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The International Continence Society (ICS) survey on intermittent catheterization and global practices with regard to the reuse of catheters

Sanjay Sinha^{a,*}, Rizwan Hamid^b, Emmanuel Jean Chartier-Kastler^c, Giulio Del Popolo^d, Pierre Denys^e, Collette Haslam^f, Jalesh N. Panicker^{g,h}, Kate Sloaneⁱ, Pawan Vasudeva^j, Desiree M.J. Vrijens^k, Emmanuel Braschi^l, On behalf of the Developing world and intermittent catheterization working group of the ICS neuro-urology promotion committee

^a Department of Urology, Apollo Hospital, Hyderabad, India

^b London Spinal Injuries Unit Stanmore & Kings College Hospital, Dubai, United Arab Emirates

^c Chef du service d'urologie, Hôpital Universitaire Pitié-Salpêtrière, AP-HP, Sorbonne Université, France

^d Department of Neurourology, Careggi University Hospital, Florence, Italy

^e Service de Neuro Urologie, Hôpital Raymond Poincaré APHP, 104 bd Raymond Poincaré, 92380 Garches, Université de Versailles Saint Quentin, UMR Inserm 1179, France

^f The National Hospital for Neurology and Neurosurgery, London, United Kingdom

^g Department of Uro Neurology, The National Hospital for Neurology and Neurosurgery, Queen Square, London, United Kingdom

^h UCL Queen Square Institute of Neurology, Faculty of Brain Sciences, University College London, London, United Kingdom

ⁱ Continence Nurse, St Vincent's Hospital, Melbourne, Australia

^j Department of Urology and Renal Transplant, Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi, India

^k Department of Urology, Maastricht University Medical Center, Maastricht, The Netherlands

^l Consultant Neuro-Urologist, Instituto Nacional de Rehabilitación Psicosfísica del Sur Mar del Plata, Argentina

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ABSTRACT

Objective: To survey members of the International Continence Society (ICS) for exploring global differences in practices with regard to intermittent catheterization (IC) and reuse of catheters in the neuro-urological patient. A project of the Neuro-Urology Promotion Committee (NUPC) of the ICS.

Methods: Cross-sectional survey of ICS members using the SurveyMonkey platform. Initial survey preparation, revisions, pilot, and finalization were performed within the NUPC. Opt-in survey emailed to all members by the ICS office. Foundation questions ascertained type of clinical practice, health care system, and country of residence which was stratified by World Bank criteria as 'high-income group, HIG' or 'not high-income group, non-HIG' for analysis. Several questions addressed the reuse of catheters and related practices. Survey results were analyzed using R (version 3.1.3) statistical analysis (p -value <0.05 significant, two-way testing).

Results: 244 out of 1107 members (22.0%) responded. Respondents were from 57 countries including 89 (36.5%) from non-HIG countries. 61.1% respondents were urologists and 62.7% were working at public teaching hospitals. Single-use catheters were prescribed by 113 (46.7%), reuse by 51 (21.1%), and both techniques by 78 (32.2%). Reuse was reported by 38.3% and 76.4% of respondents from HIG and non-HIG countries, respectively. There was marked variation with regard to the frequency of IC, method of cleaning of hands and genitalia, and the method of cleaning and storing catheters. Instruction in IC was most commonly provided by nurses in HIG countries (93.6%) but by urologists in non-HIG countries (66.3%). Reuse was recommended between 2–5 times, 6–10 times, 11–30 times, 31–50 times, 51–90 times, >90 times, and till visible deterioration in 25.0%, 25.8%, 15.8%, 7.5%, 5.0%, 5.0%, and 15.8%, respectively.

Conclusion: Reuse of catheters by patients on IC was not restricted to less affluent countries. There were wide variations in every aspect of the IC protocol. These issues are critical to patients, communities, and the environment and urgently require research.

* Corresponding author.

E-mail addresses: drsanjaysinha@hotmail.com (S. Sinha), hamid_rizwan@hotmail.com (R. Hamid), emmanuel.chartier-kastler@aphp.fr (E.J. Chartier-Kastler), pierre.denys@aphp.fr (P. Denys), collettehaslam@googlemail.com (C. Haslam), kate.sloane@svha.org.au (K. Sloane), drpawanvasudeva@gmail.com (P. Vasudeva), desiree.vrijens@mumc.nl (D.M.J. Vrijens), emmanuelbraschi@yahoo.es (E. Braschi).

