**HOW EFFECTIVE ARE HANDWASHING INTERVENTIONS IN PROMOTING HANDWASHING COMPLIANCE TO REDUCE BACTERIAL INFECTIONS IN KUWAIT HOSPITALS?**

**Introduction**

The alarming rates of nosocomial infections in intensive care units have become an issue of concern I many hospitals. Recent studies have proposed that handwashing is one of the cheapest and effective strategies for reducing the nosocomial infections (Antoniak, 2004). However, compliance with handwashing requirements is significantly lower in many hospitals. For this reason, about 10% of patients admitted to a hospital are subject to developing different nosocomial infections (Barrett & Randle, 2008). However, it is possible to reduce the hospital-acquired infections by promoting higher rates of compliance with hand hygiene (Dasgupta et al., 2015). Particularly, nosocomial infections pose a major challenge to the healthcare sector. These infections trigger increased levels of mortality, morbidity, as well as healthcare costs (Brown et al., 2014). There is evidence that handwashing with water and the appropriate detergents can register a significant level of effectiveness in the reduction of hospital-acquired infections.

The World Health Organization has introduced several recommendations with the core objective of promoting handwashing compliance. Specifically, the World Health Organization seeks to reduce the prevalence of nosocomial infections. In the intensive care unit, patients are likely to develop such infections only two days after hospitalisation (Burns & Grove, 2007). The transmission of nosocomial infections from one patient to the other or healthcare providers to patients explains why there are increasing levels of hospital-acquired infections (Creedon, 2005). The vulnerability of patients in the intensive care unit explains why they are likely to develop hospital-acquired infections (Çelik & Koças, 2008). Notably, patients in the intensive care unit may have a compromised immunity that serves to increase their susceptibility to hospital-acquired infections. In Kuwait hospitals, there is a reported low level of handwashing compliance among health care providers working in the intensive care unit (Chavali, Menon, & Shukla, 2014). For this reason, hospital-acquired infections are prevalent in many intensive care units in Kuwait. As a result, Kuwait registers an increasing economic burden associated with the treatment of the nosocomial infections.

The nosocomial infections in Kuwait are key contributors to the increasing rates of mortality and morbidity. The Ministry of Health has introduced various intervention strategies as a way of increasing handwashing compliance in different hospitals (Combes, 2008). The primary objective of this literature review is to determine the effectiveness of handwashing interventions in promoting handwashing compliance to reduce bacterial infections in Kuwait hospitals (Coughlan, Cronin, & Ryan, 2007). The literature review will seek to determine whether handwashing interventions register any positive outcomes in the promotion of handwashing compliance (Agvald-Öhman et al., 2006). The literature review will evaluate the available evidence concerning various interventions and their effectiveness in enhancing handwashing compliance. Notably, the intervention strategies should register long-term effects of reducing nosocomial infections, particularly in the intensive care unit.

**Literature Search Strategy**

The researchers conducted a rigorous electronic search on different databases; namely, EBSCO, CINAHL, MEDLINE Library, PubMed, and COCHRANE. The researcher selected these databases because they contain a diverse range of recently published research articles. The researchers identified specific keywords; such as, handwashing, handwashing compliance, nosocomial infections, hospital-acquired infections, nurses, critical care, and intensive care unit. Particularly, the researcher identified the inclusion criteria that would determine the most relevant studies in the literature review. The inclusion criteria included articles published between 2010 and 2017 and available in the English language. The researcher would also include primary research studies that directly addressed the research question. Both quantitative and qualitative studies, as well as mixed-method studies, would be included. The researcher was specific to include research studies that focused on the critical care settings, and acute care settings. The exclusion criteria included articles published before 2010 in a different language other than English. The researcher excluded articles that did not directly address the research question, and that did not focus on the critical care or acute care settings. The researcher used the inclusion and exclusion strategy to determine the most relevant studies for inclusion in the literature review.

