

IMPLEMENTING CHANGE IN HAND HYGIENE AND ASEPSIS IN HAEMODIALYSIS NURSING CARE

A literature review

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Final Project

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<p>TIIVISTELMÄ</p> <p>Tämä opinnäytetyö on osa <i>Aseptiikan ja Hygienian Kehittäminen Nefrologisen Potilaan Hoitotyössä</i> -hanketta. Työ on osa Metropolia Ammattikorkeakoulun, Helsingin ja Uudenmaan sairaanhoitopiirin nefrologian klinikan, infektiosairauksien klinikan, Turun yliopiston hoitotieteen laitoksen sekä potilasjärjestö Musili Ry:n yhteistyöhanketta.</p> <p>Opinnäytetyön tarkoituksena oli tunnistaa interventioita, joilla voidaan parantaa käsihygieniaan sitoutumista hemodialyysipotilaan hoitotyössä ja lisäksi vaikuttaa muutoksen toteuttamiseen kliinisessä käytännössä.</p> <p>Tätä kirjallisuuskatsausta varten kerättiin systemaattisesti 15 tieteellistä tutkimusartikkelia käyttäen OVID, CINAHL ja PUBMED tietokantoja. Tämän lisäksi tietoa haettiin manuaalisesti, jotta löydettäisiin käsihygienian ja aseptiikan käsitteitä kuvaavaa kirjallisuutta.</p> <p>Tuloksista ilmeni, että yksittäiset interventiot paransivat käsihygieniaan sitoutumista. Jotta saavutettiin korkeatasoista ja kestävää sitoutumista, suosittiin kuitenkin monitahoisia interventioita, jotka keskittyivät koulutukseen ja käyttäytymisen muuttamiseen. Näiden tulisi sisältää koulutuksia, harjoittelua, julistekampanjoita, suorituksesta annettavaa palautetta, teknologian hyödyntämistä, käsidesin saatavuutta ja roolimallinnusta.</p> <p>Muutoksen toteuttaminen on pitkä prosessi, joka riippuu interventioiden laadusta ja sisällöstä, sairaanhoitajien aktiivisesta osallistumisesta sekä laitoksen tarjoamasta tuesta. Monitahoisten interventioiden jatkokehittämistä tarvitaan, jotta taataan sairaanhoitajien riittävä taito ja tietoisuus käsihygieniasta ja aseptiikasta nefrologisen potilaan hoidossa.</p>		
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<p>ABSTRACT</p> <p>This final project is part of <i>Improving the Quality of Hand Hygiene and Asepsis in the Care of Nephrological Patients</i>, a project conducted by Metropolia University of Applied Sciences, in collaboration with the Clinics of Nephrology and Infection Diseases of HUCH, the Department of Nursing Science of Turku University Faculty of Medicine, and the Finnish Kidney and Liver Association.</p> <p>The purpose of this final project is to identify interventions that can improve hand hygiene adherence in haemodialysis patient care and, in addition, influence the implementation of change in clinical practice.</p> <p>There were 15 research articles for this literature review, collected systematically from OVID, CINAHL and PUBMED. In addition, manual search was conducted in order to find literature supporting the concepts of hand hygiene and asepsis.</p> <p>The findings showed that single interventions improved hand hygiene adherence but, in order to reach a sustained high level of adherence, multifaceted interventional programmes focusing on education and behavioural change were preferred. They should include educational courses, trainings, poster campaigns, performance feedbacks, use of technology, accessibility to hand rub, and role modelling.</p> <p>The implementation of change is a long process that depends on the quality and content of the interventions, the nurses' active participation and the support institutions can provide. Further development of multifaceted interventional programmes is needed to ensure that nurses have sufficient knowledge and awareness on hand hygiene and asepsis in the care of nephrological patients.</p>		
<p>Keywords Hand hygiene, aseptic techniques, change, adherence, haemodialysis, nosocomial infections, multifaceted interventions</p>		

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1. INTRODUCTION

Hand hygiene and asepsis are elements of the nurse's basic knowledge. The importance of hand hygiene and asepsis in nursing has been widely researched; hand hygiene is the cornerstone of infection control. Research by Shimokura et al (2006: 100) has emphasized that the most important patient-to-patient transmission route of pathogenic microorganisms in health care settings, including haemodialysis facilities, is via the contaminated hands of the healthcare workers.

Good hand hygiene and aseptic technique are very important in nephrological patient care to minimize, if not neutralize, the infection risk because of the patient's reduced immunity (Routamaa & Hupli 2007: 2397; Honkanen & Ratia, 2005: 428). The Helsinki University Central Hospital (HUCH) continuously works on hand hygiene and the methods of improvement in clinical practice. Healthcare professionals have been discussing the consequences of poor hand hygiene among patients receiving haemodialysis (Sierla & Tamminen 2007: 1). There is however a gap between what is known and what should be done in nursing practice regarding hand hygiene (Korhonen, Rekola & Ruotsalainen 2008).

The number of nephrology patients in Finland has significantly increased since the end of the 1990's and there were over 4000 patients in renal replacement therapy (RRT) in 2008 (Finnish Registry for Kidney Diseases 2010). This offers great challenges in terms of infection control. Earlier final projects from Metropolia UAS have shown how hand hygiene and asepsis techniques were put into haemodialysis nursing practice. In addition, nurses' general knowledge about hand hygiene is considered as average and it affects directly the adherence rates. (Luu & Mesilaakso 2008; Maskerine & Loeb 2006.)

This final project is part of *Improving the Quality of Hand Hygiene and Asepsis in the Care of Nephrological Patients*, a project conducted by Metropolia University of Applied Sciences, UAS, (Degree Programme in Nursing), in collaboration with the Clinics of Nephrology and Infection Diseases of HUCH, the Department of Nursing Science of Turku University Faculty of Medicine, and the Finnish Kidney and Liver Association. The aim of the project is to improve hand hygiene and asepsis in the care of nephrological patients as well as to develop the evidence based care in HUCH's Nephrology Clinic (Korhonen, Rekola & Ruotsalainen 2008).

The purpose of this final project is to identify interventions that can improve hand hygiene adherence in haemodialysis patient care and, in addition, influence the implementation of change in clinical practice.

2. HAND HYGIENE AND ASEPSIS IN HAEMODIALYSIS NURSING CARE

This chapter discusses the importance of hand hygiene and asepsis in the care of nephrology patients. It also introduces the concept of implementing change in clinical practice.

2.1. Hand hygiene, asepsis and aseptic technique

Hand hygiene is a cornerstone in health care settings. The term includes several actions intended to decrease colonization with transient flora (Pittet 2001: 234). The World Health Organization (WHO) has defined hand hygiene as a general term for referring to any action of hand cleansing whose purpose is to physically or mechanically remove dirt, organic material or microorganisms (WHO 2006: 9). In other words hand hygiene covers both hand washing (using plain or antimicrobial soap and water) and hand disinfection (using alcohol-based rub).

It is the single most important intervention to prevent the spread of health care-associated infections (Burnett 2009: 100). However in a research by Arenas (2005: 1164) it is shown that the overall adherence of health care workers to the recommended hand washing practices is low.

Asepsis means the absence of microorganisms that cause infections. Aseptic technique is when the possibility of transferring microorganisms from one place to another is decreased (Brunner & Suddarth 2008: 507), in other words it is employed to maintain asepsis. The Encyclopedia of Surgery (2009) defines the aseptic technique as “a set of specific practices and procedures performed under carefully controlled conditions with the goal of minimizing contamination by pathogens”. It is important to point out that the contamination has to be minimized on both human (i.e. hands) and on environmental level (i.e. surfaces, equipment). Hand washing, surgical scrub, barriers (equipment), patient preparation, maintaining a sterile field and a safe environment in the procedure

area are good examples practices. Shraag (2006) insists that the set of practices mentioned earlier are to be performed immediately before and during a clinical procedure.

Hand hygiene and asepsis are particularly important in renal replacement therapies. Hand hygiene is an aseptic technique, the goals of which are to reduce a patient's risk of exposure to microorganisms, to protect the patient from infection and to prevent the spread of pathogens by eliminating microorganisms from hands and objects (Shraag 2006, Brunner & Suddarth 2008: 507). In the case of dialysis, the treatment is invasive, thus going through our first natural barrier, the skin. A breach in this barrier may let unwanted microorganisms (even our normal flora) enter the blood stream (in haemodialysis) or peritoneal area (in peritoneal dialysis) resulting in infections that can sometimes be fatal. In the case of kidney transplantation, the patient must be free of infection before and after the surgery. This is because the patient will be under medications suppressing immune response, in order to avoid rejection (Brunner & Suddarth 2008: 1561). In that regard, it is common sense to minimize the risk of infection.