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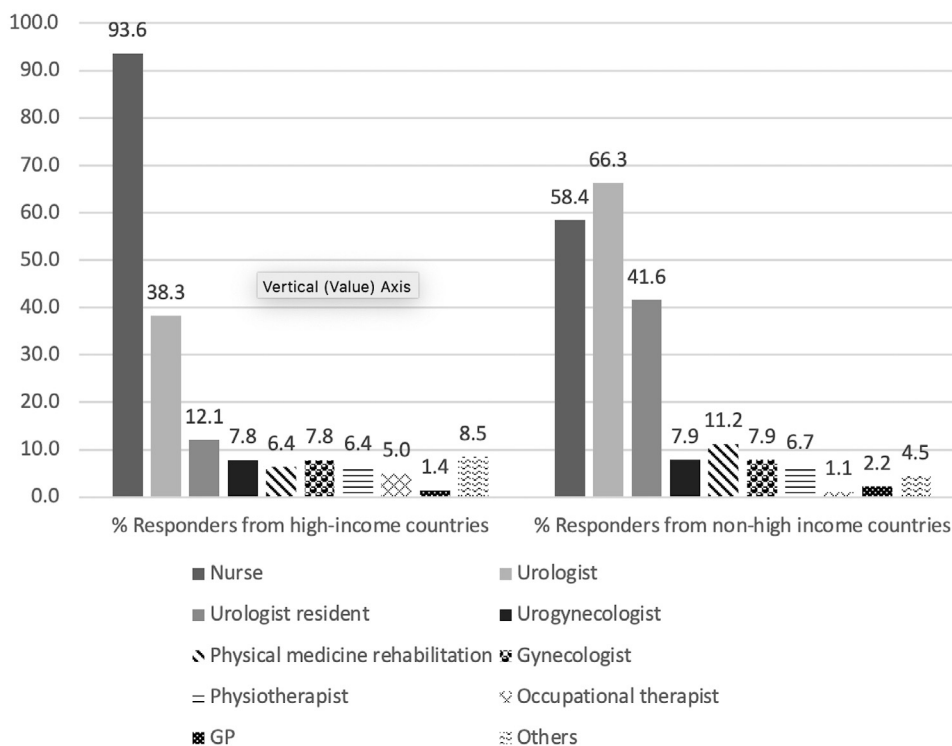


Fig. 1. Who teaches Intermittent Catheterization to the patient?

1. Introduction

Practices with regard to intermittent catheterization (IC) in neuro-urological conditions have significant implications for individual patients as well as the community. Differences in these practices can also have wide-ranging consequences for healthcare economics and the environment. Guidelines developed for affluent nations typically recommend single-use catheters but there is scant evidence with regard to actual practice patterns and global variations in those practices. Knowledge of these patterns as well as the associated health systems could improve our understanding of global care of the neuro-urological patient and in turn direct research into these practices.

This survey of members of the International Continence Society (ICS) was carried out by the Developing World and IC Working Group of the ICS Neuro-urology Promotion Committee (NUPC) with a focus on the reuse of catheters.

2. Materials and methods

A cross-sectional survey of all ICS members was carried out using the SurveyMonkey platform in 2020. The questions to be included were first internally circulated and discussed in the NUPC. Following this, a draft survey was prepared and a pilot was performed among members of the NUPC. Feedback was used to revise and finalize the original draft. The final version was circulated to the entire ICS membership by email with an opt-in for responding to the survey. The survey questions are included in Appendix A.

The survey included questions designed to ascertain the nature of the health care system in which the respondent was working. This included country (stratified by World Bank criteria as ‘high-income groups, HIG’ or ‘not high-income group, non-HIG’ for analysis) [1], profession, practice setting, commonest clinical diagnostic groups, the professional instructing and following the patient, billing system, and reuse policy. Those practicing reuse were further queried regarding their reuse-related practices. This included catheter material, size, typical number of reuses, method recommended for cleaning the genitalia and hands, as well as the cleaning, lubrication, and storage of catheters.

Table 1

Respondents classified by geographical area.

	Country of respondents	Number of respondents
Africa	7 (12%)	9 (4%)
Asia	16 (28%)	57 (25%)
Europe	17 (30%)	68 (30%)
Latin America	11 (20%)	35 (15%)
Oceania	3 (5%)	16 (7%)
North America	3 (5%)	44 (19%)
Unknown		14 (6%)
Total	57	244

Survey results were analyzed using R (version 3.1.3) statistical analysis (*p*-value <0.05 significant, two-way testing).

