovid Full Text | Nursing role in preventing infection | 2062 | 243 | 1 |
| TOTAL | | | | 11 |

Inclusion Criteria

- The articles are all research evidenced based.
- The articles are published in English.
- The articles are from year 2000-2009.

- The research articles are relevant to our research questions and helps in answering it.
- The articles are full texts and can be used free of cost.

4.3 Data Analysis

Data analysis is used as a common tool of interpreting data in systematic way by using tables to search for data in order to find answers to our study questions. The purpose of data analysis is to organize, provide structure to, and elicit meaning from the data (Polit & Beck 2006: 397). When undertaking data analysis, certain issues were taken into account such as the articles have to be within our various keywords (asepsis, haemodialysis and environmental hygiene) and the articles are relevant. Other issues are to construct and create the relationships between the articles. The approach used by the authors for data analysis was to document in the review summary table which provides the overall picture of the article and the answers to the research questions. The summary table includes author, topic, purpose, participants, methods and findings (see appendix 1). The findings were divided into two parts to answer both research questions accordingly. The other step in analysing our data is to divide our main points of the findings under two main headings to answer our research questions respectively (See appendix II).

In this data analysis, we considered ‘framing’ and accordingly searched the whole section on renal failure in the database, and then narrowed down the topic using our keywords. We examined representations within the text, which the information was aimed at, how the information was provided, aims of the articles. We also considered the overall reason for writing the renal failure section how patients nurse and doctors were portrayed within the text and the implications for people with renal failure. The articles were read and reread by both authors to identify issues that are related and unrelated. (Smith 2009: 65.)

5. FINDINGS

5.1 Environmental related risk factors in the haemodialysis unit

Renal failure is a condition in which the kidneys are incapable of performing their normal functions. In chronic renal insufficiency patients vascular access is of crucial importance. Vascular access infection in haemodialysis patients causes significant mortality and morbidity. Infection occurs more with catheters than with arteriovenous fistulas and grafts. Arteriovenous fistula had a higher infection rate than arteriovenous grafts. The important risk factors are complications due to cannulation and long usage duration of catheters. Infection was more prevalent among females and those with a low level of education. (Ghazi, Saleh, Ghazi and Badadweh 2008: 101.)

The important treatment option for persons with end-stage renal disease is haemodialysis. Infection is the most common and serious complication of haemodialysis and the most common source of infection arises from the percutaneous vascular access. The risk factors for infection include diabetes, staphylococcus aureus nasal carriage, patient hygiene, iron overload, hypoalbuminemia, and use of bio incompatible membranes. Participants were grouped as new patients initiating haemodialysis and other as continuing patients, continuing haemodialysis but starting a new vascular access. They were followed up for 6 months and a nested case-control study was carried out. There is a high rate of bloodstream infection in patients starting haemodialysis for the first six months in both groups. Continuing haemodialysis group who had previous bloodstream infection are markers for an increased risk of infection due to poor patient hygiene. (Taylor, Gravel, Johnston, Embil, Holton and Paton 2004: 155.)

The most common blood borne infection among chronic haemodialysis patients is hepatitis C virus (HCV) infection. Haemodialysis patients require frequent vascular access undergoing procedure and there is high prevalence of chronic HCV infection in this population. Thus, HCV transmission is a concern in haemodialysis units. During investigation, HCV infection test was carried out for each patient. Patient with history of HCV infection was grouped as chronic HCV infection. Staff infection control procedures were assessed. The risk was higher for patients who underwent

dialysis on the shift after that of the patient with chronic HCV. The infection control lapse observed was the failure to separate clean and contaminated patient care items. This resulted from failure to routinely clean, disinfect dialysis station and machine surfaces between patients and the preparation of intravenous medications in potentially contaminated areas before their administration to multiple patients (See appendix III). (Thompson, Novak, Datta, Cotter, Arduino, Patel, Williams and Bialek 2009: 900.)