**Study Identification Flow Chart** **Critical Review Process**

After the identification of the 13 studies for inclusion in the literature review, the researchers focused on a critical review process that involved quality evaluation, as well as data extraction and synthesis. The researcher used Critical Appraisal Skills Programme (CASP) tools and checklists to determine the quality of the included research studies. Notably, the CASP tools provide a reliable checklist for evaluating qualitative studies, quantitative studies, case-control studies, systematic reviews, cohort studies, as well as randomised controlled studies. Based on the research design, it was possible to determine the most appropriate CASP tool and checklist to use in the evaluation of the various research articles. The researchers proceeded to the data extraction and synthesis phase. Particularly, the data extraction and synthesis phase gave attention to the methodology used, the number of participants included in the study, the interventions highlighted, the level of consistency in the findings, and the principal conclusions. After completing the data extraction process, the researcher further synthesised the data by determining the heterogeneity that the studies exhibited. Through the data synthesis process, it was possible to highlight the outstanding similarities and differences between the various studies. During the data synthesis process, the researchers relied on an effective approach that focused on the emergent themes in each of the identified studying.

**Methodological Critique**

Among the 13 selected studies, there were ten quantitative studies, one qualitative study, and two studies that utilised the mixed methods approach. Out of the 10 quantitative studies, 2 were randomised controlled trials, 6 were experimental designs, while the remaining 2 were quasi-experimental. Son et al. (2011) utilised the randomised controlled trial with the core objective of determining whether newly introduced handwashing compliance interventions were effective. The study included 50 different teams comprising 5-10 healthcare workers. The randomised controlled trial is an effective approach in research studies with a significant level of evidence. Additionally, Langston (2011) used the randomised controlled trial to determine the effects of peer monitoring and peer feedback in increasing handwashing compliance. During the experiment, observers took the time to monitor randomly selected rooms in the intensive care unit, neurosurgery intensive care, and the surgical intermediate care unit for two hours. The randomised controlled trial demonstrated that peer monitoring and peer feedback had positive effects in promoting handwashing compliance. However, the number of observations in this study were limited, a factor that serves as a weakness of the study.

Sahay et al. (2010) utilised an experimental quantitative approach to determine the diurnal variation in hand hygiene compliance in a single centre study. The study utilised a limited sample size and only focused on a single centre study, serving as a weakness in the research design. Similarly, Santos et al. (2013) utilised a quantitative experimental approach to determine the strategies for improving hand hygiene adherence in the endoscopy unit. The endoscopy unit had 33 nursing assistants, five nurses, 36 Endoscopists, and four nurse assistant trainees. The study had a remarkable sample size, although the observations occurred only during the daytime. The study would have been more effective if the observations had extended to the night shift period and weekend. Lebovic, Siddiqui, and Muller (2013) embraced an experimental quantitative approach with the core objective of determining the specific predictors of handwashing compliance among 3,487 healthcare workers. Among these healthcare workers, 67% were nurses while 15% were physicians. Through observation, it was possible to determine the predictors of handwashing compliance. The researchers selected a remarkably large sample, an aspect that makes the findings applicable to a larger population.

Similarly, Cummings, Anderson, and Kaye (2010) adopted the experimental quantitative approach to determine the non-compliance with handwashing practices and the associated costs of hospital-acquired infections. The study focused on a 750-bed tertiary medical centre with the primary objective of determining the occurrence of hospital-acquired infections after a non-compliance with handwashing regulations. The study demonstrated that failure to comply with handwashing requirements increases the economic burden associated with hospital-acquired infections. Song et al. (2013) used a similar approach to determine the strategies for improving handwashing compliance among healthcare workers. The study focused on 1,433 observations before intervention and 9,580 observations after the implementation of the intervention. The methodological approach was reliable because it focused on the pre and post implementation of the selected intervention. Moreover, the increased number of observations made the findings generalisable to a larger population. Salama et al. (2013) also relied on an experimental quantitative study to determine the handwashing compliance through direct observation. The observations were made before the intervention and after the intervention of promoting handwashing compliance. The study included 12 doctors and 26 nurses, which was a remarkable sample size for an experimental study of this nature.

Mayer et al. (2011) utilised a quasi-experimental approach to determine the dissemination and sustainability of a hand hygiene program in a 450-bed tertiary care hospital. The researchers measured hand hygiene compliance in six acute care units, one oncology unit, and five intensive care units. The researchers obtained remarkable data from the different units and were able to draw conclusions based on the data collected. However, the researchers did not have a strategy of controlling the contamination of control units in the study. Higgins and Hannan (2013) also made use of the quasi-experimental approach in a quantitative study that sought to determine how the gaming technology could improve handwashing compliance in a tertiary referral acute care hospital. The study measured the compliance rates of handwashing practices after 12 months of implementing an advertising campaign to promote handwashing. The study had significant advantages because it examined the level of handwashing compliance over a significant period.