3. Results

A total of 244 members out of 1107 (22.0%) ICS members responded. Of these, 141 (57.8%) were from HIG countries and 89 (36.5%) were from non-HIG countries (Fig. 1) while information was unavailable for 14 respondents (5.7%). Respondents were more likely to be urologists (149, 61.1%; Table 2) and were most often in a public teaching hospital (151, 62.7%; Table 2). The instructor for teaching IC was most often a doctor in non-HIG countries but a nurse in HIG countries (Table 3). Most respondents were dealing with adult patients only (82, 66.7%). 38 (30.9%) were treating both adults and children while only 3 (2.4%) reported exclusively treating children. 70.4% reported following these patients after initiating IC while 29.2% of respondents would typically refer the patient back to the original referring unit for all subsequent follow-ups. A small number of respondents 6 of 244 (2.4%) reported lack of adequate follow-up in their patients. When asked to choose the two commonest conditions being treated, spinal cord injury, spina bifida, multiple sclerosis and related conditions, other neurological diseases, and non-neurogenic lower urinary tract dysfunction were chosen by 67.8%, 49.6%, 50.4%, 52.1%, and 63.2%, respectively.

Table 2
Profession and practice setting of respondents.

2A Profession of respondents		2B Practice setting of respondents	
Urologist	149 (61.1%)	Public teaching hospital	151 (62.7%)
Nurse, Continece Advisor	34 (13.9%)	Private teaching hospital	43 (17.8%)
Urogynecologist	22 (9.0%)	Private non-teaching hospital	30 (12.5%)
Gynecologist	9 (3.7%)	Individual clinic	25 (10.4%)
Physiatrist	8 (3.3%)	Public non-teaching hospital	17 (7.1%)
Urodynamist	8 (3.3%)	Group practice	16 (6.6%)
Researcher	6 (2.5%)	Non-profit charitable organization	11 (4.6%)
Physiotherapist	5 (2.0%)	Others - please elaborate	10 (4.2%)
Unknown	3 (1.2%)		
Total respondents	244		241

Table 3
Who teaches intermittent catheterization?

Nurse	190 (79.2%)
Urologist	120 (50.0%)
Urologist resident	55 (22.9%)
Urogynecologist	40 (16.7%)
Physical medicine rehabilitation	20 (8.3%)
Gynecologist	19 (7.9%)
Physiotherapist	15 (6.3%)
Occupational therapist	8 (3.3%)
General Practitioner	4 (1.7%)
Others	16 (6.7%)
	240

Table 4
Catheter reuse policy, stratified by country class (n = 230).

	High-income countries	Non-high-income countries
Single use of catheters	87	21
Reuse of catheters	16	31
Both	38	37
Total	141	89

Chi-square statistic is 35.1754. The p-value < 0.00001.

Table 5
Who pays for treatment, stratified by country class (n = 230).

	High-income countries	Non-high-income countries
National health care	73	27
Health insurance, private managed health	38	11
Patient pays	21	48
Others	9	3

Chi-square statistic is 39.885. The p-value < 0.00001.

Single-use catheters were prescribed by 113 (46.7%), reuse of catheters by 51 (21.1%), and both techniques were used by 78 (32.2%) respondents. Those responding from HIG countries were more likely to recommend single-use catheters (87/141; 62%) in contrast to those from non-HIG countries (21/89; 24%) (Table 4) Reuse (either exclusive reuse or both reuse and single-use systems) was reported by 38.3% and 76.4% of respondents from HIG and non-HIG countries, respectively (Table 4). Reuse was advised by 8 of 78 respondents from Europe and by 30 of 53 respondents from North America, Australia, and New Zealand.

Payment for therapy was by a national health care system (103; 42.7%), health insurance or managed health care (50, 20.8%), or was self-funded (75, 31.1%) with a variety of other sources for the remaining respondents (13, 5.4%) (Table 5). Respondents from HIG countries were more likely to be working within a national health care system (Table 5). 14.9% and 53.9% of respondents from HIG and non-HIG countries, respectively, noted that their patients needed to pay for their own treatment.

With regard to the technical aspects of IC, the commonest frequency prescribed was 4-times-a-day (Table 6). The most commonly prescribed

Fig. 2. Techniques recommended for cleaning hands prior to Intermittent Catheterization.

