JÖNKÖPING UNIVERSITY
School of Health and Welfare

CHALLENGES OF HAND HYGIENE AMONGST NURSES IN LOW-INCOME COUNTRIES.

A literature review

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Summary

Background: The practice of hand hygiene by nurses is important in preventing and decreasing hospital-associated infections. There are guidelines from WHO available about correct hand hygiene and it is not clear if nurses in low-income countries follow these guidelines. **Aim:** The aim of this review was to describe the challenges related to hand hygiene these nurses experience. **Method:** A qualitative literature review was conducted using twelve articles that were analysed using Friberg's five-step analysis. The search was done in databases CINAHL, MEDLINE and PubMed. **Results:** The results were categorised into three categories; Challenges in education, Challenges in the working environment and Challenges in compliance. Most nurses in low-income countries were well-informed about hand hygiene, but many had undermined the practice due to lack of regular training, lack of necessary resources, feedback and role models. **Conclusion:** The study revealed that these nurses had knowledge about hand hygiene, although some of them showed confusion in hand hygiene products and routine. The review identified hindrances to effective hand hygiene practices in low-income countries. Regular courses about effective hand hygiene for nurses are recommended. Further research on qualitative data on hand hygiene while focusing on nurses' experience in low-income countries is needed.

Keywords: Hand hygiene, knowledge, low-income countries, nurse, resources.

Utmaningar med handhygien bland sjuksköterskor i låginkomstländer.

En litteraturöversikt

Sammanfattning

Bakgrund: Sjuksköterskan handhygien är viktigt för förbyggande och minskning av vårdrelaterade infektioner. Det finns riktlinjer från WHO om korrekt handhygien men det är inte tydligt om sjuksköterskor i låginkomstländer följer dessa riktlinjer. **Syfte:** Syftet var att beskriva de utmaningar som sjuksköterskor i låginkomstländer upplever relaterat till handhygien. **Metod:** En kvalitativ litteraturöversikt genomfördes där tolv artiklar analyserades med Fribergs femstegsanalys. Sökningen av artiklar utfördes i databaserna; CINAHL, MEDLINE och PubMed.
Resultat: Resultatet delades in i tre kategorier; Utmaningar i utbildning, Utmaningar i arbetsmiljö och Utmaningar i följsamhet. De flesta sjuksköterskor i låginkomstländer var välinformerade om handhygien, men många undervärderade god handhygien på grund av oregelbunden utbildning, brist på nödvändiga resurser, feedback och förebilder. **Slutsats:** Studien visade att sjuksköterskorna ofta hade kunskap om handhygien, men att en del sjuksköterskor var konfunderade angående produkter för handhygien och rutiner. Regelbundna kurser om effektiv handhygien för sjuksköterskor rekommenderas och vidare forskning av kvalitativ data om handhygien med fokus på sjuksköterskors erfarenheter i låginkomstländer efterfrågas.

Nyckelord: Handhygien, kunskap, låginkomstländer, resurser, sjuksköterska.

Table of Contents

Introduction 1
Background 2
Healthcare-associated infections 2
Transmission of healthcare-associated infections 2
Hand hygiene in healthcare 3
Nurse's training in low-income countries 4
Nurse's role in hand hygiene practice 4
Concept: Safety. 5
The rationale of the study 6
Aim 6
METHODOLOGY 7
Design 7
Data collection and selection 7
Data analysis 8
Research ethics 8
Results 9
Challenges in education 9
Insufficient knowledge 9
Inadequate hand hygiene training 10
Challenges in the working environment 10
Lack of materials 10
Shortage of time and staff 11
Challenge in compliance 11
Lack of role models 11
Insufficient feedback 12
DISCUSSION 13
Method discussion 13
Result discussion 14
Challenges in education 14
Challenges in the working environment 15
Challenges in compliance 15
CONCLUSION 17
REFERENCES 18
ATTACHMENTS 24
Appendix I: Search matrix 24
Appendix II: Article matrix 25
Appendix III: Quality Review 32

Introduction

Hand hygiene (HH) is a basic requirement for the effective delivery of healthcare in the whole world. Good hand hygiene is an important measure to prevent the spread of healthcare-associated infections (Melhus, 2019). Healthcare-associated infections (HCAIs) hinder effective healthcare delivery affecting hundreds of millions of individuals worldwide (Allegranzi et al., 2011). Hand hygiene is one of the key elements and an effective method in preventing the transmission of microbes and healthcare-related infections (Deepak et al., 2020). Therefore, the nurses have a great role in performing and teaching fellow workers the routine practices of hand hygiene. In low- and middle-income countries, most of the nurses in healthcare settings do not perform hand hygiene practices due to the limited knowledge and skills (Ara et al., 2019). Knowledge, routine practices and necessary resources for hand hygiene are essential to all healthcare workers as it reduces the rate of transmission of hospital-acquired infections.

Effective hygiene routine guidelines adhered to by all healthcare workers in between patient's contacts is necessary to control the transmission of bacteria from one patient to another, which would otherwise result in fatal outcomes with high-risk immunocompromised patients (Lindahl & Skyman, 2014).

Although hand hygiene is effective for preventing and reducing healthcare-associated infections, low income/developing countries are the most affected, as most nurses in healthcare settings ignore these practices due to either limited resources or retraining opportunities (Ara, 2019).

Background

Healthcare-associated infections

Healthcare-associated infections (nosocomial infections) are associated with the transmission of antimicrobial resistance worldwide and affect all healthcare facilities but occur more often in low- and middle-income countries (Irek, 2019). The prevention of HCAI should be a priority for every healthcare institution committed to making service deliveries safer. In developed countries, healthcare-associated infections (HCAI) affects 5-15% of hospitalized patients and can affect 9-37% of those admitted in intensive care units (WHO, n.d.). An estimated five million HCAI occur in acute care units in Europe annually, contributing to 135 000 deaths per year (WHO, 2009). In low-income/developing countries, the risk of HCAI is two-to twenty times higher than that of developed countries, with infection rates being higher than 15% and with over 4000 child deaths occurring every day due to HCAI (WHO, n.d). Bagheri et al. (2011), wrote that HCAI problems are underestimated or even unknown, largely because there is low surveillance in low-income countries and interventions would require expertise and resources.

