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Brief communication

Overview of clean intermittent catheterization for neurogenic bladder in a developing country: Is the sterile single-use catheter really necessary?

Descripción general de la cateterización limpia intermitente para vejiga neurogénica en un país en vías de desarrollo: ¿es realmente necesaria la sonda estéril de un solo uso?

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Intermittent catheterization is the treatment of choice for bladder drainage for incomplete emptying in patients with neurogenic bladder, including those with spinal injury, multiple sclerosis, and myelomeningocele. Clean intermittent catheterization (CIC) is considered the gold standard for bladder emptying. Since Lapides et al. established in their study that CIC was a safe and effective method, it has been widely used and is preferred to an indwelling catheter.(1) In the US, an estimated 300,800 patients perform CIC, and approximately 1,500,000 catheters are used per day, for single-use catheterization. This practice further exacerbates a negative environmental impact, considering that biodegradation of the material most catheters are made of is almost nil, with the clear majority unlikely to degrade in fewer than one hundred years. Reused catheters have gained popularity in recent years, especially in developing countries, such as Mexico. Despite the frequency of that practice in our country, evidence on the safety of reused catheters is presently controversial.(2)

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Reused or single-use catheters?

Some of the concerns regarding the selection of traditional reused catheters or single-use catheters are the unknown urinary tract infection (UTI) rates, uncertain cleaning methods, questionable durability of reused catheters, social issues, high costs, and quality of life. The superiority of single-use catheters in reducing UTI rates has not been demonstrated. Despite the insufficient evidence, the American Urological Association (AUA) guidelines on catheter-associated UTIs do not recommend cleaning reusable catheters, emphasizing that hydrophilic coated catheters are preferable.[3] The European Association of Urology (EAU) points out that the gold standard remains the single-use sterile catheter and highlights concerns about the cleaning method and patients compliance, with respect to reused catheters.[4] However, the current Canadian Urological Association (CUA) recommendations for CIC are to limit catheter use to one week or until visible deterioration is noticed.[1] Unfortunately, in Mexico and some Latin American countries, the availability of hydrophilic coated and prelubricated catheters is limited to private medical practices, because they are not covered by public health insurance.

In 2014, Prieto et al. published a Cochrane systematic review and reported that reused catheters were not related to a higher incidence of UTIs. However, they concluded that there was no high-quality evidence demonstrating that the UTI rate was affected by the use of an aseptic or clean technique, or by the use of catheters that are hydrophilic-coated or uncoated, or single-use or reused. Despite inconclusive results, the study was withdrawn from publication due to an independent appraisal that identified important discrepancies in the paper. Another issue to consider is that the studies analyzed were carried out in developed countries, where resources and Medicare coverage are available.

Reasons for the withdrawal were summarized in 3 fundamental points: 1) misinterpretation of results in the different studies included in analysis, 2) the previous definition of UTI proposed by the National Institute on Disability and Rehabilitation Research (NIDRR) in 1992 was used, without considering the updated definition proposed by the Infectious Diseases Society of America (IDSA) in 2009, which probably would have modified the results of the analysis, and 3) the studies reviewed were very heterogeneous and utilized questionable methodologies that limited a comparative data analysis.[5]

As mentioned before, another matter of concern regarding catheter reuse is the lack of standardization of cleaning methods. Several methods have been described, including: alcohol sterilization, antibacterial soap and water, aseptic solution, such as cetrimide 15%, benzalkonium chloride 0.5%, and chlorhexidine 1.5%, microwave sterilization, rinsing with water, and combinations of different methods. Until now, no clinical trials have been reported that compare different cleaning methods for reused catheters.[2] At our center, we established a standardized cleaning method, using 0.5% benzalkonium chloride solution, with catheter use limited to one week.

