EVIDENCE FOR UMBILICAL STUMP CARE PRACTICES: INTEGRATIVE REVIEW

ABSTRACT

Objective: to analyze evidence on umbilical stump care practices in newborn infants. Method: integrative review whose guiding question was: “What is the evidence published on umbilical stump care practices in newborn infants?” The search was conducted in the databases MedLine, LILACS, and CINAHL within the last 10 years. The extraction, organization, and summarization of information were conducted by two independent reviewers. Result: the final sample consisted of 10 studies. The umbilical stump care practices are related to the time of fall, occurrence of infection, and neonatal mortality. Conclusion: hygienic practices when handling the umbilical stump and use of antiseptics were effective at the time of separating and reducing infections and mortality. Descriptors: Umbilical Cord; Infant Care; Newborn Infant.

RESUMO

Objetivo: analisar as evidências sobre práticas de cuidado do coto umbilical de recém-nascidos. Método: revisão integrativa cuja questão norteadora foi: “Quais são as evidências publicadas sobre práticas de cuidado do coto umbilical de recém-nascidos?”. A busca foi realizada nas bases de dados MedLine, Lilacs e CINAHL nos últimos 10 anos. A extração, organização e sumarização das informações foram feitas por dois revisores independentes. Resultado: a amostra final foi de 10 estudos. As práticas de cuidado do cordão umbilical estão relacionadas ao tempo de queda, ocorrência de infecção e mortalidade neonatal. Conclusão: práticas higiénicas ao manuseio do coto umbilical e uso de antisséptico mostraram-se eficazes no tempo de separação e na redução de infecções e mortalidade. Descritores: Cordão Umbilical; Cuidado do Lactente; Recém-Nascido.
INTRODUCTION

After child birth, the cord is clamped and sectioned, then it is named as the umbilical stump. Initially, it has a gelatin-like aspect, becoming dry, hardened, and blackened until falling or detaching.1 Generally, its process of mummification or dehydration begins immediately after section, since due to the contraction of vessels and cessation of blood supply, septic necrosis occurs.2 Stump goes through two healing stages. The initial phase is restricted to the early hours of life of a newborn infant (NBI) and it is gelatin-like, with a bluish white color, moist and bright. The second phase is characterized by dehydration that occurs soon after birth and since the second day it takes on a dark color, corresponding to the mummification process.3

The mummification process of the stump occurs near the 3rd or 4th day and its detachment from the abdominal wall occurs from the 4th to the 8th day of life, and it may extend up to 14 or 15 days. During this process, it is worth investigating the presence of secretions in the base of the umbilical stump or erythema in the skin around the navel healing.1,4

The umbilical stump requires vigilance and care because it favors the occurrence of infections, such as omphalitis and sepsis, this is so because it is characterized as a tissue undergoing a devitalization process, which makes it an excellent culture medium, besides having recently thrombosed vessels, allowing direct access to the bloodstream.5

The World Health Organization (WHO) recommends retaining the newborn infants’ umbilical stump clean and dry, however, this recommendation cannot be achieved in locations where most births occur in an unhealthy environment, whose infections account for up to half of all neonatal deaths.6

Pus secretion in the stump base, with edema and hyperemia on the abdominal wall, above all when there is formation of a triangle at the top of the navel, indicate omphalitis, a high risk infection for the child. Therefore, hygiene in the umbilical region with 70% alcohol is an important protective factor against infection.4

The most current guidelines from the Ministry of Health as for the care related to umbilical stump cleansing consist in the use of 70% alcohol or 0.5% alcoholic chlorhexidine after bathing and diaper changes in order to promote acceleration of the dehydration and antisepsis process.4

The umbilical stump is characterized as a continuity solution, something which requires the appropriate use of materials and solutions scientifically recommended for handling it.7 Currently, recommendations for the care of umbilical stump in the practice of health professionals are varied, there is little consensus on the best method or product to be applied to clean/disinfect the stump. Such inconsistency does not allow standardizing practices and it may have an impact on care quality, especially among nurses, raising doubts with regard to the best practices.8 However, it is worth emphasizing that proper cleansing should aim not only at the fall of the stump, but also the prevention of infections associated with its healing process.

Based on the above, this study aimed to analyze evidence on umbilical stump care practices in newborn infants.

METHOD

This is an integrative review9 that followed six stages: selection and definition of the theme, literature search (sampling) (Figure 1), establishment of criteria for categorizing the studies, evaluation of the studies included in the results, interpretation of results, and presentation of the integrative review.10

The guiding question was defined in the first stage: What is the evidence published on umbilical stump care practices in newborn infants?