2.2. Nephrology patient and haemodialysis care

Nephrology (from Nephros, kidney in Greek) is the medical science dealing with the study of the kidneys, their functions and diseases (renal diseases; from Renes, kidney in Latin). Nephrology, renal and kidney patient refers to a patient suffering from a kidney disease or a kidney failure. In addition, renal replacement therapy consists of the patient who need dialysis (haemodialysis, peritoneal dialysis) and kidney transplant (The Finnish Registry for Kidney Diseases 2007).

Haemodialysis is one of the three methods of renal replacement therapy along with peritoneal dialysis and kidney transplantation. A sick kidney fails when it is not able to do its work which is to filter patient's circulation of waste products, such as excessive potassium, urea and build-up of fluids. Roughly speaking, a dialysis machine acts as artificial kidneys and help filtering and removing waste products from the body (Honkanen & Ekstrand 2006: 1700).

A haemodialysis session lasts for 4-5 hours and should be renewed 3-4 days a week. Because haemodialysis is prone to occur in hospital settings, patients are at high risks of contamination with nosocomial infections if the methods of asepsis are not meticulous. By contrast nurses are also at high risk to contract blood-borne infections as well as to be a direct factor in patient-to-patient contamination.

As abovementioned, it is important to note that haemodialysis is an invasive procedure. Indeed, access to the circulation, also called vascular access, must be established to allow blood to be removed, cleansed and returned to the vascular system. This breach in the skin may allow microorganisms to have a higher likelihood of bloodstream invasion, initiating infections. Infections are the most important causes of the loss of vascular access for dialysis (Price et al. 2002: 725.)

There are three different types of access, insertion of a double-lumen catheter (acute haemodialysis) into the subclavian, internal jugular, or femoral vein, creation of an arteriovenous (AV) fistula (preferred) and of an AV graft (second choice).

The double-lumen catheter is in fact a central vein catheter (CVC). It is mainly used for acute haemodialysis or when the AV access is not yet ready. According to Price et al. (2002: 728), the use of CVC in haemodialysis should be restrained due to its high risk of infection.

The AV fistula consists of joining surgically by anastomosis an artery to a vein (usually the radial artery to the cephalic vein). In doing so it offers a great and visible access to the circulation with a low infection risk and a low tendency to clot, as well as providing an increased blood flow.

The AV fistula is ready to be used after 14 days (Brunner & Suddarth 2008: 1539, Honkanen & Albäck 2002: 1007) and can stay in place for years if well cared for. An infection can compromise the circulation access and thus compromise the whole dialysis procedure.

The second choice is to create an AV graft in the case if an AV fistula cannot be created (for instance with a diabetic patient having impaired vascular peripheral circulation). It consists of interposing subcutaneously a biologic, semi biologic or synthetic graft material between an artery and a vein (Brunner & Suddarth 2008:1539). It will act the same way as an AV fistula. However, complications such as thrombosis and infections occur more often than with AV fistulas.

In 2000, the Nephrology Clinic of HUCH reported one fistula infection for every 2000 haemodialysis treatments, *Staphylococcus aureus* or *Staphylococcus epidermidis* being the two main culprits. Infectious organisms can also easily enter the blood stream and contaminate organs (e.g. heart and endocarditis, bones and osteomyelitis) leading to a super infection, also called sepsis (Honkanen & Albäck 2002: 1008, Price et al. 2002: 725). Good hand hygiene and aseptic technique can considerably reduce this risk.

2.3. Infections related to haemodialysis

A sick kidney fails to filter waste products from the body. Kidney failure affects the organism's immune system and decreases the level of resistance to infectious attacks. Waste products and toxins that remain in the blood decrease the field of action of lymphocytes as well as leucocytes' ability to fight against bacteria. Furthermore, transplanted patients have an impaired immunization system because they need to take immunosuppressant medications to avoid organ rejection. As a result, a kidney patient is very sensitive and comes down with infections very easily. According to Honkanen and Ratia (2005: 428), this is also due to nephrotic syndrome caused by a great loss of proteins (large amount found in urine).

The most common route of infections in patients under haemodialysis is through the inserted catheter. Indeed, the microbes composing the skin's normal flora may access the blood stream when the skin's surface is not properly taken care of. A microbial colonisation on the skin is to be avoided and it is important that the patient's skin remains intact and is well cleaned and disinfected before insertion (Honkanen & Ratia 2005: 430). Lacking to follow these basic rules can have a disastrous effect on the patient, such as sepsis with multiorgan failure, endocarditis, metastatic infections, or even death (Honkanen & Albäck 2002: 1008, Price et al. 2002: 725).

The most common bacterium that can infect a patient undergoing haemodialysis is MRSA (Methicillin Resistant Staphylococcus Aureus) which is resistant to antibiotics. According to Honkanen and Ratia (2005: 431), 40-50 % of patients in haemodialysis carry MRSA in their nasal cavity. MRSA is a source of nosocomial infections and actively fought in HUCH hospitals (and also in every hospital in the world). It is easily transmitted from patient to patient through the health care provider's hands and the patients themselves (Sierla & Tamminen 2007: 8). A good hand hygiene and aseptic technique are the only way to avoid its spreading; 15-30% of nosocomial infections can be prevented through improved hand hygiene (Maskerine & Loeb 2006: 244).

2.4. Implementing change in clinical practice

2.4.1. Adherence

Shimukura (2006: 100) has identified factors influencing adherence to hand hygiene in clinical practices, such as attitudes, knowledge, institutional factors, physical barriers, type of environment, type of staff and the use of automated sinks. Another review by Allegranzi and Pittet (2009: 2) also showed that the risk of poor compliance is higher when care occurs in a care activity where there is a higher risk of cross-infection, for example in a haemodialysis ward.

Increased adherence to hand hygiene is widely acknowledged to be the most important way to reduce infections in the health care facilities (Maskerine and Loeb 2006: 244). Adherence, also often referred to as compliance in the literature, can be defined as how closely a person is able to follow some guidelines, here hand hygiene. Reasons for non-adherence to hand hygiene has been widely researched and several theories have been studied to improve adherence to hand hygiene (Whitby et al. 2007: 2).

Abovementioned theories are predominantly psychological and focus on behavioural change. Some of them are particularly interesting, for instance the health belief model and the theories of reasoned action and planned behavior, because they highlight the issues of attitudes and knowledge. According to the health belief model, as Maskerine and Loeb (2006: 245) describe it, a health care worker's actions depend on the perceived susceptibility of the health threat, the perceived severity of the threat and the belief that a particular recommendation would be beneficial without costly barriers or

high risks. In other words, when applied to hand hygiene, health care workers would adhere to hand hygiene if they believed that they were susceptible to a particular infection and would acquire and/or transmit to somebody else this infection if they did not wash their hands. Similarly, the theories of reasoned action and planned behaviour suggest that a healthcare worker will have a positive attitude if she / he believes and understands that adherence to hand hygiene prevents infections, (Maskerine & Loeb 2006: 246).

2.4.2. Interventions

It is commonly agreed that situations regarding hand hygiene must go forward. From a nursing point of view, it is crucial that basic rules of hand hygiene and asepsis, that are normally well known and well handled, are rigorously followed. It should already be part of the nurses' daily routine but the literature tends to show the opposite. Infections (including nosocomial) in nephrology patients can be reduced or suppressed with a good compliance and adherence to hand hygiene; infections are the most important causes of the loss of vascular access for dialysis and have catastrophic consequences (Price et al. 2002: 725).

Literature tends to show that specific interventions should be studied. An intervention refers to actions taken to improve a situation or to make a significant change. For instance, a frequent way to remind the nurses to keep a good hygiene is a poster which seems to be beneficial (Pittet 2001: 238). This is, however, not enough, a poster alone being not efficient if concrete interventions around it are not implemented. This final project will show methods and interventions that would improve the adherence of hand hygiene in the nursing care. According to Maskerine and Loeb (2006: 244), adherence to hand hygiene has been estimated to be 30-60% in the absence of any interventions.

3. PURPOSE OF THE LITERATURE REVIEW AND RESEARCH QUESTION

3.1. Purpose

The purpose of this final project is to identify interventions that can improve hand hygiene adherence in haemodialysis patient care and, in addition, influence the implementation of change in clinical practice.

3.2. Research Question

What interventions can be utilised in order to improve adherence to hand hygiene and aseptic methods in haemodialysis nursing care?

4. SYSTEMATIC LITERATURE REVIEW AND CONTENT ANALYSIS

4.1. Literature review

A literature review is an organized, extensive and systematic written critique of the most important published scholarly literature on a topic (LoBiondo-Wood & Haber 2006: 79, Burns & Grove 2005: 93). In nursing research, it is a tool that promotes evidence-based nursing and its main purpose is to present strong knowledge in order to improve the nursing practice.