Urinary tract infections with clean intermittent catheterization

UTI is the most frequent complication of CIC and can have high personal and healthcare costs. The 2009 IDSA guidelines defined catheter-associated UTI in patients with intermittent catheterization by the presence of symptoms or signs compatible with UTI with no other identified source of infection, along with ≥10^3 CFU/mL of ≥1 bacterial species in a single catheter or midstream voided urine specimen.[3]

The evidence on the prevalence of UTIs associated with catheter reuse is controversial. We performed a randomized clinical trial at our center, with a total of 75 patients with neurogenic bladder caused by spina bifida, comparing single-use vs reused polyvinyl chloride (PVC) catheter for CIC. After an 8-week follow-up, no statistical differences were found regarding the frequency of asymptomatic bacteriuria (32.4% vs 23.7%, p = 0.398) or UTIs (35.2% vs 36.8%, p = 0.877) between groups. A limitation of the trial was that no comparison between different cleaning methods was carried out.[6] The study was performed at a center that specialized in the comprehensive management of patients with spina bifida. As in the aforementioned hospital, many other institutions offer non-profit support due to limitations in coverage for the treatment of neurogenic patients at healthcare institutions in Mexico. CIC with reused catheters is currently the standard management in many developing countries.

Environmental impact and costs

The potential environmental burden generated by single-use catheters is not negligible, with an estimated 9.7 to 85.9 million pounds of waste produced per year in the US. Until recently, most insurance companies in the US provided four catheters per month for CIC, considering that they would be reused. However, in 2008, Medicare amended its policy to reimburse single-use CIC, covering up to 200 catheters per month and 2400 per year. Contrastingly, in Mexico and other developing countries, healthcare systems do not include that coverage. A cost-comparison analysis by Neovius et al. showed that catheter cost for single-use types (hydrophilic coated or prelubricated) was higher than that of reusable types (non-coated, non-prelubricated) (€ 2188 vs. € 817 per year and per patient). Bremingham et al. compared the costs of the sterile single-use hydrophilic-coated catheter vs reused catheter, without insurance coverage. Annual costs were 3320 USD (2352-4487) vs 713 USD (584-860), respectively.[2]

The majority of catheters used for CIC are made of PVC, a very inexpensive material available in Mexico. PVC does not undergo any significant biodegradation, under natural conditions. Silicone catheters take up to a century to significantly degrade. Latex (or rubber) is the least commonly used catheter material for CIC today, and takes between 50-80 years to degrade, once it is in the environment.[1,2] It appears that all materials currently available for manufacturing bladder catheters have a negative ecological impact due to their limited biodegradation.

The amount of waste produced by single-use catheters is alarming. Considering that current evidence shows no real benefit over reused catheterization, environmental impact is a factor that should not be taken lightly.

Conclusions

In developing countries, single-use CIC is a major expense for patients and caregivers. Many public health insurance systems do not provide coverage for this type of treatment, in addition to the fact that current evidence has shown no superiority of single-use catheters over reused catheters. In Mexico, catheter reuse is the most common practice for CIC but there is still a dilemma regarding the standardization of cleaning methods for reused catheters. Clinical trials comparing the different techniques are needed, to establish the standard practice of reused catheter cleaning and its safety.

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Conflict of interest

The authors declare that there is no conflict of interest.

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References

1. **Saadat SH, Shepherd S, Van Asseldonk B, Elterman DS.** Clean intermittent catheterization: Single use vs. reuse. Can Urol Assoc J. 2019;13(2):64–9. doi: 10.5489/cuaj.5357
2. **Sun AJ, Comiter CV, Elliott CS.** The cost of a catheter: An environmental perspective on single use clean intermittent catheterization. Neurourol Urodyn. 2018;37(7):2204–8. doi: 10.1002/nau.23562
3. **Hooton TM, Bradley SF, Cardenas DD, Colgan R, Geerlings SE, Rice JC, et al.** Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. Clin Infect Dis. 2010;50(5):625–63. doi: 10.1086/650482
4. **EAU Guidelines.** Edn. at the EAU Annual Congress Amsterdam the Netherlands 2020. Netherlands; 2020.
5. **Prieto J, Murphy CL, Moore KN, Fader M.** Intermittent catheterisation for long-term bladder management. Cochrane Database Syst Rev. 2014;(9):CD006008. doi: 10.1002/14651858.CD006008.pub3
6. **Madero-Morales PA, Robles-Torres JI, Vizcarra-Mata G, Guillén-Lozoya AH, Mendoza-Olazarán S, Garza-González E, et al.** Randomized Clinical Trial Using Sterile Single Use and Reused Polyvinylchloride Catheters for Intermittent Catheterization with a Clean Technique in Spina Bifida Cases: Short-Term Urinary Tract Infection Outcomes. J Urol. 2019;202(1):153–8. doi: 10.1097/JU.0000000000000244