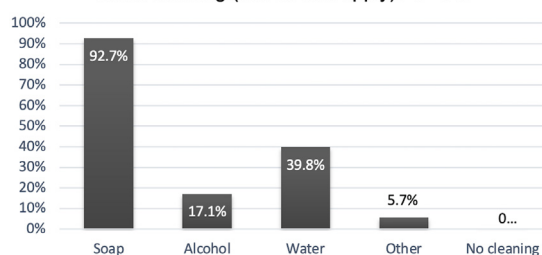


Fig. 3. Technique recommended for cleaning of genitalia prior to Intermittent Catheterization.

Which of the techniques do you recommend for cleaning the genitalia (tick all that apply)? n=123

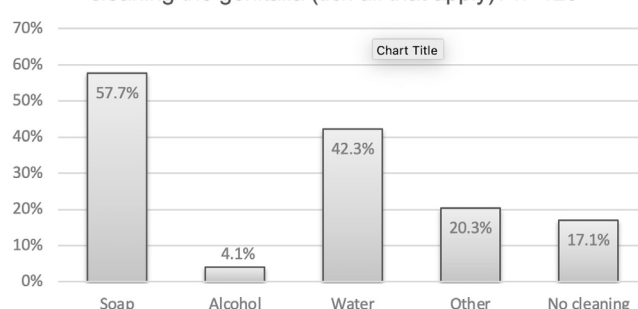


Fig. 3. Technique recommended for cleaning of genitalia prior to Intermittent Catheterization.

caliber of catheter was 14F and 12F for adult men (10F 7.6%, 12F 32.2%, 14F 33.1%, 16F 19.5%) and adult women (10F 9.0%, 12F 41.8%, 14F 38.5%, 16F 8.2%), respectively. Some form of hand cleaning was universally recommended with soap being the most frequently prescribed method (Fig. 2). Cleaning of the genitalia was recommended by 82.9%, with soap or water alone being the two most commonly advised methods (Fig. 3). A variety of different catheters were in use (Table 6). Several different methods of cleaning (Fig. 4) and storage of catheters (Table 6) were reported. Catheters were reused for a widely varying number of times with 15.8% recommending discarding the catheter only on visible deterioration of the catheter material (Fig. 5). Respondents chose a wide range of lubrication methods. The commonest method recommended was use of an anesthetic jelly (59 of 121 respondents, 48.8%) (Fig. 6).

4. Discussion

This survey provides striking new insights into global practices with regard to IC. Reuse was reported by about one-third of respondents from HIG countries and three-quarters from non-HIG countries. The survey also highlighted wide variations in the practice of IC.

Table 6
Instructions with regard to reuse.

6A. Usual frequency of catheterization		6B. Type of catheter recommended		6C. How are patients instructed to store their catheter	
1 time per day	9 (7.3%)	<i>Uncoated catheters</i>		Stored in container after drying	70 (58.3%)
2 times per day	23 (18.7%)	Silicone	55 (45.1%)	Stored by immersing in an antimicrobial	20 (16.7%)
3 times per day	31 (25.2%)	PVC	43 (35.3%)	Stored dry but not kept in any container	12 (10.0%)
4 times per day	72 (58.5%)	Latex	25 (20.5%)	Stored without drying	8 (6.7%)
5 times per day	33 (26.8%)	Rubber	17 (13.9%)	Other method	10 (8.3%)
6 times per day	20 (16.3%)	<i>Coated catheters</i>		Total respondents	122
> 6 times per day	3 (2.4%)	Pre-coated with lubricants	41 (33.6%)		
Total number of respondents	123	Pre-coated with both lubricants and antimicrobials	4 (3.3%)		
		Pre-coated with antimicrobials	3 (2.5%)		
		<i>Others</i>	8 (6.6%)		
		Total respondents	122		

How are your patients instructed to clean their re-used catheters?

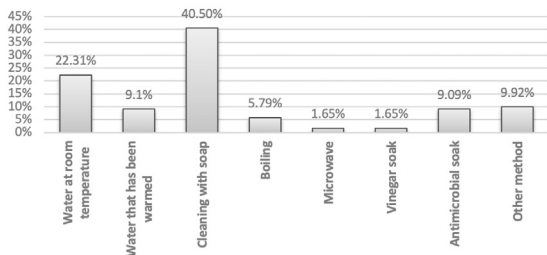


Fig. 4. Technique recommended for cleaning of catheters following Intermittent Catheterization.