Currently colonized with vancomycin - resistant enterococci (cVRE) and previously colonized (pVRE) patients attended standardized outpatient consultations and routine haemodialysis sessions. The area or settings had been thoroughly cleaned and microbiologically confirmed to be free of VRE contamination. After each session, the patient, environment, and participating health care worker (HCW) were tested for VRE contamination. Results show that sessions with cVRE patients had higher rates of contamination of the environment. Chair cultures, couch cultures, health care workers gown cultures and patients hand cultures were positive in different sessions. (Grabsch, Laurelle, Padiglione, O'Keefe, Ballard and Grayson 2006: 287.)

One of the most important routes of patient-to-patient transmission of micro-organism in health care settings is via the contaminated hands of health workers. Exposure to blood and potentially contaminated fluids can be anticipated in haemodialysis settings hence it is important to wear gloves when caring for patients and touching patient equipments. The research which was done in Spain reported that hands were washed 22% of the time before dialysis, 16% before taking them off dialysis and 19% of the time before caring for the blood line. (Shimokura, Weber, Miller, Wurtzel and Alter 2006.)

Blood-borne infections have been one of the most important problems in haemodialysis unit. Too much workload means that there is not enough time for the nurses to wash hands before and after attending a patient. In haemodialysis unit there is a similar problem in that if there are few nurses in a shift and many dialysis shifts in day then the workload per nurse is a lot and hence not enough time to practice proper hand hygiene. There is however higher hygiene adherence when dealing with patients that are in isolation rooms. The lack of proper hand hygiene practices in unit that has a lot of patients per shift means that there is also a higher chance of getting

blood-bourne infections because of the lack of enough time to be wear gloves when handling patient's equipments and also blood lines. Exposure to blood and potentially contaminated fluids can be anticipated in haemodialysis settings hence it is important to wear gloves and wash hands before and after caring for patients and before and after touching patient equipments. (Arenas, Sanches-Paya, Barril, Garcia, Gorriz, Soriano, Antolin, Lacueva, Garcia, Sirvent, Espinosa, Angoso 2005: 1164.)

5.2 Role of nurses in promoting environmental hygiene in a haemodialysis unit

Interventions aimed at improving hand hygiene compliance have been implemented but their effects remain only for a short while. Compliance with hand hygiene among different groups of hospital workers may be influenced by beliefs and norms varying across the groups for instance physicians compliance are lower than that of nurses. Attitudes toward reasons for proper hand hygiene practices vary such as most health workers practice hand hygiene for self protection not for the protection of the patients. Some of the participants mentioned that they practiced hand hygiene when they felt that their hands were dirty rather than before and after attending to a patient. Dryness and soreness of the hands also influenced the health workers not to wash hands too often and also lack of enough time in between patients also decreases the adherence of hand washing. Lack of role models influenced the compliance to proper hygiene practices. If the older nurses or tutor nurses don't wash or disinfect hands before and after attending to a patient the new nurses or the student nurses will follow in their footsteps as well. Deviation from the rules or norms and the fact that none of the other nurses were willing to remind each other whenever they forgot to wash their hands. Lack of availability and easy access to hand hygiene materials combined with the lack of time and forgetfulness is also a factor in the poor adherence to proper hygiene practices (Erasmus, Brouwer, Beeck, Oenema, Daha, Richards, Vos, and Brug, 2009).

The workers in one study believed that they were doing what was needed to protect themselves from becoming infected with a bloodbourne pathogen. The results of the study suggest that professionals and staff as well staffs with licences are not necessarily knowledgeable about appropriate infection control practices or that they follow them. Lack of enough knowledge about hand hygiene among the staff and

also students in their clinical placements is one of the major risks of spread of infection in hospitals. The attitude of staff towards proper hand hygiene also influences the way they adhere to hand washing and wearing of gloves. (Shimokura et al, 2006).