The search was conducted in May 2015, on the databases MedLine, LILACS, and CINAHL. The following key terms or descriptors in health sciences were used: umbilical cord, newborn, chlorhexidine.

The survey was conducted by using the advanced search method, the three descriptors were searched at the same time, through the Boolean operator AND (umbilical cord AND newborn AND chlorhexidine). In the Virtual Health Library (VHL), initially, 83 works were found. Subsequently, the following filters were applied: MedLine and LILACS databases; full text; newborn infant limit; English, Spanish, and Portuguese languages; year of publication from 2005 to 2015; document type: article. In the CINAHL, only one study was found within the same publication period, and it was excluded due to repetition.

After applying the filters, 28 studies were selected, and they underwent the inclusion criteria: quantitative studies, with an observational or interventional nature, aimed at the umbilical stump care practices; and the exclusion criteria: descriptive quantitative
studies, qualitative studies, and review studies. By applying these criteria, 12 productions were excluded (1 descriptive quantitative study, 7 review studies, 3 qualitative studies, 1 study not available for free), and 16 studies were pre-selected. By reading the full articles, 6 studies were excluded because they do not address the umbilical stump care practices, despite being focused on the theme. Thus, 10 studies constituted the final sample of this review and they are numbered from 1 to 10, according to Figures 2 and 3.

In the articles selected we sought to classify them according to the quality of evidence into 7 levels (level 1, evidence from systematic review or meta-analysis of relevant randomized controlled clinical trials or arising from clinical guidelines based on systematic reviews of randomized controlled clinical trials; level 2, evidence derived from at least one well-defined controlled randomized clinical trial; level 3, evidence obtained from well-designed clinical trials without randomization; level 4, evidence from cohort studies and well-designed case-control studies, level 5, evidence arising from systematic review of descriptive and qualitative studies; Level 6, evidence derived from a single descriptive or qualitative study; level 7, evidence from opinion of authorities and/or report of expert committees).11

Then, the extraction, organization, and summarization of information contained in articles was conducted by two independent reviewers, by adapting an instrument validated by Ursi.12 Since this stage, studies were categorized into a single theme: umbilical stump care practices with regard to the time of fall, occurrence of infection, and neonatal mortality.

RESULTS

Description of the articles

There was a predominance of articles identified in the database MedLine, published by the journals Lancet and Pediatric Infectious Disease Journal, starting in 2007, all of them in English. Most of the studies were controlled randomized trials, carried out with populations of newborn infants from Asian communities. Regarding the evidence type according to its strength, most of the articles were classified as Type II (Figure 2).
Evidence for umbilical stump care practices...

<table>
<thead>
<tr>
<th>N</th>
<th>Authors</th>
<th>Database Journal Year</th>
<th>Study type</th>
<th>Population and location</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mullany et al.</td>
<td>MedLine Lancet 2006</td>
<td>Randomized controlled</td>
<td>15,123 newborn infants from 413 communities in northern India</td>
<td>II</td>
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<td>2</td>
<td>El Arifeen et al.</td>
<td>MedLine Lancet 2012</td>
<td>Randomized controlled</td>
<td>29,760 newborn infants from a hospital in Kathmandu</td>
<td>II</td>
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<tr>
<td>3</td>
<td>Soofi et al.</td>
<td>MedLine Lancet 2012</td>
<td>Randomized controlled</td>
<td>9,751 newborn infants from a hospital in Lima, Peru</td>
<td>II</td>
</tr>
<tr>
<td>4</td>
<td>Mullany et al.</td>
<td>MedLine Am J Epidemiol 2007</td>
<td>Prospective observational cohort study</td>
<td>17,198 newborn infants from Sindh Province, Pakistan</td>
<td>IV</td>
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<tr>
<td>5</td>
<td>Mullany et al.</td>
<td>MedLine Pediatrics 2013</td>
<td>Randomized controlled</td>
<td>29,760 newborn infants from Sindh Province, Pakistan</td>
<td>II</td>
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<td>6</td>
<td>Rivara Dávila et al.</td>
<td>LILACS Rev Peru Pediatr 2007</td>
<td>Randomized controlled</td>
<td>162 newborn infants from a hospital in Lima, Peru</td>
<td>II</td>
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<tr>
<td>7</td>
<td>Mullany et al.</td>
<td>MedLine Pediatr Infect Dis J 2012</td>
<td>Randomized controlled</td>
<td>1,923 newborn infants from Sindh Province, Pakistan</td>
<td>II</td>
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<tr>
<td>8</td>
<td>Hodgins et al.</td>
<td>MedLine Pediatr Infect Dis J 2010</td>
<td>Randomized controlled</td>
<td>694 newborn infants from a hospital in Kathmandu</td>
<td>II</td>
</tr>
<tr>
<td>9</td>
<td>Kapellen et al.</td>
<td>MedLine Neonatology 2009</td>
<td>Bicentric randomized controlled</td>
<td>669 newborn infants from neonatal units, Germany</td>
<td>II</td>
</tr>
<tr>
<td>10</td>
<td>Gathwala et al.</td>
<td>MedLine J Trop Pediatr 2013</td>
<td>Randomized controlled</td>
<td>140 newborns infants from a neonatal intensive care unit of a university hospital in northern India</td>
<td>II</td>
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</table>