In low-income countries, HCAIs are associated with poor hand hygiene and low compliance with hand hygiene standards among health care providers (Ocran et al., 2014; Guo et al., 2017). HCAIs mostly affect individuals with compromised immunity such as a newborn and patients with multiple diseases. Catheter-associated infections, postoperative wound infections, intravenous cannula associated infections and pneumonia are the common HCAIs acquired by patients due to poor compliance with hygiene standards (Lindahl & Skyman, 2014). Deficient hygiene standards lead to the spread of drug-resistant bacteria like; methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant Enterococcus (VRE) (Lindahl & Skyman, 2014).

Transmission of healthcare-associated infections

We are surrounded by microorganisms av diverse types. The most common being bacteria and viruses but even other types of microorganisms occur such as fungi and protozoa. Infectious agents can survive outside the body from hours to months untouched, depending on the type of microorganism and the environment being dry or humid. The hands of healthcare workers are the most common route to spread microorganisms throughout the clinical environment and to the patients (Loftus et al., 2019).

The spread of microorganisms is done through direct or indirect contacts, airborne, droplet infection or blood-borne (Ransjö & Åneman, 2006). Although in healthcare settings the commonest route of spread of microorganism is through direct or indirect contacts. This occurs when microorganisms are spread from one individual to another through contaminated hands directly, or through clothing and other materials (Lindahl & Skyman, 2014). Another route of spread of HCAIs is through endogenous and exogenous infection. The endogenous infection occurs when a person is infected by their bacterial flora while exogenous infection occurs when patients are infected by microorganisms from the environment (Ransjö & Åneman, 2006). This occurs when microorganisms are spread from one individual to another

individual through contaminated hands, clothing, sharp instruments that have been introduced to other patients or materials (Lindahl & Skyman, 2014). Microorganisms are transmitted when healthcare workers do not follow the hand hygiene standards in between patient contacts. This is most prevalent after contact with bodily fluids, wound care or taking the pulse and checking the temperature (Deepak et al., 2020).

Hand hygiene in healthcare

Hand hygiene is the practice of handwashing with liquid soap and running water and/or using alcohol-based hand disinfection (Momen & Fernie, 2010). HH is the main practice in reducing the spread of bacteria and controlling the spread of infections (Lindahl & Skyman, 2014). All nurses are required to have the appropriate training, knowledge and time to practice HH at points of care to ensure patient's safety. Failure to practice HH in healthcare facilities leads to HCAI. HCAI cause a lot of difficulties in inpatient care and prolonged hospital stays, excessive costs to both patients/family and healthcare systems (WHO, 2019).

The proper HH actions depend on a combination of factors such as, application of enough amount of liquid soap, clean running water and the right disinfectant for a sufficient duration of time to satisfactorily cover the entire hand surfaces and proper hand drying methods (WHO, 2009). Duration of washing hands using soap and water should last for forty to sixty seconds and hand disinfection should last at least ten to fifteen seconds (Bjerke, 2004). Hands should be washed when visibly or feel dirty. Hand hygiene should be practised after taking care of a wound, after a dirty work moment like body fluids (vomiting, diarrhoea). Paper towels should always be used when drying hands and thrown away after use. Hand disinfection should be used where there is no access to hand wash or before and after every care moment. The amount of hand disinfection that should be used is two to four millilitres and should be rubbed dry between the palms, the thumb grips, back of the hand, fingertips, wrists and forearms (NICE, 2017).

The WHO (World Health Organization) in their ‘Save Lives, Clean Your Hands’ global campaign, emphasized the ‘Five Moments of Hand Hygiene’ poster (Fig. 1) which provides guidance on when it is most appropriate for nurses to wash their hands whilst caring for patients in a hospital. These five moments should be practiced by all nurses to create a safe environment for the patients and everyone.

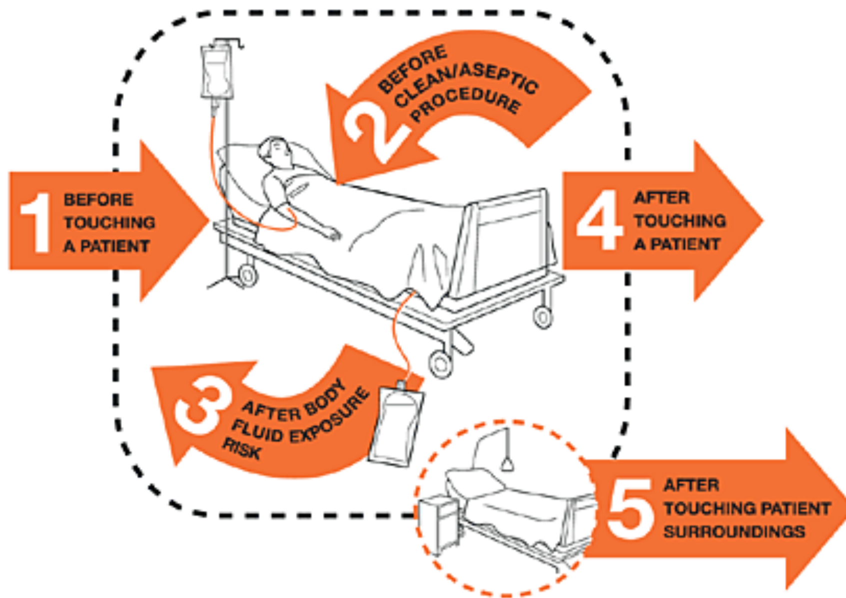

Figure 1 illustrated the five moments for when hand hygiene is to be performed.

Nurse’s training in low-income countries

Low-income countries also known as developing countries are characterized with poor education systems, poor healthcare facilities and poor infrastructures and therefore receive development aid from other developed countries for budgetary support towards infrastructural, social services, economic and environmental projects (World Population Review, 2020). Some countries such as Turkey, are becoming developed and no longer rely on foreign agencies to sustain their economy. Low-income countries are characterized with frequent illnesses and infections due to a lack of clean water supply, poor sanitation, malnutrition and low accessibility to quality medical care (World Population Review, 2020).

The healthcare facilities are responsible for providing safe care to all patients, therefore they should be supplied with necessities from the government to enhance the required Hand hygiene practices.