Reviewing literature on a clinical topic involves, as Polit and Becks (2004: 111) write, the identification, selection, critical analysis and written description of existing information. Concepts and keywords were initially identified in order to do the database search, as detailed in the next section. Sources were critically assessed against the inclusion criteria and accepted or discarded accordingly. The articles' reference lists were also assessed in order to find other relevant sources. Finally, materials were organised and analysed. Figure 1 by Polit and Becks (2004: 105) describes the systematic flow of tasks utilized for this review.

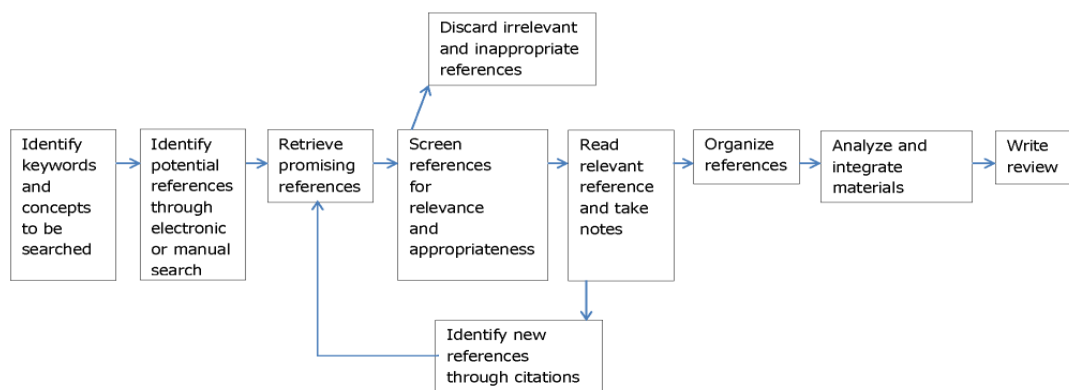


FIGURE 1. Flow of tasks in a literature review (Polit & Beck 2004: 105)

The method applied to collect materials and to analyse their content was a systematic review of the literature. In other words, the searching process was executed systematically, which provides the best available evidence on a clinical topic. It has been established, as Kääriäinen and Lahtinen (2006: 37) state in their abstract, that systematic review as a method of analysis is the most reliable and valid mean of summarizing previous scientific knowledge.

A systematic literature review as such requires expertise and double-checking from at least two members of the review team (LoBiondo-Wood & Haber 2006: 573; Kääriäinen & Lahinen 2006: 42). The very demanding aspect of a systematic review as Kääriäinen and Lahinen recapitulate (2006: 43), is not a barrier for this final project because the ability to achieve such a task is not required for a student in UAS writing his bachelor thesis (Mattila 2010). Therefore, this final project is an application of a systematic literature review, or a literature review attained systematically.

4.2. Database search

The database search was executed in several phases. The preliminary phase was aimed at finding information about the topic for the outline presentation. Keywords such as Hand hygiene, dialysis, kidney, practice and change were utilized in PUBMED, OVID, MEDIC and CINAHL. Articles found in this tentative database search, as well as sources retrieved through their references, constituted a quality source of background information which gave the author something to begin with in the building up of a relevant title and the research question.

A second phase was implemented in order to start the reviewing. The databases used for this systematic literature review are CINAHL, OVID and PUBMED. The keywords used are hand hygiene, improve and change. Limitations are years 2000-2010 and Full-Text. The first relevant search was conducted on the 17th of February 2010. It was decided that keywords related to nephrology (i.e. kidney, dialysis, etc...) would not be utilised for the database search. The reason is that infection control and adherence to hand hygiene is a common issue in any hospital ward. Therefore the interventions that can improve adherence to hand hygiene by implementing a change could be extended to haemodialysis care.

The search on CINAHL was conducted with the keywords *hand hygiene* AND *improve and hand hygiene* AND *change*. After limitation, seven relevant articles were retrieved, and five used. A very relevant article was found from the reference list of one of the two unused articles.

The search on OVID was conducted with the keywords *hand hygiene* AND *improve* AND *change* which lead to 1163 hits. After limitation, 430 hits were still shown. The author decided, nevertheless, to go through the articles; the function on OVID offering the possibility to select and display the materials with relevant titles was used and 76 articles were kept. After further analysis, 30 articles were kept, out of which nine were considered relevant to the topic, one of them being another version of a study already retrieved from CINAHL. Eventually, seven articles were used.

The search on PUBMED was conducted with the keywords *hand hygiene* AND *improve* AND *change*. After limitation, four articles were retrieved and two used

The database search resulted in 14 articles in total. In addition, one article was found in the references. Results of the database search are recapitulated in the tables Database search and data sources (APPENDIX 1).

4.3. Inclusion criteria

The author used inclusion criteria as follow:

- ✓ The article is related to the topic and has a relevant heading and abstract.
- ✓ The articles are available and easily retrievable.
- ✓ The presented researches are up to date and published during the past decade (2000-2010).
- ✓ The article is either a qualitative or a quantitative study, or a systematic review.
- ✓ The research reflects the current clinical practice in nursing.
- ✓ The research is published in English or in Finnish.
- ✓ The article answers the research question

4.4. Data analysis

Content analysis is a technique for the objective, systematic and quantitative description of documentary evidence (Lo-Biondo-Wood & Haber 2006: 561). An inductive content analysis method was used for this review which was built in three phases: preparation, organising and resulting phases (Elo & Kyngäs 2008: 109). Figure 2 represents a diagram showing the process of inductive content analysis.

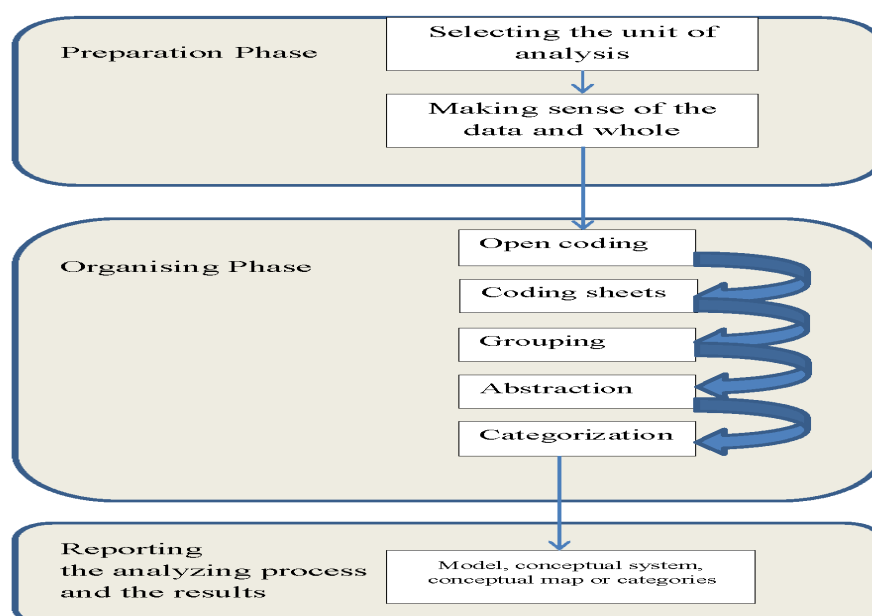


FIGURE 2. The content analysis process: inductive approach (adapted from Elo & Kyngäs 2008: 110)

The inductive content analysis aims to organize information according to concepts and its process includes open coding, creating categories and abstraction. Open coding implicates that the reader writes notes and headings while reading the articles in order to create categories. The headings are then transcribed onto a coding sheet and grouped as categories. Finally, the list of categories is hierarchized into higher groups in order to reduce the number of categories with similar or dissimilar content (Elo & Kyngäs 2008: 109-111.)

According to Elo and Kyngäs (2008: 111), abstraction means, “formulating a general description of the research topic through generating categories.” In other words, a main category generates generic categories that are divided into sub-categories. Categories are named according to their theme related to their content.

The research articles were assessed and evaluated regarding the inclusion criteria. The content of the articles was separated according to its 1) Title, author, journal, 2) Purpose, 3) Sample, 4) Data collection and analysis 5) Main findings and put into a table (APPENDIX 2).

Once assessed, the research articles were analysed in an inductive way. Open coding was used and themes were put together on a coding sheet. Generic categories and sub-categories emerged and built a strong and a logical structure, giving a clear view of the findings. As a result, two generic categories stating two types of intervention, as mentioned in the literature, were created. Finally, sub-categories describing the interventions more in details were defined. Figure 3 summarizes the categories (APPENDIX 4).

5. FINDINGS

The research studies used for this literature review have assessed and tested different interventions and evaluated their outcomes in terms of improvement of hand hygiene adherence in clinical practice. It was found out that two types of interventions were appearing from the studies: education-based and behaviour-based interventions.