Caglar, Yildiz, and Savaser (2010) utilised the mixed methods approach that combines the qualitative and quantitative paradigms with to determine handwashing practices of healthcare workers in a neonatal intensive care unit. The sample size in this study was 28, which is sufficient for a mixed methods approach. However, the researchers only made 344 observations that were limited to this type of a study. In the future, it will be possible to increase the sample size due to the concerns associated with handwashing compliance. Mathai, George, and Abraham (2011) also used the mixed methods approach to determine the effect of multimodal intervention strategies in enhancing handwashing compliance in a medical surgical unit with 13 beds. The small number of potential observations in this unit was a major limitation of the study. In this literature review, the researcher included a single qualitative study. Gül, Üstündağ, and Zengin (2012) utilised the qualitative approach to determine handwashing compliance among undergraduate nursing students. The researchers relied on self-reports from different students to determine their compliance with handwashing regulations. The level of bias in self-reports was a significant factor that served as a weakness of the study. After a critical appraisal of the methodology selected for each research study, it was evident that the researchers had utilised remarkable research designs, enabling them to gain access to reliable evidence.

 **Handwashing Interventions Increase Handwashing Compliance**

A critical review of the included studies demonstrated that the implementation of handwashing interventions had a positive effect on handwashing compliance. Many of the studies sought to determine whether implementing handwashing interventions could register desirable outcomes in enhancing the adherence to handwashing by nurses and other healthcare workers (Panhotra et al., 2004). The studies focused on different care settings and various interventions (RN et al., 2017). The quantitative studies registered a significant increase in hand hygiene compliance after comparing the level of compliance before and after the intervention. According to Son et al. (2011), it became clear that putting in place handwashing interventions for the first time could provide a significant increase in handwashing compliance from 20% to 65%.

Undoubtedly, hospitals that implement handwashing interventions are likely to promote handwashing compliance and eventually reduce the number of nosocomial infections (Higgins & Hannan, 2013; Santos et al., 2013). Each of the studies reviewed demonstrated that handwashing interventions were necessary if hospitals need to improve handwashing compliance. As expected, handwashing compliance eventually resulted in a significant decrease in nosocomial infections (Pittet et al., 2006). Regardless of the intervention implemented, each study demonstrated that the efforts made by hospitals to increase handwashing compliance and reduce nosocomial infections were effective (Caglar, Yildiz, & Savaser, 2010). Many hospitals have failed to implement effective handwashing intervention strategies without realizing that each intervention strategy registers a measure of the increase in handwashing compliance.

Most of the studies presented desirable outcomes after the hospital selected an appropriate intervention strategy to encourage healthcare workers to increase their compliance with handwashing recommendations (Rosenthal et al., 2006). Notably, nurses in different studies increase their compliance with handwashing recommendations after recognizing the benefits of handwashing practices (Lijima & Ohzeki, 2006). The different handwashing interventions helped healthcare workers to develop a deeper understanding and appreciation of the effect of handwashing on reducing nosocomial infections (Novoa et al., 2007). The studies included in this literature review focused on populations of health care workers from different hospitals across the globe (Lee, Hong, & Kim, 2015). The effectiveness of the intervention strategies in the various hospitals demonstrates that each healthcare sector can reduce the prevalence of nosocomial infections by implementing various intervention strategies to increase handwashing compliance (Kostakoğlu et al., 2016).

**Multimodal Interventions are Effective in Reducing Hospital Acquired Infections**

The literature review demonstrates that various interventions can register different levels of impact on handwashing compliance. Particularly, the implementation of multimodal types of interventions is likely to register more positive outcomes (Korniewicz & El-Masri, 2010). Specifically, the combination of interventions such as education, in-service training, and the attendance of various seminars and training sessions can increase the effectiveness of handwashing compliance (Gül et al., 2012; Higgins & Hannan, 2013; Langston, 2011; Lebovic et al., 2013; Mathai et al., 2011; Mayer et al., 2011; Sahay et al., 2010; Santos et al., 2013). The use of handwashing campaigns, posters, and pamphlets can increase handwashing compliance (Higgins & Hannan, 2013; Lebovic et al., 2013; Mathai et al., 2011; Sahay et al., 2010; Santos et al., 2013; Son et al., 2011; Song et al., 2013).