Figure 2. Distribution of articles related to the umbilical stump care practices in relation to authors, database, journal, year of publication, study type, population, location, and level of evidence. Salvador, 2015.

Figure 3 describes the umbilical stump care practices in relation to the time of fall, occurrence of infection, and neonatal mortality.

<table>
<thead>
<tr>
<th>N</th>
<th>Objectives</th>
<th>Main results</th>
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<tbody>
<tr>
<td>1</td>
<td>Evaluate the impact of 3 care schemes (cleansing with chlorhexidine; cleansing with soap and water, care to keep the stump dry) on the umbilical stump concerning omphalitis and neonatal mortality.</td>
<td>The frequency of omphalitis was significantly reduced in the NBI group that used 4% chlorhexidine. Neonatal mortality was 24% lower in the group using 4% chlorhexidine when compared to the group that kept dry stump. Soap and water in the umbilical stump did not reduce infection and mortality.</td>
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<td>2</td>
<td>Evaluate the efficacy of two care schemes (single cleansing with 4% chlorhexidine after birth and daily cleansing with 4% chlorhexidine for 7 days after birth) on the umbilical stump concerning the care scheme to maintain dry umbilical stump to prevent neonatal mortality.</td>
<td>Neonatal mortality was lower in the one-time cleansing group than in the dry umbilical stump care group. Compared with the dry care group, there was a statistically significant reduction in the occurrence of severe infection (redness and pus) on the umbilical stump in the multiple cleansing group, but not only in the single cleansing group.</td>
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<td>3</td>
<td>Evaluate the umbilical stump cleansing effect by using 4% chlorhexidine, with or without washing hands with antiseptic soap, on the incidence of omphalitis and neonatal mortality.</td>
<td>As for the risk of omphalitis, there was a reduction by applying chlorhexidine, but there was no evidence through hand washing. As for neonatal mortality, there was strong evidence of reduction in infants who received chlorhexidine, but no evidence concerning hand washing.</td>
</tr>
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<td>4</td>
<td>Evaluate the risk factors for infection of the umbilical stump in newborn infants.</td>
<td>Omphalitis was detected in 5.5% of the NBIs. The risk of infection was 29% higher in NBIs who received mustard oil and 62% higher in NBIs who received other contaminated substances on the umbilical stump. Skin to skin contact and hand washing among midwives and caregivers were associated with fewer infections.</td>
</tr>
<tr>
<td>5</td>
<td>Quantify the impact of the umbilical stump cleansing with chlorhexidine on the time of stump detachment and the implications</td>
<td>The time of umbilical stump detachment with clean and dry care was 4.78 days. The time of umbilical stump detachment with only cleansing by means of chlorhexidine after birth was 6.9 days. The time of...</td>
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of such an increase in maternal acceptance and among other caregivers.

6 Demonstrating the effectiveness of 4% chlorhexidine gluconate to prevent bacterial colonization on the umbilical stump and potential development of omphalitis. Three substances were compared: 70% alcohol, 5% povidone iodine, and 4% chlorhexidine.

7 Verifying the impact of using 4% chlorhexidine on the bacteriological profile of the umbilical stump in newborn infants. Three care schemes were compared: care to keep the stump dry, only cleansing with 4% chlorhexidine after birth, multiple daily cleansing with 4% chlorhexidine.

8 Verifying the efficacy of chlorhexidine gel in relation to the aqueous chlorhexidine in reducing the periumbilical flora in newborn infants.