5.1. Education and training

5.1.1. Hospital-wide programme and posters

Education aims at promoting intellectual curiosity, development and encouraging the ambition to implement change and training promotes discipline to inhibit development (Gould et al. 2008: 199). It is acknowledged that adherence with recommended instructions is commonly poor amongst health care workers (Pittet et al. 2000: 1307; Hussein et al. 2007: 566; Gould et al. 2008: 193; Swoboda et al. 2007: 470). Results on adherence without any intervention vary from one study to another. In the research articles used for this paper, the baseline adherence, i.e. the adherence without any intervention, is situated between 40% and 57% (with two exceptions at 6,3% and 22%). Studies have shown that educational programmes have produced clear improvement in hand hygiene adherence, hence reducing the nosocomial and health-care related infections.

A hospital-wide programme, mainly based on a poster campaign together with a generalised promotion of alcoholic hand rubs, proved to be efficient in improving significantly hand hygiene adherence and therefore reducing nosocomial infections and MRSA transmissions (Pittet et al. 2000: 1310; Hussein et al. 2007: 570; Creedon 2005: 214). Posters, reporting strong messages about infections, cross-transmission and hand hygiene were placed at strategic places and replaced once or twice per week with other posters. By doing so the posters were visible at different places in the hospital, creating an illusion that new posters were set regularly (Pittet et al., 2000: 1308). Nursing personnel feel that a reminder poster yields from a moderate to high level of motivation for adherence to hand hygiene (Picheansathian, Pearson & Suchaxaya 2008: 319).

The aforementioned hospital-wide protocol developed by Pittet et al (2000) is known as the Geneva Programme. Whitby et al. (2007) tested and compared it with a very similar protocol called the Washington Programme, which is targeted at inducing institutional cultural change toward improved hand hygiene (Larson et al. 2000 quoted in Whitby et al. 2007: 349). Both programmes have a positive effect on increasing hand hygiene practice with sustained improvement. However the durable effect of the Geneva Programme, principally based on education, may be limited in wards where leadership is weak.

5.1.2. Problem-oriented and task-based education programme

The use of a problem-oriented and task-based education programme integrated into the orientation programme for new nurses can also improve adherence to hand hygiene (Lam et al. 2004: 570; Pittet 2000: 384; Gould et al. 2008: 199). The programme, which is completed over a one-year period, includes specific trainings and demonstrations emphasizing on the importance and the correct way to wash hands. Face-to-face training and return demonstration to show what was learnt are conducted at regular intervals. Task-oriented programmes should be “continuously reinforced to achieve optimal compliance.” (Lam et al. 2004: 570)

Gould et al. (2008: 199) also mentions that educational initiatives are potentially capable of creating a sustainable change when they are well-designed and well-implemented, even though they require exhaustive human and financial resources. Training, on the other hand, is less demanding humanly and financially but is more likely to have short-term outcomes because it rather coaches to undertake a repetitive set of activities than tackles the problem-solving. However, a training -based promotion strategy, in which are referred procedural steps and indication for practicing hand hygiene, is reported as a good source of motivation for adherence to hand hygiene among nurses (Picheansathian et al. 2008: 319).

Educational and training programmes increase knowledge and therefore adherence on hand hygiene. They must be continuously reinforced to achieve optimal adherence to recommended hand hygiene policies (Hussein et al. 2007: 570). Additionally, there are positives outcomes in terms of adherence with nurses who receive a hospital-wide general overview of infection control and hand hygiene in their initial orientation to the hospital (Swoboda et al., 2004; Lam et al, 2004). However, it has also been discussed that multifaceted interventional programmes, that is to say programmes with multiple approaches, are key factors leading to a sustained high level of appropriate hand hygiene practices among nurses (Picheansathian et al. 2008; Hussein et al. 2007; Creedon 2005; Pittet 2000).

5.2. Change in the behaviour

5.2.1. Performance feedbacks

According to Jamtvedt et al. (2006: 433), audit and feedback is widely used as a strategy to improve the professional practice. Therefore, it appears plausible that feedback may have a positive effect on hand hygiene adherence in clinical practice. However Assananen, Edmond and Gonzalo (2008) did not observe significant improvement in hand hygiene adherence when feedbacks of infection control process measures were given to the nurses via their leaders in tabular forms.

In fact, as Jamtvedt et al. (2006: 436) note, audit and feedback are considered effective in improving adherence in clinical practice when baseline adherence is low and intervention (i.e. audit and feedback) high in intensity. In other words, in a ward where adherence is satisfactory, audit and feedback have a small to moderate effect on improvement.

On the other hand, multilevel performance feedback interventions may enhance hand hygiene adherence through behaviour change and performance improvement. The multilevel feedback involves “feedback through leadership and direct feedback to nurses via highly visible and easily understood infection control summary posters in staff-only areas.” (Assananen, et al. 2008: 412.). In addition, the effect of audit and feedback may be larger when nurses are actively involved (Jamtvedt et al. 2006: 434).

Hussein et al. (2007: 570) also agree that “frequent performance feedback produce a sustained improvement in adherence to hand hygiene, coinciding with a reduction in nosocomial infection rates”. In fact Picheansathian et al. (2008: 318) noticed that a monthly performance feedback was an effective method for motivating the nurses to improve hand hygiene practice. However in the research study by Creedon (2005: 214) it is discussed that an intervention based on performance feedback alone has minimal effects on hand washing practices.

Consequently, it is believed that the implementation of a multifaceted interventional behavioural hand hygiene programme (including performance feedbacks) may result in an improvement in adherence (Creedon 2005: 215; Pittet 2000: 385). Performance feedback, in combination with education for instance, is the most successful approach to increase the frequency and effectiveness of hand hygiene (Lam, et al. 2004: 569).

5.2.2. Observations in clinical practice

A very common phenomenon referred to as the Hawthorne Effect has been reported during observations on hand hygiene performance. The Hawthorne Effect refers to the tendency of subjects who know they are being observed to temporarily change their behaviour (Kohli et al. 2009: 222). Adherence to hand hygiene can be misevaluated due to this effect; it is often seen as a limitation when doing observational study and researchers try to narrow the risk down (Pittet et al. 2000: 1312; Kohli et al. 2009: 224).

However this effect by its nature can be used as a tool to improve hand hygiene adherence in the health care settings. Kohli et al. (2009) studied the Hawthorne Effect with regard to hand hygiene practice and came to the conclusion that recognized observers are associated with higher rates of hand hygiene adherence, especially in high-performing units. It is also very important to state that, when used as a tool, the Hawthorne Effect may improve adherence in a prolonged manner. Behaviour change and performance improvement is possibly mediated by the Hawthorne effect (Assananen et al. 2008: 412).

5.2.3. Engineering control and reminders

Engineering control can be defined as the devices and equipment that may contribute to the increase of hand hygiene adherence when used and placed adequately. Pittet (2000: 384) defines it as “making hand hygiene possible, easy and convenient, and making alcohol-based hand rub available”.

In the study by Pittet et al. (2000: 1311), it was established that most group of health care workers (including nurses) modified their practice and adherence improved mainly as a result of the increasing use of alcohol-based hand rub solutions. Otherwise stated, and as Hussein et al. (2007: 570) also state in their findings, the promotion of hand rub solutions by increasing the accessibility in the wards (bedside, small distance intervals, close to doors) can be considered as an efficient intervention. Picheansathian et al (2008: 318), Whitby et al. (2008: 349) and Pittet et al. (2000: 1311) have also confirmed that the availability of alcohol dispensers facilitates nurses to clean their hands more frequently. In addition the provision of a hand rub beside each patient's bedside is a behaviour enabling-factor (Creedon 2008: 210). Nevertheless, the introduction of hand rub without an associated behavioural program has proved to be ineffective (Marra 2010: 18).

Auditory reminders may also change practice behaviour. This strategy can be electronically monitored and coupled with voice prompts (Gould et al. 2006: 198). Swoboda et al. (2007) recognized that voice prompts improve hand hygiene and decrease nosocomial infections. A device monitors the patient rooms, utility rooms and lavatory while a computerized voice urges hand washing when a nurse fails to perform hand hygiene. Hand hygiene adherence is significantly improved during the period of voice prompts and it is suggested that ongoing monitoring and reminders have a short-term and perhaps a long-term effect (Swoboda et al. 2004; Swoboda et al. 2007). Additionally, the voice prompts strategy may show some significant improvement when it is located in an isolation room. Indeed nurses are "more likely to perform hand hygiene techniques when constrained by isolation rooms, with further improvement in hand hygiene behaviour with several reminders" (Swoboda et al. 2007: 475). It is again recognized that multimodal strategies have more success than single interventions to improve behaviour (Swoboda et al. 2007: 475).