The risks of acquiring infection are the reality for the most vulnerable of patients receiving health care. Being aware of and implementing updated and scientific evidence based information in infection control is critical to enhancing patient's outcome. The ready availability of guidelines has been found to have poor impact on health care workers knowledge and behaviour. The improvement in infection control can be achieved if the guidelines that exist in hospitals are addressed in simple way as possible. Nurses need to learn and know the techniques that enhance prevention of cross infection, which implementation makes a difference and how to achieve practically. Nurses are directly and indirectly linked with the patient's care and outcome in relation to acquisition of infection. Certain practices and procedures if practiced by healthcare professionals are mastered and used competently can reduce the risk of infection for patients. (Storr, Topley & Privett 2005: 19.)

Infection control is increasingly perceived as an important part of a wider risk management and patient safety agenda. Infection control is receiving increasing national attention by help of media just to protect people from infection. The only requirement that plays a big role in infection control is hand hygiene and the need to clean hands before and after each procedure. Nurses should be aware of the practices that help in minimising infection and be able to demonstrate these practices to patients. Nurses should understand the importance of maintaining a clean environment and how this can contribute in reducing reservoirs of microbes and how this assists in securing the confidence of public. Nurses play a key role in educating patients about risks factors and how good hygiene can prevent infection. (Storr et al. 2005: 19.)

Health care associated infection is one of the major challenges to providing high quality health care. Hand washing is considered the single most effective and cost effective means of preventing health care associated infection by breaking the chain of infection. Bacteria multiply rapidly in the damp, warm hospital environment, thus the best way of preventing them is to ensure that the environment and equipments are

clean and dry. The environment is not a major source of contamination and it is not thought to play an important role. However, the hospital environment is contaminated and handled by health workers. Hence, there is a need to promote a clean environment in healthcare premises. Cleaning, disinfection and sterilisation are the principles of infection control. Infection control is part of nurse's role. So, nurses should possess the knowledge of source of healthcare associated infections and for the safe practices methods of decontamination are essential. (Gould, 2005: 20.)

Hand contamination through patient associated equipment or environment cannot be isolated to health workers alone but to the patients as well. Patients rely on the nurses to educate them about hand hygiene. Cleaning staff also play a big role in infection in that after cleaning patient's rooms in that they often don't remember to wash hands or change gloves before and after cleaning rooms. This could be due to ignorance or lack of knowledge about how infections are spread in hospitals. (Arenas et al. 2005.)

Patient involvement or patient empowerment which means that patients are actively involved in various aspects of healthcare such as hand hygiene is increasingly being recognised in several healthcare units. Suggestions about how patients can help increase healthcare workers compliance with hand hygiene have been made. Patients can do so by reminding the nurses to wash or disinfect their hands before they come into contact with them. This is however difficult because most patients are afraid of taking part in studies that would help to see how well patient empowerment works. Also it is difficult for a nurse when they have to be reminded by a patient to practice hand hygiene because it could be seen as a sign of irresponsibility on their part. (Logtin, Sax, Allegranzi, Hugonnet, Pittet 2009: 830-839.)

6. DISCUSSIONS

6.1 Ethical considerations

Ethical research is essential to generate sound knowledge for practice. Conducting research ethically starts with the identification of the project topic and continues through the publication of the project. There are ethical actions essential in research which includes the following. (Burns and Grove 2005.)

- Protection of the participants rights.
- Balancing benefits and risks in a study.
- Submitting a research proposal for institutional review.
- Obtaining permissions.

This final project is a systematic literature review hence there was no direct data collection from individual nurses or participants during data collection process. The ethical considerations are based on the articles that we have used to collect data. The articles used in this project are from the school databases which were freely available.

All of the articles followed ethical guidelines by ensuring that participant's confidentiality was maintained and informed consent was obtained by explaining the purpose of the studies. The sources and references for each data used are cited after the sentence or paragraph and in the reference table as well. This paper has followed the Metropolia's guidelines for writing thesis papers. Permission for this research project was granted by Elli Löflund, the director of Nursing at the nephrology clinic of HUCH surgical hospital.

This research can be considered ethical since the findings of this project are beneficial for both the health profession and the general population. This project was not done for personal financial benefits and was not prejudiced by any resources. The authors made sure that all the articles were treated and respected equally.