Similarly, the combination of different feedback systems such as peer review and monitoring also can increase the handwashing compliance significantly (Gül et al., 2012; Higging and Hannan, 2013; Langston, 2011; Lebovic et al., 2013; Mathai et al., 2011; Mayer et al., 2011). Undoubtedly, the combination of intervention strategies to promote handwashing has desirable outcomes as these studies demonstrated. Healthcare workers are likely to give attention to handwashing practices and hygiene after gaining knowledge of the adverse effects of non-compliance with handwashing (Klevens et al., 2007). The use of the multimodal intervention is recommendable in different hospital settings because it can register a significant increase in handwashing compliance (Hussein, Khakoo, & Hobbs, 2007). Hospitals that intend to reduce nosocomial infections should implement the multimodal approach to interventions (Vindigni, Riley, & Jhung, 2011). A single approach may not register the desired effects in increasing handwashing compliance and reduce the prevalence of hospital-acquired infections (Cummings, Anderson, & Kaye, 2010). Based on these studies, it became evident that hospitals that implement a single intervention strategy do not register long-term effects in reducing nosocomial infections.

The long-term effects are only possible if health care workers develop a consistency measure in their compliance with handwashing practices. The immediate handwashing increase is a remarkable step, but may not register the long-term effects desired (Gambrel & Duncan, 2011). For this reason, the objective of implementing the multimodal intervention approach is to increase the long-term effects of handwashing compliance (Whitby & McLaws, 2004). Integrating different intervention strategies is the most effective approach to ensuring that healthcare workers have a deeper appreciation of how handwashing can promote patient safety (Salama et al., 2013). Notably, nurses give special attention to strategies that increase patient safety. For this reason, the combination of approaches should help nurses to recognize the existing relationship between handwashing compliance and patient safety (Duggan et al., 2008). Particularly, many of the studies reviewed, used combinations of intervention strategies to demonstrate that handwashing can successfully reduce nosocomial infections and increase patient safety (Esen & Leblebicioglu, 2004). The approaches used in the intervention should emphasize the most effective handwashing technique that registers long-term effects in reducing nosocomial infections.

**Conclusion and Recommendations**

Evidently, the literature review demonstrated the effectiveness of various intervention strategies in promoting handwashing compliance. The studies utilized various intervention strategies to enhance handwashing compliance. A critical analysis of the findings demonstrated that the use of the multimodal approach during the implementation process registers long-term effects in enhancing handwashing compliance. Notably, hospitals should focus on adopting the multimodal approach by integrating different interventions to promote handwashing practices. The integration of handwashing interventions should depend on the unique needs of the healthcare workers as well as the effectiveness of each independent intervention strategy. Hospitals may choose to implement training sessions, on-job training, peer reviews, peer monitoring, and handwashing campaigns. Hospitals need to determine the most effective combination of intervention strategies that will register long-term effects in handwashing compliance. There is evidence that the integration of approaches to promote handwashing helps the healthcare providers to understand the background information that surrounds the need for handwashing compliance.

The primary focus of implementing handwashing interventions should be to enhance a significant level of consistency in the compliance with handwashing practices. Hospitals need to recognize that this is the only approach to reducing hospital-acquired infections. For a long time, scholars have agreed that handwashing practices register a significant decrease in nosocomial infections. As a result, hospitals must develop regular intervention strategies that empower healthcare workers by teaching them the procedure and the importance of handwashing, especially in critical care settings. The acute care settings should be keen on improving handwashing compliance due to the increased vulnerability of the patients hospitalized in the intensive care unit. Nurses and other healthcare workers should recognize the susceptibility of patients to different nosocomial infections and their cumulative effects on the health of patients as well as the economic burden involved. Taking measures to promote handwashing compliance should be a significant step in hospitals in various parts of the world.