5.2.4. Role models and Positive Deviance

Reported reasons for nonadherence include, amongst all, the frequent lack of a role model by senior staff (Pittet 2000; Hussein et al. 2007; Schneider et al. 2009).

Eliminating physical barriers and improving accessibility to hand washing may be influential for improving hand hygiene rate but, as Schneider et al. (2009: 362) reminds: “ the most compelling factors determining adherence may be the behaviours of the senior healthcare workers.” Otherwise stated, a healthcare worker is less likely to perform hand washing in the presence of a senior healthcare worker who did not do it either.

Senior healthcare workers tend to forget or ignore that their novice and less experienced peers often see them as role models; they underestimate the impact this attitude has on the culture of medical practice and on the behaviour of their younger peers. As a matter of fact, hand hygiene behaviour of senior nurses plays a crucial role on the hand hygiene behaviour of junior nurses. Adherence to hand hygiene of nurses may improve under the supervision of adherent role models (Schneider et al. 2009: 362.)

Positive Deviance, as the Positive Deviance Initiative (2010) describes it, is “based on the observation that in every community there are certain individuals or groups (the positive deviants), whose uncommon but successful behaviours or strategies enable them to find better solutions to a problem than their peers. These individuals or groups have access to exactly the same resources and face the same challenges and obstacles as their peers.” When applied to healthcare and more particularly to hand hygiene, positive deviants are the health care workers (including nurses) who want to change and develop new ideas for improving hand hygiene by influencing their peers to change. Changing experience, showing how to improve hand hygiene practices and discussing the best way to perform hand hygiene are the main steps of it. It is suggested that a positive deviance approach could be successful in yielding a significant improvement in hand hygiene, decreasing the incidence of nosocomial infections (Marra et al. 2010.)

6. DISCUSSION

The purpose of this final project was to identify interventions that can improve hand hygiene adherence in haemodialysis patient care and, in addition, influence the implementation of change in clinical practice. There was one research question for this literature review: what interventions can be utilised in order to improve adherence to hand hygiene and aseptic methods in haemodialysis nursing care? The different approaches found in the research articles and reported in the findings section will be discussed.

6.1. Multifaceted interventions improve hand hygiene

It is commonly agreed that improving adherence to hand hygiene and asepsis in nursing practice, which reduces hospital-acquired infections, has been for years an immense challenge. Studies described in the research articles have reported the strengths and weaknesses of single interventional approaches: significant improvement and good outcomes but inability to produce sustained improvement in terms of adherence.

Therefore, the best approach to improve adherence to hand hygiene and asepsis is the utilization of interventional programmes including many successful single interventions aimed to educate and change the nurses' behaviours. They are also called multifaceted interventional approaches and they regroup poster campaigns, problem-based and task-oriented trainings, performance feedbacks, direct observations, promotion of hand rub, use of electronic systems and instauration of role models.

Nurses have strong responsibilities in the infection control process; a good adherence to infection control guidelines is crucial in order to reduce nosocomial infections. Factors such as attitudes and lack of knowledge can be undertaken with behavioural and educational interventions. Nurses' attitudes and knowledge about hand hygiene and infection control have a direct influence on adherence in clinical practice.

Every single intervention to reduce nosocomial infection by increasing hand hygiene is a positive measure. It was illustrated earlier that they all showed good results in terms of adherence improvement, but multifaceted approaches were more prone to have durable outcomes.

Interventions have to be attractive and innovative in order to motivate the nurses. Behaviour change is a long process; that is why it is difficult to reach sustained improvement in the short term. Multifaceted interventional approaches should include interventions focusing on nurses' attitudes and behaviour and promoting change in the habits and traditions. They should also concentrate both on the individual nurse and on the whole team. Implementing change in the nursing culture requires an active participation of the nurses and leaders. Nurses need to receive support from the institutions and agencies. Indeed, and as earlier studies have showed, institutional factors influence strongly adherence to hand hygiene. Institutional support can also mean giving administrative sanctions for nurses and health care workers that do not comply.

According to the research articles used for this review, a multifaceted interventional hand hygiene programme aims at predisposing (i.e. assessing the nurses' attitudes, beliefs and knowledge), reinforcing (for example: supporting the nurses with feedbacks) and enabling (provision of hand rub solutions) nurses to comply with hand hygiene guidelines. The different approaches detailed in the findings could all be utilized in a hospital-wide programme. It is important that there is a strong leadership and management in order to enhance and increase interest in hand hygiene.

6.2. Implication for clinical practice and suggestions for further research

The findings of this literature review have a significant implication in clinical nursing practice. The interventions proposed in this paper can be applied in the care of nephrological patients, since improvement in hand hygiene and asepsis is needed in any medical field. Nosocomial infections are a threat to patients' safety, and more particularly the nephrological patients.

The research studies for this literature review have established that the topic has been studied more in depth since the mid-1990's, when alcohol rub solutions were introduced in clinical practice. It was showed that some particular interventions could implement change but the effects were seen for a short period of time only. It is proposed that multifaceted intervention programmes have the aptitude to trigger a change and to produce a durable effect in the nursing culture towards infection control.

The battle against nosocomial infections is very expensive for hospital agencies, including HUCH. Implementing change through multifaceted interventions is cost-effective in the long run and provides a safer environment for the patients. It is crucial that hospital acquired infections decrease, especially when they are due to a lack of hand hygiene practice. Implementing change in clinical practice clearly offers benefits to the patients, the nurses (and health care workers) and to the institutions.

Some of the findings are fairly expected and the use of multifaceted intervention programmes becomes clearly common sense. However the best programme, providing the best outcomes, is not yet known. Therefore, one can just presume that successful interventions put together can lead to the best outcomes. Furthermore, the planning and implementation of a vast hospital-wide multifaceted interventional programme is a very demanding task and implicate a lot of human resources.

Hand hygiene and asepsis are elements of the nurses' basic knowledge. Nurses tend to take that knowledge for granted, resulting in adherence failure. A nurse has to be a role model for her / his colleagues, including student nurses. Students and novices could also be an example of good practice, because they arrive from school with fresh ideas. In addition to the hospitals' internal education and trainings, a hand hygiene passport could be developed already during the nursing school years. Increased cooperation between nursing schools and hospitals on a topic such as hand hygiene and asepsis could be beneficial.

There is an evident need for further research with regard to nursing practice and hand hygiene. More research on behaviour change is necessary in order to build strong interventions aimed at improving adherence to hand hygiene. Finally more research is needed to assess and evaluate multifaceted interventional approaches in order to promote the best practice.

7. LIMITATIONS AND ETHICAL CONSIDERATIONS

7.1. Validity and limitations

Validity is a crucial tool in research to assess the quality of the study and its findings. Validity looks, whether the findings are convincing, well-grounded and not biased (Polit & Beck 2004: 36). However, measuring validity can be a difficult task because biased can easily go undetected (Burns & Grove 2005: 383).

In this final project, the author used reliable and professional databases to retrieve scientific articles. Articles are published in distinguished journals and authors are experts in the topic. An article was considered as valid, after several readings, when it was ensured that it answered the research question and remained within inclusion criteria.

The validity of the research studies were also assessed with the help of the 12 strategies for examining the validity of qualitative measures by Miles and Huberman (1994), as Burns and Grove (2005: 383) describe it. In the research studies the researchers made sure that the representativeness was respected. They assumed that observed actions represent the usual actions when the observer is not watching. The Hawthorne Effect, as mentioned earlier, was also taken into consideration. Results were compared with previous studies.

It has also to be mentioned that the research studies in the articles were implemented in Europe, USA and Asia, which provides a large scope for interpretation. Indeed, and even though the Finnish system might be different from other countries, the interventions presented can be applied in any country.

According to LoBiondo-Wood and Haber (2006: 573) and Kääriäinen and Lahinen (2006: 42), writing a systematic literature review requires a team that includes two members at least. The authors of this paper did it alone; therefore it was difficult to evaluate properly the validity of the review and its outcomes.

There are limitations in this literature review that may affect the consistency of the findings. First, two articles published in 2000, reflected the practice of the mid-1990's, which is outside the inclusion criteria. However, the author of the articles Professor D. Pittet is a well-known expert in infection control. Moreover most of the articles used for this literature review have referred to his work (and more particularly to these two articles), which decreased the possible bias. Therefore, it was decided to use them in this paper, the validity not being affected.

Second, a literature review of hand hygiene and asepsis is a huge task and the author, a student nurse who has no previous experience in research, worked alone. The lack of experience directly affects the approach to gather the literature together. It explains the small number of articles. The lack of financial resources restrained the use of chargeable sources. As a result, other relevant research articles may have been omitted.