According to Allegranzi et al. (2011), very few of the low- and middle-income countries have national surveillance systems for HCAI. In Uganda (a low-income country), HH is taught to undergraduate medical and health science students through different modes of teaching (Kamulegeya et al., 2013). While another study by Dolamo and Olubiyi (2013) shows that the knowledge and practice of HH have improved from colonial to modern times where nurses receive training on HH during their courses of study in modern Institutions.

Nurse’s role in hand hygiene practice

Nursing practice is about caring for the patients at individual levels and ensuring patient safety at all times. The nurse's role is to ease suffering, prevent diseases and promote healthcare practices that restore health and prevent the spread of infections

(Svensk sjuksköterskeförening, 2020). The required skill level of a registered nurse includes the ability to work from established hygiene guidelines and routines in inpatient care (Svensk sjuksköterskeförening, 2020). Nursing practice is guided by the six core competencies: patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics (Sherwod, 2013). The ICN: s ethical codes for nurses describes the individual responsibility that nurses have about how they practice the profession (Svensk sjuksköterskeförening, 2020). The profession of a nurse includes leadership, supervision and teaching. This means that nurses supervise, teach and guide students and fellow workmates about good nursing practice in general to ensure patient safety (Svensk sjuksköterskeförening, 2020). It is therefore essential that nurses have knowledge and training in hand hygiene to ensure patient safety.

Concept: Safety.

One of the core competencies from the Quality and Safety Education for Nurses (QSEN) is safety (Swenurse, 2017). Safety is based on the knowledge of actions that expose patients to risks and how to prevent risky incidents. Nurses meet with patients, therefore nurses have a great responsibility to execute hand-hygiene in order to prevent injuries and all risks that may cause fatal outcomes to patients due to poor hand-hygiene (Barnsteiner, 2013).
Safety in healthcare is important to reduce risks to patients, reduce patient suffering, and shorten hospital admission time. To ensure patient safety knowledge and skills are an essential requirement for good nursing practice and this should be improved through continuous training. If hand hygiene is practised well by nurses and other health care workers then safety will be provided to patients (Sherwood, 2013). Poor hand hygiene means spreading infections and good nursing practice helps to break the chain of transmission of infections from one patient to another. It is the nurse’s role to protect all patients that are admitted and establish partnerships with all healthcare workers to ensure patient safety by practising hand hygiene (Glasper, 2019).

The rationale of the study

The nurse’s duty and extent of application of hand hygiene routines have a clear impact on the spread of HCAI. Hand hygiene is one of the most effective methods to prevent HCAI, which prolongs patient suffering and hospital admission duration and thereby increases the cost to the healthcare system. Postoperative infection is one of the most common healthcare-associated infections and HCAI rates have been shown to increase especially in low-income countries. Therefore, there is a need to review what challenges are related to the nurse's degree in applying basic hand hygiene routines. Nurses have a duty to follow hand hygiene guidelines and teach fellow workmates. This study is to identify the challenges related to hand hygiene experienced by nurses in low-income countries.

Aim

The aim was to describe the challenges nurses experience related to hand hygiene in low-income countries.

METHODOLOGY

Design

This literature review was based on articles of the qualitative method. A qualitative method means to study a person's lived experiences of specific phenomena and gain an understanding of what these experiences brought to the individual (Henricson, 2017). A literature review method summarizes the understanding of a topic, a systematic search and a critical review of the articles on the chosen topic (Friberg, 2017). The qualitative method suited the study's aim, as this increased understanding of the nurses' experiences of the challenges faced performing hand hygiene in low-income countries.

Data collection and selection

Data collection for the literature review was done with the help of information and instructions from the university's library recorded films. The data collection was done using databases; CINAHL, MEDLINE and PubMed. CINAHL includes research within nursing, biomedicine, physiotherapy and occupational therapy. MEDLINE and PubMed include research within medicine, nursing and dentistry (Karlsson, 2017).
When using the databases, an advanced search was used with combined search terms such as nurses, hand hygiene, low-income countries, developing countries, hand washing, infection control, healthcare-associated infections, knowledge, practice, nurs, qualitative and barriers. For a narrower search, the Boolean term AND together with truncation mark asterisk (*) were combined with the search words (Östlundh, 2017). Suggested search terms seen in the database MEDLINE were other definitions that were used in explanation to the authors' search terms (see appendix I). Articles that were chosen, answered the review's aim and were quality reviewed by the authors as a pair following the audit report from the School of health and welfare Jönköping (see appendix III).

For this literature review, articles of a qualitative method were sampled out to be used as results. The inclusion criteria were the scientific articles written in English, ethically granted, peer-reviewed and written within the years of 2008- 2020 and the articles described nurses' experiences on hand hygiene in low income or developing countries. Exclusion criteria were articles of the quantitative method, articles about hand hygiene in developed countries and articles of hand hygiene in different environment such as school grounds.

In CINAHL two search strings were used and resulted in 155 articles hits. Every title was read and 45 abstracts that could answer the study's aim were read. Twenty articles were chosen and read, of which three articles were quality reviewed and included in the results. In PubMed two search strings were used and generated 448 hits, all titles and only 180 abstracts were read. Sixty-two articles were read leading to only four articles for quality review and the results section. In MEDLINE, two search strings were used which generated 232 hits. All titles and only 70 abstracts were read. Twenty-two articles were read, five articles were chosen for quality review and results. As the search was done in three different databases, several articles occurred more than once in CINAHL and MEDLINE. Although these articles were duplicate,

there were uncounted from the number of reading abstracts in each of these databases.
The search for articles resulted in 11 articles that were of a qualitative method. While the twelfth article was a mixed-method, but our focus was put on the qualitative result of the article. The search matrix (see appendix I) shows the steps that the authors followed while searching the articles. Twelve articles that we chose to the results describe the nurses' challenges related to hand hygiene. Although some articles included other healthcare workers, the focus was applied to nurses.

The articles used in establishing results were assessed for quality using the basic quality criteria protocol from the nursing department of health and welfare School of Jönköping (appendix III). The protocol consists of two sections, the first section with four questions and the second section with eight questions. For data analysis, an article was approved bypassing all criteria (answered yes) to all the points in the first section and at least meet four of eight criteria in the second session. Articles that met more than eight criteria, were the only ones included in the study (see appendix II). This was done among the two authors.

