



Research Article

Assessment and Management of Dehydration in Children Based on Digital: A Systematic Review

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ABSTRACT

Dehydration remains a critical issue in children and can pose a risk of mortality. Nurses play a crucial role in promptly and accurately preventing dehydration, beginning with the recognition of its causes and symptoms in patients. A thorough assessment by nurses is key to ensuring proper and timely treatment of dehydrated patients, especially in high-activity emergency units. The integration of technology into emergency units is essential for enhancing patient services and decision-making processes. This study aims to conduct a systematic review by analyzing the use of mobile phone applications in assessing signs of dehydration and possible management in hospital services. Four databases (Scopus, Science Direct, and Pubmed) were used in this study using the keywords assessment, smartphone, and dehydration management. Access to the quality of this study using a cross-sectional design from Joanna Briggs Institute. Use the PRISMA flowchart to summarize the study selection. Limit for the last eight years, namely 2017 – 2022. The results of this study met the inclusion criteria, including patients with dehydration caused by gastroenteritis problems and pediatric or pediatric patients. inclusion and exclusion criteria applied to the PICOS framework.

The result of eleven studies in the article found that a digital-based dehydration management approach is very beneficial for the effectiveness of services and initial assessment of the patient's clinical condition. The integrity of digital technology in healthcare has revolutionized many aspects of healthcare management and delivery. By implementing digital solutions such as dehydration management documents, health workers can improve their ability to prevent and treat dehydration.

Keywords: Assessment, children, digital, management of dehydration

INTRODUCTION

One common issue arising from an imbalance of fluids in the body is dehydration. Dehydration is a condition characterized by an insufficient total body water content due to fluid loss, reduced fluid intake, or a combination of both factors (Popkin et al., 2010). Within the body, water levels are regulated by compartments such as intracellular and extracellular spaces to maintain balance. The regulation of water levels to ensure balance is governed by a mechanism known as homeostasis, which is essential for maintaining fluid balance, whether it be a deficiency or excess (Jéquier & Constant, 2010). Fluid homeostasis influences cell work starting from cell volume to any

functions to arrange cell work in terms of epithelial transport, metabolism, excitation, hormone action, cell proliferation, and even cell death (Delpire & Gagnon, 2018).

Data from the Directorate General of Public Health, Ministry of Health of the Republic of Indonesia in 2022 states that the most common cause of death in the toddler group (12-59 months) is diarrhea, namely 10.3% and 6% in children under five (Ministry of Health, 2022). When experiencing diarrhea, the body will look at large amounts of salt and can become dehydrated very quickly (Pace, Lynn, and Glass, 2001).

Dehydrated patients are prone to experiencing critical conditions and are often referred to hospitals or health services. One of the causes of dehydration is diarrhea, particularly prevalent in children, yet many parents do not fully grasp the impact of fluid deficiency on the body. It is crucial for clients to understand the role of water components in the body to comprehend how to maintain hydration levels effectively (DeLaune & Ladner, 2010). Efforts are needed to facilitate initial screening and management of dehydration at the community level, enabling individuals to recognize and address dehydration before it worsens.

The utilization of technology is rapidly expanding, with an increasing number of studies focusing on symptom monitoring through mobile devices (Chan et al., 2010). Android applications have become essential for prompt and urgent treatment (Thinnukool et al., 2017). The presence, utilization, and advantages of digital technologies in healthcare are pertinent topics in current technological discussions (Krick et al., 2019). Recently, numerous articles have suggested that utilizing Android apps to address preclinical dehydration levels could offer a viable solution accessible to the general public. In a study by Thinnukool et al. (2017), they developed an application called the Pediatric Fluid Therapy Calculator (PFTC) to calculate patient fluid needs. This application is publicly accessible and can be practically used by anyone. Mobile applications serve as a medium for disseminating information (Thinnukool, 2017). This literature review aims to analyze the effectiveness of Android-based assessment models through previous studies' findings. The outcomes of this research can serve as a reference for developing additional supportive applications to aid in managing dehydration at the pre-hospital level.

MATERIAL AND METHODS

Literature Search Strategy

Access to quality of this study used a cross-sectional design from the Joanna Briggs Institute. The three databases used were Scopus, Science Direct, and Pubmed for 2017-2022 using the keywords assessment, smartphone, and dehydration management. The search technique uses Boolean Logic (AND, OR, NOT, and MesH (Medical Subject Headin)).