6.2 Validity and Limitations

Validity is the quality of research being used to support the argument being made. It also refers to if a measurement instruments measures accurately as it is supposed to measure. (Lo Biondo & Harber 2006: 338) The articles used in this project went through monitoring procedures before they were published hence the validity is assured.

In this project we kept in mind that all the findings were based on the original articles and our personal views were not added. We both read our articles and analysed our data according to our research questions and our topic. We divided our findings under two sub headings so that it answered our research questions. The articles that were used were based on researches conducted in Europe, America, Canada, Australia and one from Jordan. Articles were chosen from this countries because the level of healthcare and education of healthcare staff is the same or better than Finland. One article from Jordan highlighted problems in education level which are not major problems faced in Finland and for that reason we might not apply this result in the general Finnish nephrological health care unit assuming the environment is not similar to the one in Jordan. On the other hand, there is an increase in number of immigrants from countries whereby the level of hospital hygiene and the education level is different or might not be as good as that in Finland. However, the overall information we got was applicable in the Finnish healthcare since these were issues that affect most of the Nephrological healthcare units.

All the articles used were freely available from the school database. There wasn't any funding for this project hence we couldn't use the articles that we had to pay to use even though the content described in the abstracts were relevant to our study. The articles that we have used in our findings were limited to English language thereby, excluding the Finnish articles due to language barrier.

Due to difficulty in finding the best article which could answer our research question, we had to use two articles that were literature review itself. Whether the findings can be generalized to apply to all nephrological units in Finland, we still subject to trial. The study was intended to benefit the nurses and the patients in the nephrological units. Further research on environmental hygiene in haemodialysis unit needs to be

done. The other limitation was that it was difficult to concentrate on any specific age group since our articles does not talked about any specific age group.

Both of the authors mother tongue is not English therefore there was a risk to misinterpret the original researchers work therefore the results should be assessed with vigilance.

7. CONCLUSION

Infection control measures should be taken into account to minimize the transmission of bacteria, virus or disease. These measures include environmental factors such as chair cleaning, couch cleaning, patient and health workers' hand hygiene, routinely cleaned machine surfaces between patients and the preparation of intravenous medications in potentially contaminated areas before their administration to multiple patients.

Nurses should give continuous, careful and intellectual consideration to smallest details of cleanliness so these procedures become their habit instead of just thoughts. Personal cleanliness is essential and it includes the care of the hands, hair, clothing and the prevention of all body odours. Personal hygiene among the nurses also means they ensure that the skin on their hands is not damaged as it provides a place for micro-organisms to survive and breed. Damaged skin provides a site for entry of micro-organisms into the skin tissues which is very risky when dealing with patients whose blood and body fluids are exposed.

Hand washing is considered the most effective means of preventing infection. On the other hand the environment is not a major source of contamination and it is not thought to play an important role. However, the hospital environment is contaminated and handled by health workers hence there is a need to promote a clean environment in healthcare premises. Providing more hygiene courses for students before they start their clinical placements or offering new students hygiene courses in the units before they have any contact with the patients.

There is the need for more education among the cleaning staff about infection prevention and control since they also play a major role in the spread of infections in the haemodialysis units. Regular training of the staff in haemodialysis units should be organised. The use of posters and reminders about the importance of hygiene should be increased. One of the articles mentioned that hospital staff did not like using hand disinfectants because it damages their hands hence the need for more research on better and skin friendly hand hygiene solutions is necessary. Providing the nurses with enough hand cream prevents hand damage caused by hand cleaning solutions. Accessibility of hand disinfectants and hand creams also encourages the nurses to practice hand hygiene.

Patient education on hygiene both in and out of the ward is important because some patients might carry some infections from outside and bring them to the wards. Emphasis on the importance of the use of hand disinfectants among the patients would also help to reduce the risk of spread of infections when they touch equipments or when they are in contact with the nurses. Nurses should recognize their roles in preventing infection in the haemodialysis for themselves, other personnel and the patients as well. Hand hygiene does not only include the use of gloves or washing hands before and after patient contact and the use of disinfectant but the combination of all the above.