Data analysis

The data analysis was done using Friberg's five analysis steps (2017) for a literature review. For the first step, the authors read the articles carefully to get a meaningful understanding and a holistic perspective. In this first step all the 12 articles that were collected, were printed out and individually read before meeting on zoom and discussing the articles together several times. For the second step, results in each of the articles were analysed to find out the key findings. In the articles where other healthcare workers occurred, the authors differentiated the results by highlighting nurses' responses. During the third step, the results of the articles were analysed, compiled in a shared document to easier summarise the overview of the key findings, and divide the key findings into various categories. In the fourth step, key findings were reread, compared to identify similarities and differences. Main categories and sub-categories were created and showed in a figure applied in the review's result section. In the fifth and last step, the analysed content was reported in running text that formed the literature review's result (Friberg, 2017).

Research ethics

The literature review method does not require ethical permissions since the material used in the study are already published articles and already consented to by well-informed participants (Kjellström, 2017). And they were aware of the information such as consent, confidentiality and the right for the participants to withdraw from the research at any time without giving any reason. Therefore, articles that did not include ethical permissions were all excluded from the search
(Kjellström, 2017). However, the articles used in this study were approved by the ethics committee since they were empirical studies. The quality review of articles was also done to give more credibility and ethical value to the study (Henricson, 2017). The knowledge that was gathered from the articles was discussed amongst the two authors to avoid the influence of their own experience which could have affected the writings.

Results

The results were based on 12 relevant scientific articles on nurses in low-income countries and their challenges experienced in practising hand hygiene. The results were presented with three main categories: Challenges in education, Challenges in the working environment, and Challenges in compliance. These were further sub-categorized into; Insufficient knowledge, Inadequate hand hygiene training, Lack of materials, Shortage of time and staff, Lack of role models and Insufficient feedback (fig. 2). The articles utilized for this study were based in low-income countries like Bangladesh, Egypt, India, Nigeria, Uganda, Vietnam, Guatemala, India, Indonesia, Iran and Turkey.

Figure.2

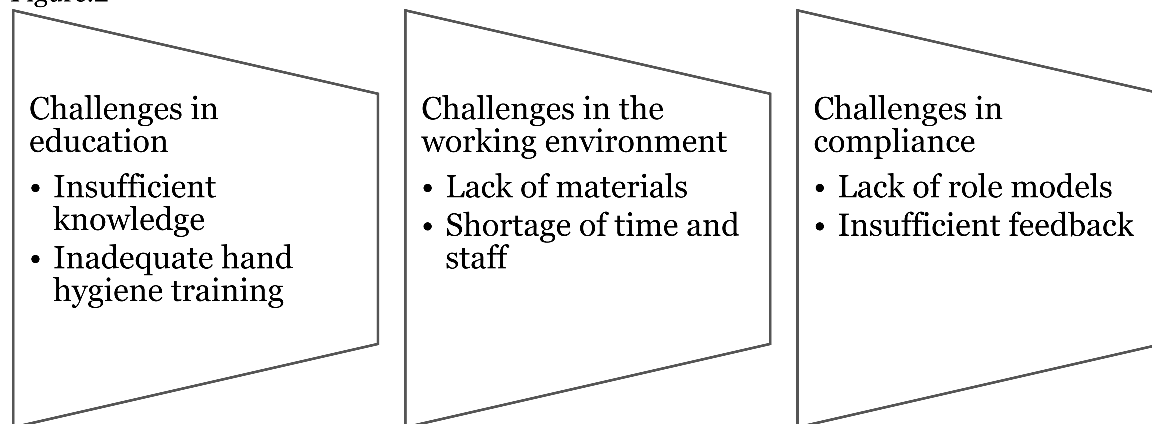

Figure 2 illustrated the three main categories and the six sub-categories.

Challenges in education

This included two sub-categories:

Insufficient knowledge

In a study with a total of 96 nurses, many nurses showed confusion about the choices and effects of the different hand hygiene products (Lohiniva et al., 2015). Many nurses regarded water and soap as the best option for hand hygiene routine after every patient instead of alcohol-based rub. The majority of school-based nurses were unsure about the effect of hand hygiene products. Lack of information about how hand hygiene products work and their effect on dirty hands was experienced as a challenge by nurses (Lohiniva et al., 2015). Although nurses regarded hand hygiene as being crucial, many had forgotten the steps they had learned many years back (Sickder, 2017). Nurses considered that lack of updated knowledge was a challenge in performing hand hygiene (Salmon & McLaws, 2015; Sickder, 2017). In the study conducted by Lohiniva et al. (2015), many of the nurses had different types of education, whereby some nurses were school-based (two years vocational training at nursing school) and four graduate nurses from a high institute of nursing (four years of education). Therefore, leading to a wide gap in knowledge and training of hand

hygiene for these nurses. In another study (Sickder, 2017), a nurse stated that she did have the knowledge to practice hand hygiene, but she had forgotten the routines. In other studies, they showed that nurses had knowledge of hand hygiene and understood the negative effects when not practised (Joshi et al., 2020; Mearkle et al., 2016; Nwaokenye et al., 2020; Barker et al., 2017). Hand hygiene was seen as an essential part of nursing practice because it was taught in schools (Nwaokenye et al., 2020). In the study of Nwaokenye et al. (2020) whereby a third of the participants were nurses, many of them considered that hand hygiene was necessary for the routine of patient care. In the study of Joshi et al. (2020), whereby 17 out of 75 participants were nurses, one nurse stated that hand hygiene is a small aspect and if these small aspects are focused on, then big problems can be prevented.

Inadequate hand hygiene training

Two studies showed that some nurses lacked hand hygiene training (González et al., 2016; Joshi et al., 2020). The study of González et al. (2016) whereby 28 nurses out of 55 participants, showed that new staff members had to wait for months before they received hand hygiene training. According to the study of Mearkle et al. (2016), whereby half of the participants were nurses, reported that they never received any hand hygiene training, while others had only received HH training during their undergraduate studies. The healthcare workers stated that the training they had received was variable. Although the training provided a process of hand washing, they struggled to remember this (Mearkle et al., 2016). Some nurses suggested that training can be provided in phases by first training a group of six nurses, who in turn can train other fellow staff (Joshi et al., 2020).