Third, no research articles in Finnish language were used for the findings, even though the project is aimed to HUCH. This aspect does not affect the validity, since hand hygiene and asepsis is a worldwide issue.

7.2. Ethical considerations

The goal of research, as defined by Burns and Groves (2005: 203), is to generate rigorous scientific knowledge. Therefore, for a scientific research to be ethically acceptable with credible findings, a good scientific conduct is required. Honesty, integrity and accuracy of the research process must be guaranteed when reviewing and reporting research studies. It also requires that the data collection, research and evaluation methods conform to scientific criteria, avoiding research misconduct (including fabrication, falsification and plagiarism). Finally, the reviewed sources and their authors must be respected and accurately referenced (Burns & Groves 2005: 207; Academy of Finland 2003: 21.)

This literature review was written in a neutral and objective way: own interpretation and opinions are not included in the analysis. The sources were appropriately referenced following the good scientific conduct. There was no research misconduct; results were neither fabricated, nor manipulated. The authors were also quoted accurately and it was made sure their statements were faithfully reported and not plagiarized.

Hand hygiene is a critical issue. As seen earlier, the lack of adherence to hand hygiene leads to harmful and uncomfortable situations such as infections. Based on the ethical principle of beneficence, it is acknowledged that patients have the right to be protected from discomfort and harm (Burns & Grove 2005: 190). Therefore it can be established that this topic has a strong connection with ethics in the nursing field.

This final project was part of the cooperation between Metropolia University of Applied Sciences (UAS), the Clinics of Nephrology and Infection Diseases of HUCH, the Department of Nursing Science of Turku University Faculty of Medicine, and the Finnish Kidney and Liver Association. The author signed an official contract (*vakiosopimus*) with the school and the clinics. The research studies followed the good scientific conduct and did not report any ethical issues or conflict of interests. Privacy and anonymity of the participants were ensured.

8. CONCLUSION

The implementation of change is a long process that depends on the quality and the content of the interventions, the nurses' active participation and the support institutions can provide. There is a need for improvement in hand hygiene adherence and practice amongst nurses. Multifaceted interventional programmes including educational courses, trainings, poster campaigns, performance feedbacks, use of technology, accessibility to hand rub and role models need to be arranged in hospitals and continuously reinforced. In conclusion, hand hygiene and asepsis is primordial in haemodialysis nursing care and the active development of such programmes is needed to ensure that nurses have sufficient knowledge and awareness on hand hygiene and asepsis in the care of nephrological patients.

The knowledge acquired in this final project has a particular importance and significance for every health care worker, including nurses. Good hand hygiene and asepsis methods are important with nephrology patients because their immunity and level of resistance to infections is being impaired, and also with any patient in any clinical setting. The author of this final project, who has previous experience as a nurse student in the kidney-transplant ward of HUCH, hopes to share new information and knowledge through this work, as well as to develop his professional skills on the topic.

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APPENDIX 1

Table 1. DATABASE SEARCH

Database (accessed)	Key Words	Hits	Limitations	Articles Retrieved	Articles used
OVID (17.2.2010)	Hand hygiene AND improve AND change	1163	430	76* 9	7
CINAHL (17.2.2010)	Hand hygiene AND improve	208	27	7	5
	Hand hygiene AND change	61	3	0 (1)	
PUBMED (24.2.2010)	Hand hygiene AND improve AND change	28	21	4	2

IN TOTAL: 14 articles + 1 from references

APPENDIX 2

Table 2. DATA SOURCES

PUBLICATIONS	YEARS								TOTAL
	2000	2004	2005	2006	2007	2008	2009	2010	
The Lancet	X								1
Pediatrics		X							1
Scandinavian Journal of Infectious Diseases					X				1
Journal of Advanced Nursing			X						1
International Journal of Nursing Practice						X			1
Critical Care Medicine		X							1
American Journal of Infection Control					X	X, X			3
Infection Control and Hospital Epidemiology	X						X	X	3
Pediatric Critical Care Medicine							X		1
Journal of Hospital Infection						X			1
Quality and Safety in Health Care				X					1
TOTAL	2	2	1	1	2	4	2	1	=15

In total 15 articles were used; 12 are empirical research studies and 3 are systematic reviews. This table indicates that the sources reflect current knowledge.

APPENDIX 3
ARTICLE ANALYSIS

TITLE, AUTHOR AND JOURNAL	PURPOSE	SAMPLE	DATA COLLECTION AND ANALYSIS	MAIN FINDINGS
<p>Pittet, D., Hugonnet, S., Harbarth, S., Mourouga, P., Touvenau, S., Perneger, T. and members of the Infection Control Programme (2000) Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. <i>The Lancet</i> 356, 1307–1312.</p>	<p>Attempted to promote hand hygiene by implementing a hospital-wide programme, with special emphasis on bedside, alcohol-based hand disinfection. Measurement of nosocomial infections in parallel.</p>	<p>5 wards in in a teaching hospital in Geneva, Switzerland, 2629 scheduled observation periods</p>	<p>Observational surveys were done twice yearly from December 1994, to December 1997 before and during implementation of a hand-hygiene campaign.</p>	<p>Compliance improved progressively from 48% in 1994, to 66% in 1997 ($p < 0.001$). Hand washing with soap and water remained stable, frequency of hand disinfection substantially increased during the study period ($p < 0.001$) The campaign produced a sustained improvement in compliance with hand hygiene, coinciding with a reduction of nosocomial infections and MRSA transmission.</p>
<p>Lam, B.C.C., Lee, J. and Lau, Y.L. (2004) Hand Hygiene Practices in a Neonatal Intensive Care Unit: A Multimodal Intervention and Impact on Nosocomial Infection. <i>Pediatrics</i> 114(5), 565-571.</p>	<p>Study the impact of a task-orientated hand hygiene education and intervention program, coupled with an ongoing regular hand hygiene audit on the hand hygiene compliance of HCWs.</p>	<p>A target patient was selected randomly by drawing lots before each observation period, in neonatal intensive care unit of Queen Mary Hospital in Hong Kong. One study lasted 4 weeks and covered daytime shift (8 hrs).</p>	<p>Observational study conducted before and 6 months after intervention. All personnel in contact with the target patient, which included doctors, nurses, allied health (e.g., physiotherapists, occupational therapists, radiographers), and others (e.g., visitors) were observed. SPSS was used for the analysis</p>	<p>Overall hand hygiene compliance increased from 40% to 53% before patient contact and 39% to 59% after patient contact. More marked improvement was observed for high-risk procedures (35%–60%). The average number of patient contacts also decreased from 2.8 to 1.8 per patient per hour. There was improvement in most aspects of hand-washing technique in the post intervention stage. The health care-associated infection rate decreased from 11.3 to 6.2 per 1000 patient-days. A problem-based and task-orientated education program can improve hand hygiene compliance. Enhancement of minimal handling and clustering of nursing procedures reduced the total patient contact episodes, which could help to overcome the major barrier of time constraints. A concurrent decrease in health care-associated infection rate and increase in hand hygiene compliance was observed in this study.</p>