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APPENDIX I

| Author / Topic | Purpose | Participants | Methods | Findings |
|---|---|--|----------------------------|--|
| <p>Arenas, DM, Sanchez - paya, J, Barril, G, Garcia-Valdecasas, J, Gorriz, LJ, Soriano, A, Antolin, A, Lacueva, J, Garcia, S, Sirvent, A, Espinosa, M and Angos, M. A multicentric survey of the practice of hand hygiene in haemodialysis units: Factors affecting compliance. <i>Nephrology Dialysis Transplantation</i> 20:1164-1171, 2005</p> | <p>To investigate the degree of compliance with hand hygiene and use of gloves by health workers in HD units and factors affecting adherence to hand hygiene protocols.</p> | <p>9 different dialysis units in Spain .</p> | <p>observational study</p> | <p>Overall adherence of health workers to recommended hand hygiene practices is low. Further investigation about whether programmes that promote higher hand hygiene standards and use of alcohol based hand cleansers will improve is yet to be done.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|--|---|--|---|--|
| <p>Burnett, E. Perceptions, attitudes, and behaviour towards patients hand hygiene. <i>Am J Infection Control</i> 37:638-642 2009.</p> | <p>It is aimed at exploring Perceptions, attitudes, and self reported behaviour towards patient hand hygiene among clinical ward nurses within an acute hospital environment.</p> | <p>55 hospitals in 14 countries (Southern Asia, Europe Eastern Mediterranean, and Western pacific)</p> | <p>Mixed methodological, descriptive, cross sectional survey design using questionnaires.</p> | <p>Patients are not provided with the opportunities to practice hand hygiene practices due to major beliefs and preexisting behavior towards patient hand hygiene.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|---|---|---|--|--|
| <p>Erasmus, V, Brouwer, W, Beek V, Oenema A, Daha, JT, Richards, HJ, Vos, CM, and Brug, J. A qualitative exploration of reasons for poor hand hygiene among hospital workers: Lack of positive role models and of convincing evidence that hand hygiene prevents cross-infection. <i>Infection Control Hospital Epidemiology</i> 30(5):415-419, 2009.</p> | <p>To study potential determinants of hand hygiene compliance among health workers in hospital setting.</p> | <p>65 nurses ,attending physicians, medical residents and medical students In 5 hospitals</p> | <p>Qualitative study based on structured interview guidelines.</p> | <p>Staff in hospitals focus more on importance o self protection and are their main reasons for performing hand hygiene and a lack of positive role models and social norms may hinder compliance.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|---|---|--|--|---|
| <p>Ghazi, RQ, Saleh El, Ghazi Al and Badadweh M. (2008) Vascular Access Infection Among Hemodialysis Patients in Northern Jordan: Incidence and Risk Factors. <i>Southern Medical Journal</i>, 101(5), 508-512.</p> | <p>The aim of this prospective, descriptive, exploratory survey of end-stage renal disease patients was to explore the incidence and risk factors of Vascular Access Infection.</p> | <p>188 participants from 5 different hospitals</p> | <p>prospective descriptive, exploratory survey</p> | <p>34.6% patients had a Vascular Access Infection during the study Period. Infection occurs more with catheters than with arteriovenous fistulas and grafts. Arteriovenous fistula had a higher infection rate than arteriovenous grafts. The important risk factors are complications due to cannulation and long usage duration of catheters. Infection was more prevalent among females and those with a low level of education.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|--|--|-----------------------|--------------------------|--|
| <p>Gould, D.J. (2005) Infection control: the environment and service organisation. <i>Nursing Standard</i>, 20(5), 57-65.</p> | <p>To explore the contribution of the healthcare environment and the organization of healthcare delivery to healthcare-associated infection.</p> | <p>Hospital staff</p> | <p>Literature Review</p> | <p>Hand washing is considered the single most effective and cost effective means of preventing health care associated infection by breaking the chain of infection. The environment is not a major source of contamination and it is not thought to play an important role. However, the hospital environment is contaminated and handled by health workers. Hence, there is a need to promote a clean environment in healthcare premises.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|---|---|--|---|--|