Challenges in the working environment

This category focused on challenges faced by nurses and affected their practice of hand hygiene. It was sub-categorized into:

Lack of materials

The common reason why hand hygiene was not performed and regarded as a challenge by nurses was due to lack of necessary resources, for example, soap, access to functional sinks and towels (González et al., 2016; Joshi et al., 2020; Lohiniva et al., 2015; Marjadi & McLaws, 2010; McLaws et al., 2015; Nwaokenye et al., 2020; Sickder, 2017). Nurses stated that hand hygiene performance would be improved if there were more sinks and at a reachable distance. Some of the nurses had to walk to other departments or locker rooms to wash hands and this was time-consuming (Joshi et al., 2020; Lohiniva et al., 2015; Salmon & McLaws, 2015). A study conducted by Salmon and McLaws (2015), whereby half of the participants were nurses, reported that lack of access to practical sinks and hand hygiene solutions were the challenges that affected hand hygiene practices. One nurse suggested that having more sinks would lead to more motivation and more persons to wash hands. Comments such as, water being too cold for handwash or the bad smell of the cleansing solutions were made by nurses and therefore prevented them from performing hand hygiene routines (Salmon & McLaws, 2015). A nurse stated that, if an alcohol-based rub is perfumed with a nice scent, this would attract more nurses to practice hand hygiene routines (Salmon & McLaws, 2015). Nurses stated that hand hygiene became useless because their hands would still be wet when touching patients and they had to use whatever material that was available to dry their hands,

for example, their clothes (Marjadi & McLaws, 2010; Lohiniva et al., 2015; Salmon & McLaws, 2015).

Shortage of time and staff

A contributing challenge to why nurses did not perform hygiene was because of the high and heavy workload they got, especially during the evening and night shifts (Ay et al., 2019; Barker et al., 2017; Ghaffari et al., 2020; Joshi et al., 2020; Lohiniva et al., 2015; Marjadi & McLaws, 2010; McLaws et al., 2015; Nwaokenye et al., 2020). Four of the studies showed that nurses' performance of hand hygiene routines was time-consuming since they had many patients to attend to. This stressed the nurses so much and they ended up changing gloves after every patient's visit instead of washing hands (González et al., 2016; Joshi et al., 2020; McLaws et al., 2015; Nwaokenye et al., 2020). In the study of Marjadi & McLaws (2010), whereby 169 out of 318 participants were nurses, one nurse stated that she requested her patient to dress the wounds under her guidance because she wanted to eliminate the time and the need to perform hand hygiene. The shortage of staff members was the other challenge to why nurses did not perform hand hygiene (Ghaffari et al., 2020; Lohiniva et al., 2015).

Challenge in compliance

These are sub-categorized into two challenges that hinder nurses to comply with hand-hygiene guidelines.

Lack of role models

The complete compliance to hand hygiene was unachievable because nurses made a subjective risk assessment of when and how hand hygiene should be performed. For example, hand hygiene was not performed during the procedure of connecting intravenous infusion (Salmon & McLaws, 2015). Based on a nurse's conclusion, hand hygiene's negative results were based on hospital hierarchy underperformance (González et al., 2016; McLaws et al., 2015).

A study conducted by González et al. (2016), where 28 out of the 55 participants were nurses, showed that doctors held prominent positions in hospitals, therefore unfairly affecting the practices of other health workers through their attitudes and practices towards hand hygiene. The study of McLaws et al. (2015), where 36 of the 80 participants were nurses, stated that physicians were consistently less compliant with hand hygiene practices. And therefore, did not serve as good role models to the nurses.

A nurse stated that some physicians would not accept suggestions of hand hygiene from nurses (González et al., 2016). Other nurses stated that they felt embarrassed to ask for permission to wash their hands yet many of the physicians did not comply or give them time to perform hand hygiene practices (Lohiniva et al., 2015). Two of the studies showed that hand hygiene practices should start from the top. Because those from the top such as physicians, head of nurses and infection control nurses set an example for nurses to follow (Ghaffari et al., 2020; McLaws et al., 2015). Having role models was seen as a positive outcome because nurses had someone to look up to (Ghaffari et al., 2020; McLaws et al., 2015).

Insufficient feedback

Two of the studies showed that feedback was insufficient because of no monitoring systems to evaluate the nurses (Ay et al., 2019; Sickder, 2017). Nurses stated that the feedback was needed for better improvement and to sustain their hand hygiene practices (Sickder, 2017). In the study of Ay et al. (2019), nine out of 25 participants were nurses, stated that feedback given by the infection control nurses was accepted positively as it praises the good performance and suggests areas for improvement when the performance of hand hygiene was poor.

Feedback given individually was seen and taken on favourably and accepted if the person giving and the person receiving it was of the same professional (Ay et al., 2019). A nurse stated that the feedback that was given by the nurse who was responsible for infection control, was always individual and was encouraging and would guide the nurses on how to perform hand hygiene accordingly (Ay et al., 2019).

DISCUSSION

Method discussion

The Literature review was the methodology used in this study to describe the challenges nurses experienced related to hand hygiene in low-income countries. This creates an overview of existing knowledge or information about a specific problem in the field of nurses (Friberg, 2017). Twelve qualitative articles were sampled and used in the review. Using qualitative articles gave depth in understanding the hand hygiene challenges experienced by nurses. An inductive approach was applied to the literature review, which therefore indicates that the results of the articles were interpreted based on the phenomena of hand hygiene and experiences of nurses in low-income countries (Henricson and Bilhult, 2017).

Transferability is when the review can be applied to different contexts (Henricson and Bilhult, 2017). The results of the review can be transferred to other contexts as hand hygiene challenges not only by nurses in low-income countries but all healthcare workers around the world. Articles selected were quality reviewed among the two authors following the protocol from the School of Health and Welfare Jönköping, to increase the review's reliability and validity. Although the validity could have been affected by how the authors understood and interpreted the articles (Priebe and Landström, 2017).
The use of three databases increases the sensitivity of the results and thereby increasing the credibility also validity (Henricson, 2017). Databases CINAHL, MEDLINE and PubMed were used as they contained articles or journals about, medicine, nursing, etc. (Karlsson, 2017). Search terms that were relevant and connected to the objective of the review were combined using the Boolean term and sign AND/ asterisk (*). Authors used Boolean terms in combination with search terms low-income countries and barrier in MEDLINE to receive a narrower search of articles relating to low-income countries. Search terms barrier and low income obtained other similar keywords (see appendix II) further narrowed the search, resulting in one article.