Inclusion and Exclusion Criteria

Inclusion and exclusion criteria were applied to the PICOS framework (Population, Issue of interest, Comparator, Outcomes, and Study Design). Inclusion criteria included patient populations in hospitals and communities, quasi-experimental study design, case report, cross-sectional, RCT and cohort study, year of publication 2017-2022, expected results were assessment and treatment management of dehydration, use of English. Full-text articles can provide a more detailed explanation of the research theme used as a reference, while those that are not available in full-text are excluded.

Study Selection and Quality Assessment

The journal search began by inputting keywords into three databases. From the literature search results, 3878 journal articles were obtained. Subsequently, Mendeley bibliography software

was used to check and filter out duplicates based on titles and abstracts. Additionally, only journals available in full-text format were considered. Researchers conducted screening based on title (n=2544), abstract (n=106), and full text (n=7) that matched the title of the literature review. The inclusion and exclusion criteria were then adjusted based on these seven articles. Quality assessment of the research journals (n=7) was performed using a cross-sectional study evaluating critical judgment according to Joanna Briggs Institute (JBI) criteria. The checklist consisted of 8 questions with assessment criteria including "yes," "no," "don't know," and "not applicable." One point was assigned for "yes," while other responses scored zero. Scores were totaled, and if the study score exceeded 50%, it was considered to have good quality. All journals scored above 50%.

Eight journals rated 75%, and the rest rated 62.5%. So that all journals that met the criteria was analyzed. The result of the Journal selection explanation in a flowchart. (Figure 1).

Identification

The research was organized through a database search from: Scopus, Science Direct, dan PubMed (n=3878).

RESULTS AND DISCUSSION

The literature search yielded a total of seven journals, comprising results from the Scopus database (n=2), Science Direct (n=2), and PubMed (n=3). Publications spanned across the years 2017 (n=2), 2018 (n=1), 2020 (n=1), 2021 (n=2), and 2022 (n=1). These seven journals passed the selection review and quality assessment. The majority of the selected journals, three in total, were sourced from the PubMed database.

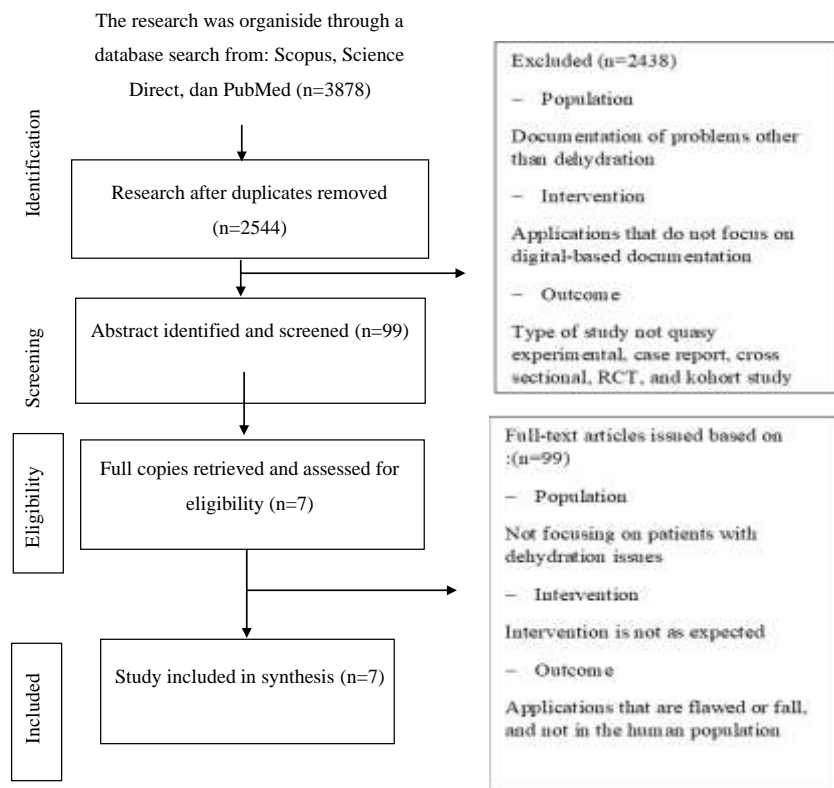


Figure. 1 The result of the Journal selection

Technological Benefits

The use of technology is evolving rapidly, particularly in the field of healthcare. It is crucial for health information delivery to be innovative and aligned with current advancements to ensure accessibility for those in need. Mobile applications have become widely utilized for health education and treatment assistance purposes.