| <p>Grabsch, Elizabeth A. et al. Risk of Environmental and Healthcare Worker Contamination With Vancomycin-Resistant Enterococci During Outpatient Procedure and Hemodialysis. Infection Control and Hospital Epidemiology. 27(3):287-293, March 2006.</p> | <p>To assess the risk of environmental and HCW performed on fecally contaminated pt. contamination with VRE during outpatient procedures.</p> | <p>14cVRE patients -28 HCWs -7 pVRE patient -14 HCWs</p> | <p>- Observational study/Qualitative research</p> | <p>-cVRE patient had higher rates of contamination of environment than pVRE. -Chair culture positive -36% for OPD, 58% for hemodialysis. -Couch culture +ve-48% OPD, 42% radiology, 45% hemodialysis. -Contamination of HCW gowns were +ve in 20% of OPD, 4% radiology and 30% hemodialysis. -Contamination of pt's own hand were +ve in 36% OPD, 25% radiology, 54% hemodialysis. -Overall contamination rates with pVRE pt. were 12% at OPD.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|--|---|--|--------------------------------|---|
| <p>Longtin, Y, Sax, H, Aallegranzi, B, Hugonnet, S, Pittet , D. Patient's beliefs and perceptions of their participation to increase Healthcare worker compliance with hand hygiene.infection control hospital epidemiology (2009)</p> | <p>To assess patient's perception of a patient-participation program to improve healthcare worker's compliance with hand hygiene.</p> | <p>194 patients in a large Swiss teaching hospital</p> | <p>Cross sectional survey.</p> | <p>There is a positive side to encouraging patients to participate in hand hygiene compliance and the findings from the study could be used in the future to develop hand hygiene promotion strategies.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|--|---|--|--|---|
| <p>Shimokura, G, Weber, JD, Miller, CW, Wurtzel, H and Alter, MJ. Factors associated with personal protection equipment use and hand hygiene among haemodialysis staff. Am J Infection Control 34:100-107 2006</p> | <p>To investigate factors associated with performing proper hand hygiene practices and wearing of gloves.</p> | <p>45 US HD hospitals and 420 out of 605 eligible staff members responded.</p> | <p>Self administered questionnaires.</p> | <p>Compliance with recommended hand hygiene and glove use among HD staff was low and infection control practices specific to HD ward was poorly understood by all staff. Infection control training should be tailored to this setting to address misconceptions.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|---|---|--------------------|----------------------------|--|
| <p>Storr, J, Topley K and Privett, S. (2005) The ward nurse's role in infection control. Nursing Standard 19 (41), 56-64. UK.</p> | <p>To provide an overview of the ward nurse's role in reducing the risk of infection.</p> | <p>Ward nurses</p> | <p>Double blind review</p> | <p>Staff at ward level require good knowledge and skill regarding infection and its control. Standard principles for preventing health care associated infections are environmental hygiene, hand hygiene, use of personal protective equipment and safe use and disposal of sharps.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|--|---|---|--|---|
| <p>Taylor,G, Gravel,D, Johnston,L, Embil,J, Holton,D and Paton,S. Incidence of bloodstream infection in multicenter inception cohorts of haemodialysis patients. Association for Professionals in Infection Control and Epidemiology, Inc, 32,155- 160,2004.Canada</p> | <p>To assess incidence of and identify risk factors for bloodstream infection in patients starting haemodialysis or starting a new means of vascular access for haemodialysis</p> | <p>527 patients (258 new, 269 continuing)</p> | <p>-A nested case- control study</p> | <p>- There were 96 bloodstream infections in 93 patients. Identified risk factors are prior blood stream infection, poor patient hygiene and superficial access-site infection. Continuing haemodialysis group who had previous bloodstream infection are markers for an increased risk of infection due to poor patient hygiene.</p> |