During the data collection, the search was further broadened with search terms healthcare workers or providers as it was difficult to find articles only about nurses in low-income countries. The selection followed the inclusion criteria and selected only articles that were peer-viewed. Peer-viewed articles strengthen the review's credibility as they are viewed as scientific articles that have gone through an evaluation process conducted by members of the same profession (Henricson, 2017). The articles chosen for the results section included other healthcare workers although authors found it more interesting to continue while applying focus on nurses as it was the main interest. Eleven articles of qualitative design and one article of a mixed design both qualitative and quantitative were chosen for this study. Although the twelfth article was of a mixed-method, the authors were able to focus on the qualitative result section of this article.
All articles without abstracts or full texts were excluded from the selection, although they could have had crucial information towards achieving the study's aim. The Great precaution was taken to ensure that the chosen articles were first individually read and then as a group for increased validity/reliability (Henricson, 2017).

The analysis was done using Friberg's five-step analysis (2017). The authors individually read the articles and together discussed them to highlight similarities (Henricson, 2017). During the literature review process, feedback from students and supervisor was received, leading to areas of change and improvement and strengthening the review's validity/credibility (Henricson, 2017).

The articles covered different low-income countries with different education and healthcare systems hence a non-biased study, Bangladesh, Egypt, Guatemala, India, Indonesia, Iran, Nigeria, Turkey, Uganda and Vietnam. The review focused on nurses in low-income countries, this resulted in a limited number of articles and was a great challenge during the study.

The main disadvantage of writing the literature review was that the chosen design of the articles and topic focusing on nurses and low-income countries. The particular reason for this disadvantage was that there were more articles of quantitative research instead of qualitative and more articles that were written about healthcare workers in general and not only nurses. Although the process was challenging, it was still important to highlight the need for continuously knowledge, training, resources and monitoring of hand hygiene from a nurse's perceptive in order to provide safety to patients.

Result discussion

Hand hygiene is a vital factor and one of the important methods of monitoring and reducing diseases associated with healthcare. Non-compliance with hand hygiene by nurses is a big concern in hospitals (Allegranzi & Pittet, 2009). The challenges found in the review's results that hindered nurses when performing HH in low-income countries were categorised into three main categories challenges in education, challenges in the working environment and challenges in compliance. Effective hand hygiene routines are essential to nurses while using proper guidelines as this leads to safety for patients.

Challenges in education

The review's findings showed the different perspectives and individual views nurses had on HH in healthcare settings, as they relied on certain assumptions to perform the routines. This suggests that although nurses understood the significance of handwashing, depending on the indications, they tended to selectively wash their hands. Carefully performed hand hygiene is the most effective and important measure in the prevention of infection and healthcare-associated infections since the common route are through direct or indirect contact and the hands of healthcare professionals (Allegranzi & Pittet, 2009). The profession of nurses includes a leadership role, in which they are to tutor and spread knowledge of hand hygiene to different healthcare workers (Svensk sjuksköterskeförening, 2020). Nurses are guided by the six core competencies and these should be applied for patient safety.

The indifference with the review's results, a study that was done in East Iran showed that most of the nurses, 194 out of 200 had good knowledge about hand hygiene. One hundred seventy-five of the nurses had good performance when it came to hand hygiene (Sharif et al., 2016). Other research's findings showed that nurses often used alcohol hand rub instead of washing their hands with soap and water first (Feyissa et al., 2014). The review's results showed that hand hygiene training for some nurses

was prolonged for a long time while other nurses received no training. Implementation of WHOs 'My Five Moments for Hand Hygiene' are essential among nurses through education and training. Loftus et al. (2019), wrote that although healthcare workers change, it is of great purpose that hand hygiene training is repeated intermittently for new workers and that knowledge of others remains updated. Loftus et al. (2019), continued to write that education sessions for hand hygiene should be conducted regularly, allowing healthcare workers to learn and practice the proposed methods. To increase HH practices among nurses, updated knowledge and training sessions are of great importance for further development in healthcare settings. Nurses have a responsibility to maintain lifelong learning in their work, as this leads to the prevention of healthcare-associated infections and multi-resistant bacteria (Svensk sjuksköterskeförening, 2020).

Challenges in the working environment

The review showed that most nurses understood that good performance of hand hygiene reduces HCAIs despite this, nurses experienced challenges in form of skin discomfort, inaccessible equipment, forgetfulness, misunderstanding of guidelines, insufficient time high workload and understaffing. These challenges corresponded with the study's results of Owusu-Ofori et al. (2020) and Devnani et al. (2011), as nurses experienced similar challenges that affected the performance of hand hygiene. Owusu-Ofori et al. (2020), found that the situation in low-income countries at the moment is such that handwashing facilities are optimal, that adequate sinks are not usable, and that running water is often recognized as an impediment. However, alcohol-based hand rubs are useful for tackling hand hygiene (Owusu-Ofori et al, 2020). One of the main causes of poor hand hygiene is insufficient access to services.
The review showed that some nurses forgo hand washing because of the inconvenient distance to the sinks or none at the departments. The study by Devnani et al. (2011), reported that an inadequate number of sinks or inaccessible to sinks as well as inconveniently placed sinks is a major barrier to effective handwashing. Having access and accessible distance to resources such as sinks makes it easier for nurses to perform hand hygiene. Challenges identified in the review's results lead to difficulties for the procedures of hand hygiene to be applied step by step. In some healthcare facilities where nurses were understaffed, the routines of hand hygiene were overlooked due to the overwhelming number of patients. Akyol (2007), wrote that having no time or forgetfulness are some of the challenges that lead to the non-practice of hand hygiene. It is of great importance that these challenges are inspected by the healthcare management to provide patient safety, as this is one of the nurse's roles in the healthcare setting.

Challenges in compliance

Hand hygiene compliance was low as nurses were influenced by their workmates especially those with higher competence. Compliance increases when nurses are aware of the individual responsibility for their actions for hand hygiene (Svensk sjuksköterskeförening, 2020). This means that every nurse has a responsibility to do right even when other workmates are non-compliant about hand hygiene routines. Nurses are to perform as role models and encourage other healthcare workers in performing hand hygiene as it reduces HCAI affecting patients.