Numerous studies highlight the effectiveness and advantages of technology in assessing and managing dehydration, emphasizing its efficacy, practicality, simplicity, and accuracy. The ability to make quick calculations of fluid turnover is particularly noteworthy. One study specifically underscores that technology utilization can enhance healthcare workers' adherence to established guidelines, including those set forth by the World Health Organization (WHO).

Comparison of Digital and Conventional Methods

The findings of this literature study underscore the advantages of digital technology as a promising avenue for enhancing healthcare in hospitals and other healthcare facilities. Healthcare systems are encouraged to leverage digital technologies to provide innovative solutions for improving healthcare delivery and addressing medical challenges (Stoumpos et al., 2023). The study suggests that digital-based assessment and management methods outperform conventional approaches. Moreover, it advocates for collaboration among healthcare providers and nurses to develop strategies for utilizing communication technology to enhance patient care practices in terms of efficiency, respectfulness, ethics, and effectiveness (Brandt et al., 2016).

Furthermore, adopting digital solutions is expected to reduce the reliance on manual record-keeping and minimize errors associated with paper-based documentation. Comparative studies comparing computerized and paper inpatient protocols have demonstrated the superiority of computerized protocols (Hoekstra et al., 2010). Health information technology offers numerous opportunities to improve and transform healthcare delivery by reducing human error, enhancing clinical outcomes, facilitating care coordination, improving practice efficiency, and enabling longitudinal data tracking (Alotaibi & Federico, 2017).

Benefits of Electronic Documentation for Exchanging Information on Patient Health Status between Health Workers

Electronic records of a patient's fluid intake and urine output facilitate healthcare professionals in monitoring hydration status more effectively, aiding in patient care planning and monitoring. Pankhurst et al. (2023) found that using electronic charts in intensive care units allows nurses to track fluid volumes for each patient hourly, involving numerous calculations, ultimately enhancing treatment management and potentially reducing hospital stays. However, it's essential to recognize that not all patients with dehydration problems require hospitalization, and dehydration can also be overdiagnosed (Taylor & Jones, 2022).

Digital dehydration management documents not only assist in managing dehydration but also support preventive actions by enabling early identification of at-risk patients and facilitating necessary interventions (Jedwab et al., 2019; Keyworth et al., 2018). Nevertheless, implementing such systems requires robust measures for privacy and data security, as well as user-friendly designs accessible across various devices and platforms to ensure widespread adoption among healthcare professionals. The potential benefits are substantial, including more efficient monitoring and treatment strategies, reduced errors, and improved patient outcomes.

Furthermore, electronic prescriptions have been shown to reduce patient harm and improve documentation accuracy (Reckmann et al., 2009; Kossman & Scheidenhelm, 2008). Implementing digital dehydration management documents can also aid in preventing dehydration by identifying at-risk patients before symptoms manifest, thereby improving treatment plans and outcomes while reducing manual errors.

In conclusion, the integration of digital tools into healthcare management, such as dehydration, offers multifaceted benefits, promising efficient and effective healthcare services, improved adherence to clinical guidelines, and potentially greater access and equity in healthcare provision, along with cost savings (Cresswell et al., 2016). Nurses and other medical professionals can leverage smartphones to facilitate information sharing (Jong et al., 2020). Technology utilization has the potential to enhance adherence to clinical guidelines and improve professional behavior in applying guidelines (Fiander et al., 2015).

CONCLUSION AND SUGGESTION

The integration of digital technologies into healthcare has revolutionized numerous aspects of healthcare management and delivery. With the implementation of digital solutions such as dehydration management documents, health workers can enhance their ability to prevent and manage dehydration in patients. The utilization of digital tools in healthcare has yielded various benefits, including more efficient management and prevention strategies, ultimately leading to improved patient outcomes. Technology in the health sector serves as a viable source of information for self-management within communities, aiding in early prevention of health problems, particularly dehydration, before patients require hospitalization.

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