9 Evaluating the efficacy of chlorhexidine powder 0.1% versus care to keep the umbilical stump dry.

10 Comparing the topical application of chlorhexidine to provide care for the umbilical cord to the conventional dry care for prevention of neonatal sepsis in neonatal intensive care unit.

Cultures conducted 24 hours after applications of the two forms of chlorhexidine were less positive in the chlorhexidine gel group than in the aqueous chlorhexidine group. Mothers acceptance and adherence were high in both care schemes.

The time of detachment had significant difference between groups. The time of fall of the stump was 7.0 ± 2.5 days in the care scheme with chlorhexidine powder and 7.8 ± 2.9 days in the dry care of umbilical stump. There were 9 cases of omphalitis, 2 in the group using chlorhexidine. There was no difference between groups as for the occurrence of umbilical granuloma. NBIs who used chlorhexidine were less likely to adverse events when compared to NBIs who underwent dry care. The parental satisfaction was significantly higher in the group of NBIs who used chlorhexidine.

The time of fall of the stump had significant difference between groups. The average time of fall of the stump was 8.92 (± 2.77) days for the chlorhexidine group, 7.2 days in the povidone iodine group, and 6.5 days with alcohol. Chlorhexidine showed, with significance, greater antimicrobial effect than the other solutions.

Reduced colonization in the stump was observed in the groups using chlorhexidine once or multiple times.

On the 6th day greater colonization was identified in the multiple daily cleansing group. Only daily use of chlorhexidine managed to maintain and reduce the colonization until the first week of life.

The distribution of articles related to the umbilical stump care practices in relation to objectives and main results. Salvador, 2015.

**DISCUSSION**

Infections are responsible for up to half of the neonatal deaths in low-income countries and the umbilical stump is a common source of infection among this population and within this scenario. As for the risk factors associated with omphalitis and neonatal death during the stump healing process, signs of local infection are associated with increased mortality among newborn infants. Bacterial contamination on the stump can lead to sepsis and result in morbidity and mortality, especially in developing countries.

Umbilical stump care practices in low-income countries can be a significant factor in infection control. In this review, virtually all studies found addressed the umbilical stump care practices and their relationship with the time of detachment and/or the occurrence of infection and neonatal mortality.

Providing guidance to mothers and caregivers about hand washing with soap and water, aseptic cutting of the umbilical cord, non-application of household substances in the umbilical stump, and adoption of hygienic practices are measures that should be adopted to reduce exposure of newborn infants to risks associated with the umbilical stump healing process and mortality rates.

The implementation of simple actions (use of topical antiseptics and low-cost interventions, such as skin to skin contact, hand washing, and avoid the use of contaminated substances on the umbilical stump) should be promoted by health professionals, since they characterize protective factors for infection on the...
Cleansing the umbilical stump of newborn infants with 4% chlorhexidine can save lives, but further studies are needed to establish a better frequency of this intervention.\textsuperscript{19} Recommendations to keep the umbilical stump dry must be rethought considering the results with early use of chlorhexidine, as this has proved to be effective in reducing colonization\textsuperscript{17,19} and infections\textsuperscript{14,20,21}, as well as mortality associated with complications on the umbilical stump.\textsuperscript{13,15} The preparation of chlorhexidine gel reduced bacterial colonization to a greater degree than the aqueous formulation.\textsuperscript{20} Stump care by using 0.1% chlorhexidine powder decreased adverse events in relation to care to keep the stump dry.\textsuperscript{21} Regarding care schemes and substances used in cleansing with time of umbilical stump detachment, the use of chlorhexidine may or may not\textsuperscript{17,18,22} increase the time of umbilical stump detachment, however, an increased time of detachment was not associated with omphalitis.\textsuperscript{17} The fall of the stump was extended by using chlorhexidine in relation to other substances used, such as 70% alcohol and 5% povidone iodine.\textsuperscript{18} The time of fall of the stump in newborn infants was extended by using chlorhexidine in relation to umbilical stump dry care\textsuperscript{21}, but, in the NICU, the time of fall was lower with clorexidine.\textsuperscript{22} Caregivers showed both satisfaction with using clorexidine\textsuperscript{21} and dissatisfaction\textsuperscript{17} regarding the delay in the fall of the stump, but, even this way, they accepted the intervention. In this case, it is suggested that chlorhexidine could be used having its effectiveness in reducing infection and increasing neonatal survival as a basis, despite the possibility of increasing the time of fall of the umbilical stump.

