



CORRESPONDENCE

Disability and sustainability: reusable versus single-use catheters for persons with neurogenic bladder due to spinal cord injury

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Received: 19 May 2020 / Revised: 14 August 2020 / Accepted: 17 August 2020
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To the Editor

Intermittent catheterization (IC) and self-catheterization (ISC) are fundamental methods for management of neurogenic bladder [1, 2]. IC has represented the most important innovation in the last century for neurological bladder rehabilitation, particularly in individuals affected by spinal cord injury (SCI) [1]. Sterile IC was introduced to treat SCI patients by Guttman, and then Lapedes in 1971 popularized the clean intermittent catheterization (CIC) technique [2]. In 2016, European Urological Association (EAU) Guidelines described the Aseptic technique (or no touch technique) that has been widely used in the last decade and is currently the method recommended in the aforementioned guidelines [3]. IC boasts several benefits: IC users suffer fewer lower urinary tract symptoms (LUTS), enjoy better sleep and enhance their physical activities, with resultant improved quality of life (QoL) [4]. Sterile technique should be used for hospitalized patients, but aseptic technique is more often used in clinical practice. However, there is incomplete evidence regarding whether the aseptic technique increases the incidence of urinary tract infection (UTI). EAU guidelines conclude that aseptic IC is a valid substitution for sterile IC, which is not always easy to perform in a hospital setting. Moreover, a lower rate of UTI was observed using hydrophilic catheters. The use of IC, possibly the aseptic technique, is recommended for patients with urinary retention. No recommendations are available on reusable catheters, which are mainly used in developing countries [4]. Despite the availability of continuous innovations in materials, packaging, and pre-lubricated or hydrophilic catheters in rich countries, there is little to no

interest in developing better reusable catheters. This is unfortunate because managing neurogenic bladder requires the use of reusable catheters and lubricant in most developing countries. Moreover, considering costs, ease of use and the lower environmental impact, reusable catheters may be a key to promoting sustainability after SCI.

Reusable catheters are rare in developed countries; thus, further studies are needed to understand whether single-use consumers are open to the idea of reusing catheters. There are few studies to detect evidence that reusable catheters have similar incidence of catheter-associated urinary tract infections (CAUTI) as compared to single-use ones [5, 6]. Only two studies explore intermittent catheter users' perspectives about the advantages and disadvantages of single use versus reusable devices [7, 8]. Therefore, we still need evidence concerning CAUTI; there is, however, information available on patients' fears about reusing catheters to manage neurogenic bladder. These concerns regard the catheter user's security, discomfort and lifestyle in general, as well as UTI, and how and where to easily and optimally clean, prepare and store catheters [8] (Table 1).

The major reason not to switch from reusable catheters to single-use is the belief that UTI is more likely with reusable ones. In 2014, a Cochrane systematic review concluded that reusing catheters had similar risk of UTI when compared to single use; however, this review has been criticized for methodological bias [9]. A metaanalysis of seven trials performed by Christison et al. (2017) reported no difference in UTI rates between the two IC techniques. Additionally, a subanalysis of three trials referenced in the paper was performed to take in account contemporary UTI definitions and there were still no significant differences in UTI rates [10]. Hakansson et al. published a review concerning trials and guidelines that reported no evidence, just expert opinions. He was unable to demonstrate that reusable catheters increased UTI [7]. Further, Saadat et al. reported that the relationship between reusable catheters and an increase in UTIs is controversial [11]. Van Hala et al. [5] evaluated adults with paediatric onset neurogenic bladders and

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Table 1 Main aspects on patient's perception: reusable vs single use.

	Reusable	Single use
Risk of UTI	Concern about hygiene and perceived as more risky.	Considered more safety, less care required
Management	Good compliance needed, always available, no storage problems.	Some storage problems, need supply or good delivery service.
Sustainability	Low cost and impact on environment, high sustainability.	High cost, important pollution and waste source.
Quality of life	Not instantly usable, but good solution while traveling and to carry around.	Easy to use and immediately available for use, high independence. Not easy to carry on holiday or around.

reported no correlation between the number of UTI per year regardless of whether sterile, new or reusable catheters were utilized. Moreover, in their study on children with neurogenic bladder, Kanaheswari et al. found an increase of prevalence of only asymptomatic bacteriuria in patients who reused catheters for a long period, with no increase in UTI [6]. These data suggest reusable catheters are not correlated to a higher probability of developing UTI. A recent prospective multicentre clinical trial in patients using reusable catheters versus single-use hydrophilic catheters (HC) reports that single-use HC improved health-related QoL and were preferred over reusable catheters among people practicing IC. But this study has some important limitations: first 44% of patients used plastic and not silicone catheters, second there was insufficient and unstandardized use of lubricant with 15% not using any lubricant. Additionally, the trial was sponsored by a company producing single-use HC catheters. Thus, this study does not provide evidence against reusable catheters but underlines the need to develop technology to reuse catheters and a standardization of reuse techniques, including lubricant and cleaning [12].