| Author / Topic | Purpose | Participants | Methods | Findings |
|---|--|------------------|--|---|
| Thompson, ND., Novak, RT., Datta, D., Cotter, S., Arduino, MJ., Patel, PR., Williams, IT and Bialek, S. R. Hepatitis C Virus Transmission in Haemodialysis Units: Importance of Infection Control Practice and Aseptic Technique. Infection Control and Hospital | To identify practices associated with transmission of HCV infection in haemodialysis unit. | 234 Out patients | - case-control or retrospective cohort study | - The risk was higher for patients who underwent dialysis on the shift after that of the patient with chronic HCV. Failure to routinely clean dialysis station and machine surfaces between patients and the preparation of intravenous medications in potentially contaminated areas before their administration to multiple patients. |

APPENDIX II

| Heading | Sub heading |
|---|---|
| Environmental related risk factors in the haemodialysis unit | <p>failure to clean equipments and the haemodialysis settings</p> <p>long usage of catheters</p> <p>low level of education</p> <p>poor patient hygiene</p> <p>cleaning staff 's lack of adherence to proper hygiene practices</p> <p>work overload and shortage of nurses</p> <p>attitude towards hand hygiene</p> <p>dryness and soreness of the hands</p> <p>lack of role models</p> <p>lack of time, availability and forgetfulness</p> <p>improper hand hygiene techniques.</p> |
| Role of nurses in promoting environmental hygiene in a haemodialysis unit | <p>as role models for student nurse and healthcare staff</p> <p>patient education on infection prevention</p> <p>cleanliness as a habit</p> <p>teamwork in improving hospital hygiene</p> <p>to orientate visitors</p> <p>mastering knowledge and techniques in infection prevention and applying it into their daily working situations</p> <p>implementing updated and scientific evidence based information in infection control</p> |

APPENDIX III

Recommended infection control precautions for haemodialysis units.

1. Disposable gloves should be used during touching of the patient's equipment at the dialysis station. Changing gloves and washings hands between each patient are compulsion. Hand hygiene and gloves change should be frequently done during routine patient check.
2. Any items taken inside the dialysis station should be used for a single patient and therefore need to be cleaned and they should be disposed after used. In some cases if the items are being used in other patients or common clean area they should be cleaned and disinfected.
3. Not all the items can be cleaned and disinfected. For e.g. Adhesive tape. Therefore should be used only once.
4. Other unused medications and supplies like syringe, alcohol swabs etc can only be used for one patient therefore they should not be used in common clean area or for other patients used.
5. All single use injectable medication vials should be dedicated for use on a single patient and used 1 time only. When multiple-dose medication vials are used to prepare individual patient's doses in a clean (centralized) area away from dialysis stations and deliver separately to each other patient. Do not carry medication vials, syringes, alcohol swabs, or patient treatment stations.
6. Clean area should be clearly designated for the preparation, handling, and storage of medications and unused supplies and equipment. Clean areas should be clearly separated from contaminated areas where used supplies and equipment are handled. Do not handle and store medications or clean supplies in the same or an adjacent area to where used equipment and blood samples are handled.
7. External venous and arterial pressure transducer filters/protectors should be used for each patient treatment to prevent blood contamination of the dialysis machines' pressure monitors. Do not reuse the filters and always change them between each patient treatment.
8. Dialysis station should be cleaned and disinfected between patients. For e.g. Chairs, tables, machines, beds etc.
9. Special attention should be given to clean control panels on the dialysis machine and other surfaces which are frequently touched and potentially contaminated with patient's blood. Buckets attached to the machine are also included in this process.
10. For dialyzers and blood tubing that will be reprocessed, cap dialyzer ports and clamp tubing. Place all used dialyzers and tubing in leak proof containers for transport from station to reprocessing or disposal area.

*Source: Adapted from Thompson et al. Hepatitis C Virus Transmission in haemodialysis Units: Importance of Infection Control Practice and Aseptic Technique. *Infection Control and Hospital Epidemiology* 2009; 30(9): 900-903.