Contrary to recent assumptions that reuse is limited to non-HIG countries, a significant number of respondents from Europe and North America in this survey reported reuse [2]. It is unclear whether reuse in HIG countries was owing to a lack of conviction regarding the presumptive benefits of single-use catheters or economic reasons. In a survey of urologists in the New England region of the United States, 17% of respondents advised reuse of catheters. In HIG countries, the availability of insurance coverage can be an important determinant of reuse and other catheterization practices [3]. However, this survey suggests that economic factors might not explain all the observed reuse in HIG countries. While cost has been assumed to be the chief reason behind reuse of catheters, this has not been studied well. A perceived lack of good evidence to show substantial health benefits of single-use, along with economic costs to patients and environmental costs to the community, might play a role.

Concerns with regard to a possible propensity for infection have been paramount when considering reuse. However, a recent Cochrane study found no conclusive difference between clean and aseptic techniques, single-use and reuse, and hydrophilic and non-hydrophilic catheters in terms of infection rate or other complications. Of note, the number of trials and patients within these trials was small for each of the analyses, and the quality of the evidence was low [4]. There have been criticisms with regard to this review [5]. On-going trials might answer some of these questions [2]. The impact of switching from reuse to single-use was studied in a large cohort of spinal injury database patients recruited over 25 years (1995–2020) in the United States. This study, which examined 6843 patients, found that the infection rate did

not improve following the switch to single use. In fact, infection rate was lower prior to the switch (10.6% versus 14.6%, $p < 0.001$) with findings persistent on multivariate logistic regression (OR = 0.67, $p < 0.001$) [6]. Avoiding infection in the early period after initiation of IC can be important for long-term compliance [7].

There was unanimity with regard to the need for cleaning of hands prior to IC among the respondents. However, there was considerable variation in practice pattern with regard to cleaning of genitalia with no cleaning or a simple water wash recommended by over half the respondents. The benefits of meatal cleaning remain uncertain. A recent systematic review found some evidence to support the use of meatal cleaning using antiseptics (chlorhexidine, povidone-iodine) with a possible reduction in infection (OR = 0.65, 95% CI 0.42 to 0.99; $p = 0.047$) [8]. Recommendations with regard to the cleaning of genitalia carry significant implications for some of these patients for whom each additional step in the IC process can be challenging due to neurological, socio-economic, or access limitations. Clean water in public toilets is not universally available in all communities [9].

Somewhat surprisingly, guidelines fail to provide any recommendations with regard to the cleaning of hands or genitalia, which is applicable to all patients performing IC regardless of reuse. Guidelines are also silent with regard to the cleaning of catheters, applicable specifically to those reusing catheters, despite significant evidence of reuse in the (affluent) communities for which those guidelines were written [10,11].

This survey showed extraordinary variation in the options chosen for cleaning catheters for reuse. A recent systematic review examined various cleaning methods and found 12 studies reporting on different methods. The review noted that abrasive methods or heating were associated with deterioration of catheter material. Individual studies in the review suggested that antimicrobial soaks were effective without impacting the integrity of the catheter. The conclusions of this review are limited by the small number of studies and heterogeneity of design [12]. There were also marked variations in the practices for catheter storage. Ideally, the cleaning and storage method needs to strike a balance between efficacy, burden on neurologically compromised individuals, and the availability of materials, including clean water and toilet facilities. Guidelines fail to provide any guidance on cleaning or storage of catheters [10,11]. Marked variations in instruction for IC probably reflect a lack of standardized protocols [13].

There were striking differences in the instructing professional between HIG and non-HIG countries. This was most often carried out by nurses in HIG countries but doctors in non-HIG countries. Training by specialized nurses has been shown to optimize patient uptake and

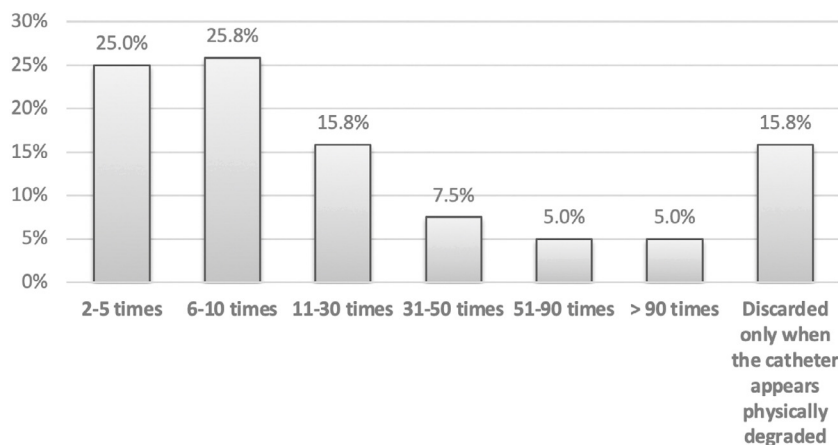


Fig. 5. Recommendation for the number of times one catheter should be used before it is discarded.