To discuss the concept of reusable catheters it makes sense to look back in time and learn from our ancestors. Catheters were used in ancient times as far back as 3000 B.C. to treat urinary retention. Various metals, as well as organic material such as leaves and straw, were utilized to construct primitive catheters [13]. These materials are all biodegradable and eco-friendly, in line with the growing awareness of sustainability. In contrast, single-use catheters are commonly made of materials such as silicone, polyvinyl chloride (PVC), and latex [14], with latex being used less frequently due to allergic reactions. With the availability of these materials there has been an increase in costlier single-use intermittent catheter strategies [15] throughout industrialized countries, but what is the real expense? Sun et al. conducted a recent study to investigate how much of an impact single-use CIC had on the environment in the US. His study found that 206 million litres of waste per year could be produced by single-use CIC, or the equivalent of 80 Olympic swimming pools. It's necessary to keep in mind this negative consideration when weighing which technique to choose [16]. Furthermore, due to the elevated expense of disposable catheters, only wealthy countries

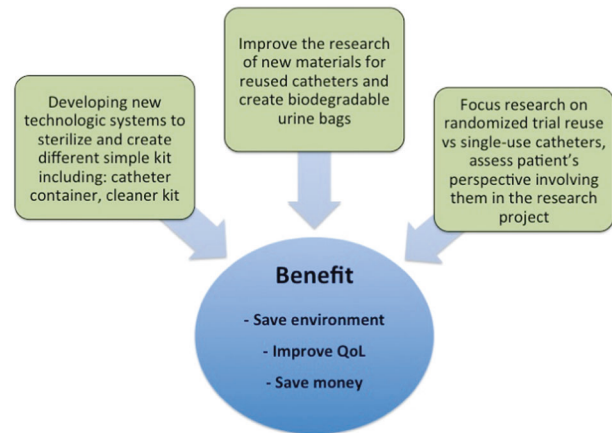


Fig. 1 Improve reusable catheters: possible benefits. Main reasons to focus future research on the development of reusable devices and related potential benefits.

would be able to afford to use them indefinitely [17]. How can we justify this practice when in many undeveloped countries, where resources are severely restricted, catheters are regularly reused long term? Various practices to resterilize catheters, including antiseptic soaks, boiling water and microwave techniques have been reported by Silbar et al. [18]; moreover, a combined antibacterial soap and microwave technique was reported to be effective [19]. A Japanese silicone self-catheter has showed that it could be reused for a long duration [20]. Furthermore, an interesting study demonstrated that submerging a catheter in a 70% alcohol solution for 5 min sterilized it without damaging the quality of materials [21].

In Figure 1 we report benefits and reasons to focus future research on improving reusable catheter devices and their management.

Reusable catheters are not widely used in industrialized countries due to the widespread availability of single-use catheters and patients' concerns. However, currently there are only a few studies that attempt to correlate UTI and reusable versus single-use catheters, and some of these studies do not show a higher risk of UTI in patients using reusable catheters. Future research is needed to thoroughly evaluate the relationship between reusable catheters and UTI. Moreover, the

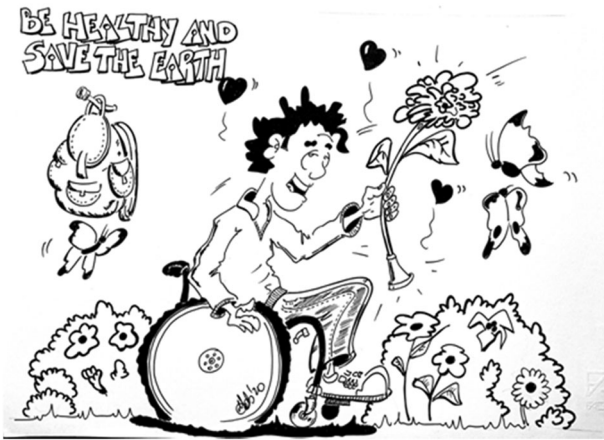


Fig. 2 A patient's future expectations. Fabrizio Torsi president of Associazione Paraplegici Livorno (www.paraplegicilivorno.com) represented his ideal catheter with this drawing.

impact of our decisions about bladder management on the environment and worldwide pollution is no longer negligible, and this aspect of care needs to be addressed. We must evaluate our current practices as we move into the future to help reduce health care costs and environmental pollution. By optimizing advanced technologies, new strategies could be developed to allow patients to manage reusable catheters more easily. Finally, considering what catheter users want, safe reusable catheters with a practical cleaning method were evaluated as an acceptable treatment option in a qualitative study with semi-structured interviews of 39 IC users [8]. Thus, if we can demonstrate the safety of reusable IC, users will view it as a viable solution (Fig. 2). We must consider the possibility of adopting both procedures to create personalized bladder management that meets users daily needs: perhaps, single-use for outdoor activities and reusable for comfortable situations, getting the most out of both techniques. Most importantly, we must put the effort into new clinical trials to push the pendulum back to using less costly, less wasteful, reusable catheters.

Conflict of interest The authors declare that they have no conflict of interest.

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