<p>Hussein, R., Khakoo, R and Hobbs, G. (2007) Hand hygiene practices in adult versus pediatric intensive care units at a university hospital before and after intervention. <i>Scandinavian Journal of Infectious Diseases</i> 39, 566-570.</p>	<p>Determine HCW's knowledge of hand hygiene and evaluate the effect on adherence to hand hygiene of an educational intervention.</p>	<p>6 various intensive care units (adult and pediatric) at a tertiary care, academic medical centre. 286 before and 248 HCW's after intervention were observed and surveyed.</p>	<p>Observational study between Nov 2004 and March 2005, HCW's unaware of it. 36 observation sessions of 2h each, randomized to cover the 6 units and different working shifts. A statistician used SAS JMP program to analyse the data. In April and May 2005 a program was carried out to educate the HCW's about the importance of hand hygiene in infection control. In June and September, observations were repeated using the same methods. Data were compared. A survey was sent to collect demographic data and professions. Questions related to hand hygiene were also asked.</p>	<p>Before interventions, 54% of 579 hand hygiene opportunities were followed (35% adherence in adult ward vs. 90% in pediatric wards), 57% amongst nurses. Traditional hand washing was greater (72%) than alcohol-based rub (28%). After interventions 85% of 374 hand hygiene opportunities were followed (81% adherence in adult wards, no significant change in pediatrics), 89% amongst nurses. Traditional hand washing (64%) and alcohol-based rub (26%). 179/250 (61 nurses) survey-copies returned (71% response rate). Interventions increased knowledge and adherence on hand hygiene, especially in adult wards.</p>
<p>Credon, S.A (2005) Healthcare worker's hand decontamination practices: compliance with recommended guidelines. <i>Journal of Advanced Nursing</i> 51(3), 208-216.</p>	<p>Observe HCW's compliance with hand hygiene guidelines during patient care in an ICU in Ireland before and after implementation of a hand hygiene programme Investigate their predisposition (knowledge, attitudes and beliefs) to compliance with hand washing guidelines before and after implementation of the programme.</p>	<p>Study conducted in the medical/surgical ICU (8 bedded) of a large urban teaching hospital in Ireland (344 beds).</p>	<p>Quasi-experimental study. Observations were drawn from HCW's attending three beds randomly selected for each observational period (~2h) over a period of 20 hours (generally during morning shift). HCW's aware of it but Hawthorne effect minimized. All staff on duty during the pre-test (4 weeks) and post-test (4 weeks) was invited to answer a questionnaire. A 6-week period after the pre-test was set aside to introduce the interventional hand hygiene programme. Educational hand-out and poster campaign, feedback of pre-test observation by poster. Maximum visibility criteria and located as close as possible to where hand washing occurs. Feedback poster displayed at the nurses' station, so that visitors and patients cannot read it. Alcohol hand rub disposed by each patient's bedside. Hawthorne effect overcome by spending time in the unit before the data collection. SPSS used for data analysis</p>	<p>Pre-test phase: 152 indications for hand washing observed and 77 observations of hand washing practice on 33 HCW's (23 nurses). → 51% compliance Post-test phase: 162 indications and 135 observations on 40 HCW's (22 nurses). → 83% compliance, p<0,001. Nurses in pre-test: 101 indications and 57 observations on 23 nurses → 56% compliance. Nurses in post-test: 106 indications and 94 observations on 22 nurses → 89% compliance p<0,001. Attitudes towards compliance with hand washing guidelines appeared to be positive (no difference btw pre- and post-test). Knowledge appeared to be quite good during pre-test (79-91% correctly identified guidelines for hand washing) and excellent in the post test (100%). Implementation of a multifaceted interventional behavioural hand hygiene programme (predisposing, enabling, reinforcing constructs) resulted in a major improvement in hand hygiene behaviour. HCW's believed their skin conditions improved significantly following an interventional hand hygiene programme.</p>

<p>Picheansathian, W., Pearson, A. and Suchaxaya, P. (2008) The effectiveness of a promotion programme on hand hygiene compliance and nosocomial infections in a neonatal intensive care unit. <i>International Journal of Nursing Practice</i> 14, 315-321.</p>	<p>Identify the impact of a promotion programme on hand hygiene practices and its effect on nosocomial infection rates in a neonatal care unit of a university hospital in Thailand.</p>	<p>17 registered nurses and 9 practical nurses</p>	<p>Quasi-experimental study from June 2004 to Feb 2005 in 3 phases beginning with a 8-week control period without any interventions to obtain baseline data followed by the intervention programme (hand hygiene promotion, training session, regular performance feedback, reminder poster displays, provision of bedside alcohol-based hand rub, distribution of individual bottles of hand rub) and evaluation (8 weeks after the beginning of phase 2, individual interviews. Data analysed using descriptive statistics, chi-square, Pearson's Product Moment Correlation Coefficient, infection rates. Qualitative data and interviews using content analysis.</p>	<p>During the baseline period: rate of compliance with hand hygiene 6,3% (20/320 observations), 31,2% (100/320) incomplete observations. Reasons: forgetfulness, lack of time, wearing gloves, lack of knowledge, skin irritation, perception that hands uncontaminated. After the promotion programme: rate of compliance improved progressively to 44-80,9-80,5-92,6-90,8-90,6-89,7% in the first 7 months. During the follow-up period, rate maintained at 81,2% (751/925) $p < 0,001$. over 7 months follow-up period noncompliance averaged 10,1% (101/925). Nurses would rather wash their hand than use hand-rub. Nurses reported that being motivated continuously made them comply which led to a habit. More than 80% reported that the performance feedback and training was also a factor of motivation. The availability of hand-rub dispenser was also beneficial</p>
<p>Swoboda, S., Earsing, K., Strauss, K., Lane, S. and Lipsett P. A. (2004) Electronic monitoring and voice prompts improve hand hygiene and decrease nosocomial infections in an intermediate care unit. <i>Critical Care Medicine</i> 32 (2), 358-363.</p>	<p>Determine whether electronic monitoring of hand hygiene and voice prompt can improve hand hygiene and decrease nosocomial infection rates in a surgical intermediate unit.</p>	<p>A nine-room, 14-bed intermediate care unit in a university, tertiary-care institutions. All patients rooms, utility room and staff lavatory were monitored electronically. All HCW were observed. All patients staying over 48hrs followed for nosocomial infections. 420 days, 10,080hrs for 3549 patient days)</p>	<p>Quasi-experimental study. in three phases: 1/ electronic monitoring and direct observations; 2/ electronic monitoring and computerized voice prompts for failure to perform hand hygiene on room exit; 3/ electronic monitoring only. All nursing personnel had received a general overview of hand hygiene and infection control as part of their orientation + annual update.</p>	<p>283 488 electronically monitored entries into a patient room with 251 526 exits for 420 days. Hand hygiene compliance in patient rooms improved 37% on phase 2 and 41% on phase 3. Nosocomial infections decreased by 10 % during phase 2 and 40% during phase 3. Electronic monitoring provided effective ongoing feedback about hand hygiene compliance. Proved that there is a short-term effect (perhaps a long term effect too)</p>

<p>Assanasen, S., Edmond, M. and Bearman, G. (2008) Impact of 2 different levels of performance feedback on compliance with infection control process measure in 2 intensive care units. <i>American Journal of Infection Control</i>, 36, 407-413.</p>	<p>Determine the relative impact of 2 different levels of feedback on compliance in an intensive care unit setting.</p>	<p>16-bed medical ICU and 18-bed surgical ICU of an 820-bed tertiary care teaching hospital.</p>	<p>Quasi-experimental study in 3 phases from april 2004 to june 2006.: 1/ april-june 2004 baseline observations 2/ july 2004- june 2005 quaterly feedbacks 3/july 2005 – june 2006. quarterly feedbacks + posters with feedback parameters. At the end of the study a survey was performed to assess the influence of the posters and HH observations.</p>	<p>There were 1576 HH opportunities. HH compliance did not change in phase 2 (40% vs. 47%). Comparing phase 3 and phase 2 HH compliance significantly improved from 47% to 71% (p<0.001). 60% of these who respondes to the survey said the poster information changed their practices. Multilevel feedback significantly improved HH compliance.</p>
<p>Marra, A. R., Guastelli, L. R., Pereira de Arujo, C. M., Saraiva dos Santos, J. L., Lamblet, L. C. R., Silva Jr, M., De Lima, G., Rodrigues Cal, R. G., Paes, A. T., Neto, M. C., Barbosa, L., Edmond, M. B. and Dos Santos O. F. P. (2010) Positive Deviance. A New Strategy for Improving Hand Hygiene Compliance. <i>Infection Control and Hospital Epidemiology</i>, 31(1), 12-20.</p>	<p>Evaluate the effectiveness of a positive deviance strategy for the improvement of hand hygiene compliance in two adult step-down units.</p>	<p>Two 20-bed step-down units in a tertiary care private hospital.</p>	<p>A 9-month, controlled trial comparing the effect of positive deviance on compliance with hand hygiene. Three phases: 1/ from april to june 2008: baseline period in which HH episodes were counted by use of electronic hand washing counters. 2/ from july to September 2008: a positive deviance strategy implemented on one unit, the other one being the control unit 3/ from October to December 2008: positive deviance in both units.</p>	<p>During the first phase, there was no statistically significant difference between the 2 step-down units in the number of episodes of hand hygiene per 1,000 patient-days or in the incidence density of HAIs per 1,000 patient-days. During the second phase, there were 62,000 hand hygiene episodes per 1,000 patient-days in the east unit and 33,570 hand hygiene episodes per 1,000 patient-days in the west unit. The incidence density of HAIs per 1,000 patient-days was 6.5 in the east unit and 12.7 in the west unit (Pp.04). During the third phase, there was no statistically significant difference in hand hygiene episodes per 1,000 patient days or in incidence density of HAIs per 1,000 patient-days. A positive deviance strategy yielded a significant improvement in hand hygiene, which was associated with a decrease in the overall incidence of HAIs.</p>