Studies reviewed identified that improved practice of hand hygiene reduces HCAIs. Despite this, challenges experienced in form of non-compliance and lack of feedback affect patient safety. Safety is an important section of work in a nurse's role, as this minimizes risks of healthcare-associated infections when hand hygiene is performed. Piras & Minnick (2017) wrote about the importunateness and meaningfulness for nurses to be each other's role models and have inspiring workmates to look up to, as this leads to the positive performance of hand hygiene. This helps nurses to follow the good examples of hand hygiene practices set by fellow nurses or other healthcare workers. The study by Huis et al. (2013), reported that HH among nurses improved when feedback and motivation were given to nurses and it was also seen as a positive influence on compliance to hand hygiene routines. Motivation and role models are needed for successful improvement of hand hygiene as it contributes to a common goal and responsibility among nurses to provide patient safety (Huis et al., 2013). Apart from role models, non-compliance to HH routines is influenced by the non-accessible locations of sinks. The study by Vernon et al. (2003), reported that accessibility to the sink improved handwashing compliance. The role of the government to ensure the availability of resources played a primary role in influencing compliance among nurses to perform hand hygiene (Ahmed et al., 2020). When the government performs the role of providing healthcare facilities with the resources, nurses do not have to leave the patient room to access the resources needed for hand hygiene. Continued preparation and feedback cycles are required to maintain the progress.

CONCLUSION

Compliance with optimal practices of hand hygiene by nurses in low-income countries is poor. Nurses had knowledge about HH, although some of them showed confusion in hand hygiene products and routine. The resource-related challenges which hindered the nurses' maintenance of proper HH included an inadequate supply of the necessary resources. The other challenges which featured prominently included extremely busy schedules due to being understaffed, lack of feedback and monitoring systems and lack of compliant role models. Private healthcare facilities and publicly funded healthcare providers should endeavour to install all necessary and quality resources required to maintain proper hand hygiene to minimize infection transmission and to guarantee a safe environment. A monitoring and evaluation system needs to be adopted and a regular feedback mechanism adopted geared towards improving the nurse's performance and continuing nurse training should be offered to ensure effective hand hygiene practices in low-income countries.

Our review identified various factors that contribute to and affect nurses' compliance to hand hygiene in the prevention of HCAI. By identifying and describing the factors that affect hand hygiene practices in low-income countries, directly promotes the good nursing practice and ensures safety for the patients. Good performance of hand hygiene leads to less healthcare-associated injuries and less suffering for the patients and reduced healthcare costs to the system.

Further qualitative research on this topic of hand hygiene is needed, to in-depth capture of the nurses' experience with a focus on low-income countries.

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ATTACHMENTS

Appendix I: Search matrix

Databases	**Search terms**	**Number of hits**	**Read titles**	**Read abstracts**	**Read articles**	**Articles to results**
CINAHL *Limiters: English language, peer reviewed, Academic journal**s** 2008-2020*	hand hygiene or handwashing or hand washing or hand disinfection AND health care workers or health care professionals or nurses AND Qualitative Research	60	60	30	15	2
PubMed *12/11/20 Limiters: English, abstract, full text* 2008-2020	(Qualitative) AND (healthcare worker and hand hygiene)	96	96	30	12	3
MEDLINE *27/11/20 Limiters: English language, Academic journals 2008-2020*	hand hygiene or hand washing or handwashing or hand cleaning AND barriers or obstacles or challenges AND low-income or poverty or low socioeconomic status	32	32	10	7	1
CINAHL *Limiters: English language, peer reviewed, Academic journal**s** 2008-2020*	handwashing or hand washing or hand hygiene AND nurs* AND qualitative	95	95	15	5	1
PubMed *Limiters: English, abstract, full text* 2008-2020	(hand hygiene or infection control) AND (nurse) AND (qualitative)	352	352	150	50	1

MEDLINE *27/11/20 Limiters: English language, Academic journals 2008-2020*	hand hygiene or handwashing or hand washing AND healthcare workers* or nurs* AND qualitative* or interview*	200	200	60	15	4

Appendix II: Article matrix

Author/ Year/ Country	**Title**	**Aim**	**Method**	**Participants**	**Results**	**Quality review Points**
Ay, P., Teker, A. G., Hidiroglu, S., Tepe, P., Surmen, A., Sili, U., Korten, V., & Karavus, M. 2019 Turkey	A qualitative study of hand hygiene compliance among health care workers in intensive care units.	To explore the resasons for poor hand hygiene compliance	4 focus group discussions and 6 in-depth interviews	25 participants	Healthcare workers mostly practiced hand hygiene depending on the sense of "dirtiness" and "cleanliness".	Qualitative 10/12
Barker AK, Brown K, Siraj D, Ahsan M, Sengupta S, Safdar N. 2017 India	Barriers and facilitators to infection control at a hospital in northern India: a qualitative study	To assess the facilitators and barriers to infection control practices at a 1250 bed tertiary care hospital in Haryana,	Semi-structured interviews	20 participants	Major challenges include in heavy workload and time spent in training new staff	10/12 Qualitative

		northern India.				
Ghaffari, M., Rakhshand erou, S., Safari-Moradabadi, A., & Barkati, H. (2020). Iran	Exploring dete rminants of ha nd hygiene am ong hospital n urses: a qualitative st udy	To assess various aspects of HH from the per- spective of nurse in Iran.	Semi-structured individual interviews	16 particip ants	Nurses stated that lack of time or forgetfuln ess were some of the challenges for not performin g hand hygiene routines	9/12 Qualita tive
González ML, Finerman R, Johnson KM, Melgar M, Somarriba MM, Antillon-Klussmann F, Caniza MA. 2016 Guatemala	Understanding hand hygiene behavior in a pediatric oncology unit in a low- to mid-income country	To better understand site-specific determinants of HH practice in a pediatric cancer unit in Guatemala.	Interviews inform of open-ended questions	55 particip ants	Not having enough resources, heavy workload and lack of hand hygiene training	10/12 Qualita tive
Joshi, S, C., Diwan, V., Tamhankar, A, J., Joshi, R., Shah, H., Sharma, M., Pa thak, A., Maca den, R., Stålsb, L, C. 2012 India	Qualitative stu dy on perceptions of hand hygiene a mong hospital staff in a rural teaching hospital in India	To explore staff perceptions of hand hygiene using focus group discussions (FGDs) in a teaching hospital in India.	Interviews in form of focus group discussions	75 particip ants.	Staff had knowledge about hand hygiene but faced challenges in performin g the routines	8/12 Qualita tive