**Proposal**

**Introduction**

Handwashing is one of the effective practices that help in the reduction of nosocomial infections. Particularly, healthcare providers need to understand the basis of handwashing practices and its effectiveness in reducing nosocomial infections. In the intensive care unit, patients are vulnerable to the development of nosocomial infections. The reduced immunity of patients in the intensive care unit makes them vulnerable to developing hospital-acquired infections. Combining different intervention strategies will help in promoting handwashing compliance to reduce nosocomial infections.

**Research Question**

The primary research question for this study will be:

What is the effectiveness of handwashing campaigns, peer reviews, and nurse education in promoting handwashing compliance?

**Aims and Objectives**

The primary aims and objectives will include:

1. To determine the effectiveness of a multimodal intervention strategy in promoting handwashing compliance
2. To assess the long-term effects of handwashing compliance in the intensive care unit

**Methodology**

The study will adopt a qualitative approach in which nurses from 13 different public hospitals around Kuwait will discuss their experiences of handwashing compliance after the implementation of an integrated intervention strategy to promote handwashing. The researcher will rely on purposive sampling to identify five nurses from the intensive care unit from 13 public hospitals in Kuwait. The researcher will rely on the use of semi-structured interviews to determine the perceptions of nurses towards handwashing after the implementation of an integrated intervention strategy. The use of semi-structured interviews helps the researcher to use open-ended questions and determine whether the intervention strategies had any impact on the perception of the nurses towards handwashing.

The interviewer will allow the nurses to provide an in-depth description of their perspectives, giving attention to the main lessons that the nurses have learned from the handwashing interventions. Through tape recording, it will be possible for the interviewer to transcribe the interviews and use them for the data collection analysis phase. Particularly, all the nurses will benefit from a multimodal intervention comprising lectures, in-service training, and peer monitoring before the interviews. The researcher will contact the nurses through a telephone to inform them of the main objective of the study and to schedule the most appropriate time for the interview. The data analysis process will be based on the thematic approach in which the researcher will discuss the main thematic frameworks evident from the interviews. The first step in the data analysis will be the sorting of the data and arrangement of the findings in agreement with the identified themes.

**Ethical Considerations**

In this study, the researcher will seek approval from the relevant boards before conducting the study. Moreover, the researcher will contact all the hospital and seek permission from the hospital administration. The researcher will also obtain informed consent from the participants before the beginning of the data collection process. Throughout the study, the researcher will maintain high levels of privacy and confidentiality with the aim of promoting the interests of the participants. The participants will be free to withdraw from the study at any time of their convenience. The study does not pose any potential harm to the participants, and the researcher will make them aware of this aspect before the beginning of the data collection process.

**Summary**

The researchers conducted a systematic literature review with the core objective of determining the effectiveness of handwashing interventions in promoting handwashing compliance as a way of reducing bacterial infections in Kuwait hospitals. Through a rigorous electronic search, the research was able to identify 13 relevant articles from different databases. The researchers relied on a comprehensive exclusion and inclusion criteria in determining the most relevant research articles to include in the literature review. Using the CASP tools, the researcher was able to evaluate the quality of the selected articles and to proceed to the data synthesis and extraction process. After the data synthesis, the researcher carried out a rigorous critique of the methodology used in each study included. The emergent themes of the literature review were that handwashing interventions could register positive outcomes in promoting handwashing compliance. The second theme was that the multimodal intervention approach is likely to register long-term effects of handwashing compliance and the reduction of nosocomial infections. It became explicit that hospitals need to combine various interventions if they need to register an increased level of handwashing compliance.

Particularly, the hospital should determine the best combination of intervention strategies that are likely to register positive outcomes in reducing hospital-acquired infections. Many of the studies reviewed demonstrated that a combination of various handwashing interventions could increase handwashing compliance and reduce the prevalence as well as the economic burden of hospital-acquired infections. In the recommendation section, the researcher highlighted the need for hospitals to focus on an integrated approach that creates awareness on the need for consistent handwashing with the purpose of promoting patient safety. The implementation of such measures should empower nurses and other healthcare workers to register remarkable levels of handwashing compliance and eventually prevent the occurrence of hospital-acquired infections. After the literature review, the researcher further presented a research proposal that highlights the best methodology for a study that will be conducted in Kuwait hospitals to determine how various intervention strategies impact nurses regarding handwashing.

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