<p>Whitby, M., McLaws M-L., Slater, K., Tong, E. and Johnson, B. (2008) Three successful interventions in health care workers that improve compliance with hand hygiene: Is sustained replication possible? <i>American Journal of Infection Control</i>, 36 (5), 349-355.</p>	<p>Determine whether three successful interventions are still successful in the long-term range. Two major programs (Washington and Geneva) have demonstrated interventions that induce sustained improvement. The introduction of alcohol-based and rub (AHR) together with education also has been reported to improve compliance.)</p>	<p>An 800-bed university teaching hospital.</p>	<p>These interventions were replicated concurrently for 2 years in selected wards of an 800-bed university teaching hospital, with compliance assessed only within, not between, programs.</p>	<p>No significant improvement in HH compliance was observed after the introduction of AHR or substitution of AHR for a similar product with concomitant education. The Washington program achieved a 48% improvement in compliance, sustained over 2 years. The Geneva program failed to induce a significant increase in Compliance in 3 wards, but achieved improvement over the already high HH rate in 1 ward (infectious disease unit). The Washington program demonstrated effectiveness in achieving sustained improved HH compliance, whereas the effect of the Geneva program was limited in those wards without strong medical leadership. Introduction of AHR without an associated behavioral modification program proved ineffective.</p>
<p>Swoboda, S.M., Earsing, K., Strauss, K., Lane, S and Lipsett, P.A. (2007) Isolation status and voice prompts improve hand hygiene. <i>American Journal of Infection Control</i>, 35, 470-476.</p>	<p>Hypothesis that both patient isolation and electronic hand hygiene prompts incrementally improve hand hygiene of health care workers compared with nonisolation rooms.</p>	<p>An intermediate care unit with 9 patient rooms (3 isolation rooms, 6 nonisolation rooms)</p>	<p>A prospective, 14.5-month, 3-phase electronic surveillance study of hand hygiene behavior. Phase I: electronic observation, Phase II: electronic observation with automated voice messages urging hand hygiene, Phase III: electronic observation. Electronic sensors monitored room entries and exits and use of all sinks and all soap dispensers.</p>	<p>Phase I (1616 patient-days) health care workers were 49% more likely to wash their hands in isolation rooms versus nonisolation rooms. Phase II (1390 patient-days) and phase III (543 patient-days) health care workers were 59% more likely to wash their hands in isolation versus nonisolation rooms. Health care workers improve hand hygiene when constrained by isolation rooms. Electronic voice prompts further improve hand hygiene behavior. Both physical and auditory reminders improve hand hygiene.</p>

<p>Schneider, J., Moromisato, D., Zemetra, B., Rizzi-Wagner, L., Rivero, N., Mason, W., Imperial-Perez, F. and Ross, L. (2009) Hand hygiene adherence is influenced by the behavior of role models. <i>Pediatric Critical Care Medicine</i> 10 (3), 360-363.</p>	<p>Hypothesis that strict hand hygiene adherence by supervisor role models would improve the hand hygiene behaviour of junior staff.</p>	<p>Pediatric and cardiac intensive care units of a tertiary care children's hospital. Two critical care fellows and four nurse orientees.</p>	<p>Prospective observational study. 1/Observation and record of HH adherence of the fellows and nurse orientees and their respective supervisors (doctor or nurse). 2/ The same fellows and nurse orientees paired with a different supervisor, who maintained strict HH adherence.</p>	<p>HH adherence by fellows and orientees at baseline was 22% (200 HH opportunities) and improved to 56% (234 opportunities). Increase of 34% (p<0.001). HH adherence of junior practitioners plays a crucial influence on other staff. Senior healthcare practitioners should consider the important role they may play in reinforcing or weakening a culture of patient safety and proper HH.</p>
<p>Jamtvedt, G., Young, M.Y., Kristorffersen, D.T., O'Brien, M.A. and Oxman, A.D. (2006) Does telling people what they have been doing change what they do? A systematic review of the effects of audit and feedback. <i>Quality and Safety in Health Care</i> 15, 433-436.</p>	<p>Assess the effects of audit and feedback on the practice of healthcare professionals and patient outcomes.</p>	<p>The Cochrane Effective Practice and Organisation of Care Group</p>	<p>A systematic review of randomized trials of audit and feedback that reported objectively measured professional practice in a healthcare setting or healthcare outcomes. 118 trials included.</p>	<p>In the primary analysis, 88 comparisons from 72 studies were included that compared any intervention in which audit and feedback was a component to no intervention. For dichotomous outcomes, the median-adjusted risk difference of compliance with desired practice was 5%. For continuous outcomes, the median-adjusted percentage change relative to control was 16% (interquartile range 5–37). Low baseline compliance with recommended practice and higher intensity of audit and feedback appeared to predict the effectiveness of audit and feedback Audit and feedback can be effective in improving professional practice. The effects are generally small to moderate. The absolute effects of audit and feedback are likely to be larger when baseline adherence to recommended practice is low and intensity of audit and feedback is high.</p>

<p>Pittet, D. (2000) Improving Compliance with Hand Hygiene in Hospitals. <i>Infection Control and Hospital Epidemiology</i> 21(6), 381-386.</p>	<p>Review reported barriers to appropriate HH and factors associated with poor compliance. In addition explore how to improve compliance with HH through interventions with long lasting results.</p>		<p>Literature review, 47 studies used.</p>	<p>Easy access to hand hygiene in a timely fashion and the availability of skin-care lotion both appear to be necessary prerequisites for appropriate hand-hygiene behavior. In particular, in high-demand situations, hand rub with an alcohol-based solution appears to be the only alternative that allows a decent compliance. The hand-hygiene compliance level does not rely on individual factors alone, and the same can be said for its promotion. Because of the complexity of the process of change, it is not surprising that solo interventions often fail, and multimodal, multidisciplinary strategies are necessary. A framework that includes parameters to be considered for hand-hygiene promotion is proposed, based on epidemiologically driven evidence and review of the current knowledge. Strategies for promotion in hospitals should include reasons for noncompliance with recommendations at individual, group, and institutional levels. Potential tools for change should address each of these elements and consider their interactivity.</p>
<p>Gould, D.J., Drey, N.S., Moralejoo D., Grimshaw, J. And Chudleigh, J. (2008) Interventions to improve hand hygiene compliance in patient care. <i>Journal of Hospital Infection</i> 68, 193-202.</p>	<p>Identify all studies investigating the effectiveness of interventions intended to increase hand hygiene compliance and/or use of alcohol hand rubs short term (less than six months) and longer term (six months or more) and to determine their success in terms of hand hygiene compliance and subsequent effect on rates of HAI.</p>		<p>A systematic review, 48 studies and 1 thesis.</p>	<p>Educational programmes are successful while audit with performance feedback less successful. Educational initiatives are resource intensive and expensive, but if well designed and well implemented, have the potential to effect sustainable change. Training is cheaper but its effects are likely to be short-lived and influenced by staff turnover and shortage. Initiatives to enhance hand hygiene compliance lack rigour. Educational interventions should include rational for choice of educational approach and venue, who delivered the education and their preparation, programme content, number of HCW attending, evaluation, changes necessary to the planned programme, and their impact.</p>

<p>Kohli, E., Ptak, J., Smith, R., Taylor, E., Talbot, E.A and Kirkland, K.B (2009) Variability in the Hawthorne Effect With Regard to Hand Hygiene Performance in High- and Low-Performing Inpatient Care Units. <i>Infection Control and Hospital Epidemiology</i>, 30(3), 222-225.</p>	<p>Determine the impact of known observers on hand hygiene performance in inpatient care units with differing baseline levels of hand hygiene compliance.</p>	<p>Three inpatient care units, selected on the basis of past hand hygiene performance, in a hospital where hand hygiene observation and feedback are routine.</p>	<p>Observational study. Beginning in late 2005, the 3 ICPs, who were well known to the hospital staff, performed frequent, regular observations of hand hygiene in all 3 inpatient care units of the hospital, as part of routine surveillance. During the study period (January–May 2007), a student intern who was unknown to the hospital staff also performed observations of hand hygiene in the 3-inpatient care units. The rates of hand hygiene compliance observed by the 3 ICPs were compared with those observed by the student intern.</p>	<p>The 3 ICPs observed 332 opportunities for hand hygiene during 15 observation periods, and the student intern observed 355 opportunities during 19 observation periods. The overall rate of hand hygiene compliance observed by the ICPs was 65% (215/332) and the overall rate of hand hygiene compliance observed by the student intern was 58% (207/355). Both the ICPs and the student intern were able to distinguish between inpatient care units with a high rate of hand hygiene compliance (hereafter referred to as high-performing units) and those with a low rate (hereafter referred to as low-performing units). However, in the 2 high-performing units, the ICPs observed significantly higher compliance rates than did the student intern, whereas in the low-performing unit, both the ICPs and the student intern measured similarly low rates of hand hygiene compliance. Recognized observers are associated with higher rates of hand hygiene compliance, even in a healthcare setting where such observations have become routine. The Hawthorne effect may be a useful tool for sustaining and improving hand hygiene compliance.</p>
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APPENDIX 4

Figure 3. CATEGORIZATION