Lohiniva AL, Bassim H, Hafez S, Kamel E, Ahmed E, Saeed T, Talaat M. 2015 Eygpt	Determinants of hand hygiene compliance in Egypt: building blocks for a communication strategy	To understand the behavioural determinants of hand hygiene in order to develop sustainable interventions to promote hand hygiene in hospitals.	focus groups discussions participants :	14 FGD, with 96 nurses	Nurses linked hand washing to a sense of dirtiness. Knowledge of hand hygiene was limited together with the right resources.	10/12 Qualitative
Marjadi, B., & McLaws, M-L. 2010 Indonesia	Hand hygiene in rural Indonesian healthcare workers: barriers beyond sinks, hand rubs and in-service training	To explore hand hygiene barriers in rural Indonesian healthcare facilities	observation, focus group discussions and semistructured in-depth and informal interviews	318 participants	Major barriers to compliance included longstanding water scarcity, tolerance of dirtiness by the community and the healthcare organisational culture.	Qualitative 10/12

					Hand hygiene compliance was poor	
McLaws, M.-L., Farahangiz, S., Palenik, C. J., & Askarian, M. 2015 Iran	Iranian healthcare workers' perspective on hand hygiene: a qualitative study	To assess various aspects of HH from the perspective of HCWs.	Eight focus group discussions and six in-depth interview	80 participants	The results were sorted into three themes: the relationship between personal factors and HH compliance," "the relationship between environmental factors and HH compliance" and "the impact of the health system on HH adherence, including	10/12 Qualitative

					the role of adequate health systems, administrative obligations and the effect of surveillance systems."	
McLaws, M.-L., Farahangiz, S., Palenik, C. J., & Askarian, M. 2015 Iran	Iranian healthcare workers' perspective on hand hygiene: a qualitative study	To assess various aspects of HH from the perspective of HCWs.	Eight focus group discussions and six in-depth interview	80 participants	The results were sorted into three themes: the relationship between personal factors and HH compliance," "the relationship between environmental factors and HH complianc	10/12 Qualitative

					e" and "the impact of the health system on HH adherence, including the role of adequate health systems, administrative obligations and the effect of surveillance systems."	
Nwaokenye, J., Lakoh, S.,Morgan, J. 2020 Nigeria	Perceptions of Nigerian healthcare workers towards hand hygiene: a qualitative study	To explore the perceptions of Nigerian HCW towards HH and the use and availability of ABHR in order to suggest potential interventions to improve HCW as qualitative evidence in this field is	Interviews	19 participants	five themes emerged including discrepancies in what constitutes HH practice as participants, motivation for HH practice, a good knowledge of timing as regards practice, barriers to	Qualitative 11/12

		limited in Nigeria.			good practice and evidence of poor practice.	
Salmon, S., & McLaws, M-L. 2015 Vietnam	Qualitative fin dings from focus group dis cussions on hand hygiene c ompliance amo ng health care workers in Vietnam	To explore HCWs' barriers to hand hygiene in Vietnam.	Interviews inform of focus groups	12 focus groups with 8-12 particip ants	HCWs did acknowled ge a personal duty of care when hand hygiene was perceived to benefit her or his own health, and then neither workload or environme ntal challenges influenced complianc e.	Qualita tive 10/12
Sickder, H. K., Wanchai Lertwathanawi lat, Hunsa Sethabouppha, & Nongkran Viseskul. 2017 Bangladesh	Nurses' Surgical Site Infection Prevention Practices in Bangladesh.	Were to identify nurses' practices for SSI prevention and their barriers and facilitators, and to propose direction for improving nurses'	Focus Group discussion	22 nurses	Nurses stated that they had forgotten the knowledge their learnt about hand hygiene.	9/12 qualitat ive

		practices for SSI prevention				

Appendix III: Quality Review

Protokoll för basala kvalitetskriterier för studier med kvalitativ metod

Titel: ____________________
Författare: ____________________
Årtal: ____________________
Tidskrift: ____________________

Del I.
Beskrivning av studien

Beskrivs problemet i bakgrund/inledning? Ja ☐ ☐ Nej

Kunskapsläget inom det aktuella området är beskrivet? Ja ☐ ☐ Nej

Är syftet relevant till ert examensarbete? Ja ☐ ☐ Nej

Är urvalet beskrivet? ☐ ☐ Ja
Nej

Samtliga frågor ska besvaras med ja för att artikeln ska granskas med hjälp av frågorna i Del II. Vid Nej på någon av frågorna ovan exkluderas artikeln.

Del II
Kvalitetsfrågor

Beskrivs vald kvalitativ metod? ☐ Ja ☐ Nej

Hänger metod och syfte ihop? Ja ☐ ☐ Nej
(Kvalitativt syfte – kvalitativt metod)

Beskrivs datainsamlingen? ☐ Ja ☐ Nej

Beskrivs dataanalysen? ☐ Ja ☐ Nej

Beskrivs etiskt tillstånd/förhållningssätt/ställningstagande? Ja ☐ ☐ Nej

Diskuteras metoden mot kvalitetssäkringsbegrepp (t ex tillförlitlighet och trovärdighet) i diskussionen?
Ja ☐ Nej ☐

Diskuteras huvudfynd i resultatdiskussionen?
☐ ☐
Ja Nej

Sker återkoppling, från bakgrunden gällande, teori, begrepp eller förhållningssätt i diskussionen?
☐ Ja ☐ Nej

Är resultatet relevant för ert syfte?
Om ja, beskriv:
……
……………………………………………………………………………………………………

Om nej, motivera kort varför och exkludera artikeln:
……
……………………………………………………………………………………………………

Forskningsmetod/-design (t ex fenomenologi, grounded theory)

………………………………………………………….
…………………………………………………………

Deltagarkarakteristiska
Antal……………………
Ålder…………………....
Man/Kvinna……………

Granskare sign: ……………………………………………….

Framtaget vid Avdelningen för omvårdnad, Hälsohögskolan i Jönköping/henr