Meta-analysis of Studies Comparing the Effectiveness of CHG Bathing in ICU Patients

Assessment 3: Critical appraisal of evidence

Introduction

Despite several studies being conducted on the effectiveness of daily chlorhexidine (CHG) bathing for the prevention of Hospital-Acquired Infections (HAIs) in Intensive Care Unit (ICU) patients, there is little consensus on its practice in healthcare facilities. This paper is a critical appraisal of a meta-analysis conducted by Frost et al. (2016) evaluating the available literature on CHG bathing in ICU patients. This paper will critically assess the authorship, justification of research question, research design, methods, results, and limitations of the study. It will also present a discussion on the enablers and barriers of the implementation of CHG bathing in ICU patients for the preventions of HAIs based on the results of the meta-analysis.

PART A – Critical appraisal

Authorship

The authorship of this study (Frost et al., 2016) comprises of 8 authors, 6 of whom are a part of the Critical Care Research for Innovation & Evidence Translation (CCRICET) research group, and the remaining 2 are a part of the Simpson Centre for Health Services Research, both of which are located in Sydney, Australia. Additionally, 7 of the authors are also affiliated to the Liverpool Hospital in Sydney, which further adds credibility to their study. Each author's contribution to the study has been clearly stated and a statement of no competing interests is also declared in the article.

Therefore, it can be effectively concluded that the authorship of the article is a strength of the study based on their contributions and affiliations.

Research question & Justification

The objective of this study (Frost et al., 2016) was to conduct a systematic analysis of published trials for evaluating the effectiveness of CHG bathing of patients in the ICU for control of various HAIs. Overall, the literature review in the background section is quite short and does not elaborate on some of the results that have been found in various studies. Also, the background to the problem of the occurrence of HAIs in the ICU is limited and is not backed by global statistics. The total number of references used in the background section is 10, with only 2 of them related to CHG bathing in ICU patients and the remaining 8 relating to HAIs in general. Therefore, the background and literature review of this paper was weak in terms of content as well as relevant sources.

Research design

The research design of this study (Frost et al., 2016) was a meta-analysis in accordance to the PRISMA guidelines as stated by the authors. Meta-analyses support the development of practice guidelines and aid decision-making in the clinical setting, and PRISMA provides a 17-point checklist that outlines the preparation and reporting guidelines for a meta-analysis (Moher et al., 2015). As stated in the background, there is a lot of inconsistency in the literature regarding the effectiveness of CHG bathing in ICU patients for the prevention of HAIs, and therefore, the authors were justified in choosing a meta-analysis to appraise the literature in line with their research question.

Thus, the choice of a meta-analysis in accordance with PRISMA guidelines is a strength of the study (Frost et al., 2016).

Research methods

The methods section of the study (Frost et al., 2016) elaborated on the databases and keywords used for the study, also stating that the back references of the selected papers were searched. The inclusion and exclusion criteria were explicitly mentioned, and the study selection was done independently by two authors, thereby employing double-screening (Waffenschmidt et al., 2019) and eliminating bias in study selection (Charrois, 2015). Only randomized controlled trials were included in the meta-analysis to obtain focused results about the effectiveness of CHG bathing, which is a strength of the study. Another strength is the detailed explanation of statistical methods that were used in the meta-analysis, including models, tests, and evaluation of publication bias. Overall, the methodology of the meta-analysis has been well-described, although in study selection, most of the reasons for the specific methods are based on inferences from the background section and are not completely elaborated in this section.

Results and Limitations

The authors of the study (Frost et al., 2016) have described in detail the number of studies included and their individual characteristics including study designs, specific HAIs studied, and summary estimates in their results section. The description of results was divided based on the type of HAI, which was a strength as it indicated the effectiveness of CHG bathing for each HAI. The authors have also stated an absence of

publication bias based on statistical tests, which also adds to its credibility. Overall, the authors have demonstrated that, as per the current literature, CHG bathing was most effective for preventing CLABSI and MRSA infections in the hospital. The only item that has not been included here is the study selection flowchart with details of initially identified studies and the studies that remained after the screening process.

The limitation of their study was the use of two articles which statistically altered the results if excluded from the meta-analysis due to changes in their control period and lengths of intervention. As this point has been stressed by the authors, the results of the meta-analysis need to be considered with caution.

PART B – Enablers and Barriers

As per the study (Frost et al., 2016), the authors' recommendation of using daily CHG bathing for ICU patients for reducing the risk of CLABSI and MRSA infections is only effective if the underlying risk of acquiring these infections in the ICU is high. For instance, if the risk of acquiring CLABSI infection is 5 per 1000 days, then 360 patients need to be exposed to CHG bathing every day to prevent a single infection, which can be a barrier for implementation. If on the other hand, the risk is 1 per 1000 days, the number of patients that need to be exposed to the intervention increases to 1780. Similarly, for preventing MRSA infections, the number of patients that need to be exposed to the intervention is 600 for a risk of 5 in 1000, and 2800 for a risk of 1 in 1000. Therefore, the cost, labour, and compliance that is required for the prevention of a single infection is a significant barrier for implementing CHG bathing in ICU patients (Musuuza et al., 2020).

On the other hand, an extremely high baseline risk of these infections in the ICU and organizational factors such as policies and constant reminders by nursing managers can serve as enablers for implementing daily CHG bathing in the ICU. Also, the potential benefit of daily CHG bathing in the ICU for the prevention of CLABSI and MRSA infections can also serve as a facilitator for its implementation as it will reduce adverse patient outcomes and increase the overall quality of care delivered to the patients (Musuuza et al., 2017).

Conclusion

In conclusion, the article was concisely written although it did cover all the important points necessary for the study. The background and literature review could have been a little more elaborate to set the context for the study. The research design chosen was a meta-analysis in accordance to the PRISMA guidelines which was suitable for the authors' objective of evaluating the literature on daily CHG bathing in the ICU for the prevention of HAIs. The results of the meta-analysis were that daily CHG bathing in ICU patients was effective for the prevention of CLABSI and MRSA infections, given that the baseline rate of infection in the ICU was high. However, as all the included studies had different research designs, the rates of effectiveness were different, and further studies are required to establish the practice of daily CHG bathing for the prevention of HAIs in ICU patients.

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