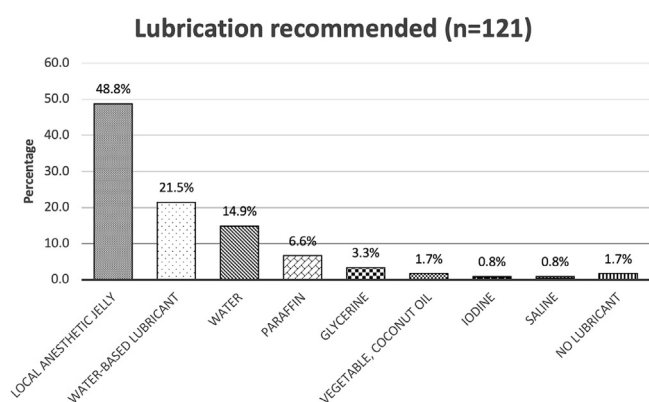


Fig. 6. Lubrication recommended for Intermittent Catheterization.

satisfaction [14]. However, as a survey of urologists in France showed, permanent dedicated nursing staff for teaching IC might not always be available even in HIG countries [15]. Overall, a large number of respondents reported that instruction in IC technique was carried out by doctors. There might be benefits of this policy. It is possible that patients might be more inclined to follow the instructions when given by a medical professional rather than by other health care professionals. Given the reluctance of some patients to initiate therapy, this might be important for compliance with therapy. However, this might also be considered sub-optimal utilization of highly skilled medical professionals for a job that can be handled very effectively by trained nursing or paramedical staff. Increasing the availability of nursing staff trained as IC instructors must be considered a key goal specifically for non-HIG countries. Dedicated staff for teaching IC could be important for ensuring satisfactory outcomes. Lack of such staff might result in sub-optimal uptake of IC with resultant adverse health consequences of long-term indwelling catheters.

Guidelines recommend between four and six catheterizations in a day (optimum five) ensuring that individual catheter volumes do not exceed 400–500 ml on the diary record. Catheter of size 12–16F has been recommended in adults [10]. The survey responses were in line with these recommendations.

Over half the respondents in this survey chose neurological conditions as their commonest class of patient. The underlying diagnosis can influence the likelihood of infections in patients on IC. Patients with neurogenic lower urinary tract dysfunction might be more likely to develop urinary tract infection compared to those with other diagnoses [16]. High-risk neurogenic lower urinary tract dysfunction patients are also more likely to have personal and socio-economic

limitations that could influence the choice of catheter use and IC techniques. Lack of urethral sensation might also have conceivably influenced the choice of lubrication and could account for why only about half the respondents recommended use of a local anesthetic.

The number of reuses recommended before a change of catheter varied widely in this survey ranging from as low as two uses to over ninety, with 15.8% of respondents recommending discarding the catheter only when deterioration of material was visible. Choices with regard to IC can have a profound impact on health care economics as well as the environment. Assuming single use, it has been estimated that a child might require about 160,000 catheters over a lifetime [17]. There appears to be a trend toward increasing usage of intermittent catheterization, especially in the non-neurogenic population. IC rates nearly tripled from 92 per 100,000 to 267 per 100,000 patients in a Netherlands database between 1997 and 2018 [18]. This is coupled with increasing (inflation-adjusted) overall cost as well as cost per user [18]. Aside from economics, all this has profound implications for an environment already burdened by burgeoning plastic waste from the healthcare industry.

There are several limitations to this study. The overall response rate to the survey was low. This survey did not include questions to understand why the respondents chose reuse, a significant shortcoming. Respondents were self-selected introducing a bias into the results. The survey was limited to members of the ICS, which might not reflect community practice. Membership of the ICS is also skewed toward more affluent countries further biasing these results. Of note, this survey addresses recommendations made by each healthcare practitioner and does not examine actual IC data from each respondent.

5. Conclusions

Reuse of catheters by patients on intermittent catheterization is a global practice, not restricted to less affluent countries. Instructions for intermittent catheterization are most often imparted by trained nurses in high-income countries but by doctors in non-high-income countries. Each aspect of reuse remains unstandardized. Research on reuse is urgently needed to address questions that are critical to individual patients, communities, and the environment. The resources available in different countries needs to be taken into consideration. This would enable suitable evidence-based recommendations by guidelines that are currently lacking.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.cont.2023.100597>.

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