Brazilian health professionals who work with neonatal care often ground their practice in the guidelines of the main health organizations responsible for designing care guidelines to this population. Recommendations from the WHO and the Brazilian Ministry of Health are important in the deployment of good practices by professionals who care for the maternal and neonatal population. The WHO recommends that care with cleansing the umbilical stump among newborn infants in developing countries should be aimed at keeping it clean and dry, although the use of antiseptics can bring benefits. The WHO Collaborating Centre for Research Synthesis Based on Evidence and Development Guidelines in Reproductive Health pointed out, in 2008, a review of evidence available on the use of 4% chlorhexidine for umbilical stump care, including this in the List of Essential Medicines of the WHO. In addition, the WHO recommends that, in need of using an antiseptic umbilical stump, chlorhexidine should be the agent of choice.\textsuperscript{12-28}

The fact that the WHO does not standardize the use of chlorhexidine among all newborn infants as an antiseptic in preventing complications associated with the umbilical stump healing process going against much of the evidence shown in this review, indicating a need to revise the guidelines currently recommended.

In our country, according to the latest guidelines of the Ministry of Health, considering the Manual of Care to the NBI, published in 2011, as a guide for health professionals, routine care to the umbilical cord through clinical stabilization of the newborn infant in the delivery room should be focused on: fixing the clamp to a distance of 2 to 3 cm from the umbilical ring, wrapping the stump with gauze soaked in 70% ethyl alcohol or 0.5% alcoholic chlorhexidine, using saline on the stump of newborn infants with extremely low birth weight, as well as verifying the presence of the number of umbilical vessels.\textsuperscript{4} Different products have advantages and disadvantages. The care of keeping the stump clean and dry is the most commonly accepted and it should be conducted once a day or more when needed. As for the product to be used, antiseptics or antimicrobials seem to be of little value in the absence of an infectious outbreak within hospital units. Chlorhexidine has proven to be effective in reducing the colonization and infection of the stump, but it slows mummification and the time of detachment. Seventy percent alcohol speeds mummification, but it does not interfere with colonization. Whatever the product chosen, it should be stored in a single-use bottle.\textsuperscript{4}

In an approach to infection control among newborn infants, the Ministry of Health emphasizes the importance of hand washing with soap and water and an alcoholic solution when handling newborn infants as an important preventive measure for infection control, besides it indicates that cleansing the umbilical stump is still a controversial issue in the literature.\textsuperscript{4} A systematic review study from the Cochrane Library found that chlorhexidine can increase the time of fall of the stump and, in

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addition, there is significant evidence to suggest that topical application of chlorhexidine reduces neonatal mortality and omphalitis in communities and in primary care in developing countries. However, there is not a sufficient number of studies to provide any inference about the effectiveness of other antiseptics used to keep the umbilical stump clean.  

The results of this review show that within the last 15 years, on the databases searched, no national studies were found, with a quantitative approach, addressing care practices by cleansing the umbilical stump of newborn infants, something which reflects the need for investigations to examine the national reality.

We need to conduct studies, well-designed and having a high level of evidence, so that they can drive the umbilical stump care practices better. Evidence based on scientific knowledge can ground an efficient and effective nursing care practice. Through evidence-based knowledge, it is possible to provide the best care at the lowest cost in settings with limited resources.

CONCLUSION

Some interventions are regarded as safe for cleansing the umbilical stump: hygienic practices for handling the umbilical stump, such as hand washing, not using homemade substances, and daily cleansing with antiseptics. As to the most suitable antiseptic, chlorhexidine, although extending the time of fall, was effective in reducing infections and mortality. Studies with other substances, such as 70% alcohol, commonly used in our country, are scarce.

The results of this review and the recommendations from the WHO and the Ministry of Health ratify the need to evaluate the environmental, human, and social conditions of the institutional and home care spaces, from the perspective of defining the best care scheme for cleansing the umbilical stump in newborn infants.

The predominance of international works confirms the lack of relevant research addressing the theme in the national context, and this highlights an inconsistency, given the significant neonatal mortality rates, combined with the occurrence of home births in Brazil. Therefore, we suggest that robust studies are conducted at the national level, with the purpose of validating umbilical stump care protocols in newborn infants, contributing to reduce preventable morbidity and mortality among this group.

REFERENCES

Evidence for umbilical stump care practices...


e/ub/citation/20555293/Chlorhexidine_gel_vs


