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Reusable Intermittent Catheters are Acceptable but Product Innovation is Needed

An Interview Study of Catheter Users' Experiences

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OPEN

ABSTRACT

PURPOSE: The purpose of this study was to explore the experiences of intermittent catheter users after using both reusable and single-use catheters, with a particular focus on factors that affected acceptability.

DESIGN: Qualitative descriptive study following a clinical trial.

PARTICIPANTS AND SETTING: Thirty-six participants who had used both reusable and single-use catheters in a clinical trial were interviewed between June 2022 and March 2024. All were living at home in England or Wales, UK.

METHODS: Participants were invited to interview following one-year's use of a reusable catheter as part of a clinical trial. The reusable catheter was used in combination with their usual single-use catheter. Semi-structured telephone and video interviews were used to enable participants to describe their experiences. Data were analyzed using inductive methods and framework analysis to develop themes and subthemes.

RESULTS: Data analysis identified 4 themes. Successful use of the reusable catheter depended on capacity, confidence and willingness of the individual to adapt. Most people found reuse easier to do at home but there were significant barriers when going out. The design of the catheter used in the trial and the process of reuse did not suit everyone. While there was a desire to continue reuse, this was conditional on the provision of single-use catheters to enable users to mix and match both types in different situations.

CONCLUSIONS: This study presents data from participants who were enthusiastic to try reusable catheters, mainly for environmental reasons, as part of a trial. For most there was a desire to mix and match, combining single use and reusable catheters for different situations. Innovation is needed to create a range of reusable catheter designs and cleaning processes that better meet individual needs.

KEY WORDS: Intermittent catheter, Qualitative research, Reusable catheter, Reuse.

INTRODUCTION

Intermittent catheterization (IC) is the preferred method of management for people with incomplete bladder emptying where no curative treatment is possible.[1] Fifty years ago, a clean technique was used, washing the catheter in between uses and reusing it many times. Over the past 30 years the development of hydrophilic coatings and pre-lubricated catheters has led to the production of single-use catheters, to the exclusion of reusables. These features are designed to aid insertion and convenience and to reduce urinary tract infections (UTI) and urethral trauma. However, as catheters are now packaged and labeled for single use only the option to reuse no longer exists in the UK, so catheter users are unable to exercise their preference for a reusable catheter.

Urinary tract infection remains a high risk for intermittent catheter users[2-4]; however, we searched the literature and found no compelling evidence to suggest the risk is greater for users of reusable catheters than for single-use catheters.[5-7] Furthermore, exploratory research has indicated there may be personal benefits for individuals using reusable catheters, such as avoiding the need to store multiple packs of single-use catheters and to ensure availability when single-use supplies are interrupted.[8] In addition to the personal benefits there is

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widespread public concern over the environmental impact of single-use disposable plastics, with an estimated three-quarters of the adult population in the UK now worried about climate change.[9] The health sector is a major contributor to worldwide waste, of which single-use catheters form a part, yet until recently the green agenda has remained a relatively low priority within the National Health Service (NHS).[10] We know that patients generally wish to be involved in decision-making about their treatment and product choices,[11-14] so the lack of reusable options for IC users merits consideration. However, little is known about the user experience and comparative benefits and drawbacks of single and reusable catheters to inform this debate and some recent studies have identified negative quality of life impacts of changing from single-use catheters to using exclusively reusables.[15] The aim of this study was to explore the experiences of IC users who have used both reusable and single-use catheters within the context of a clinical trial[16] and to identify factors that positively or negatively affected the likelihood of a successful change to reuse.

METHODS

This qualitative study was embedded into a large randomized controlled trial comparing intermittent self-catheterization using single-use catheters with mixed-use of both reusable and single-use catheters. The larger trial recruited 578 participants who normally used a single-use catheter and had resided in England, Wales, and Scotland, over a period of 1 year. Half of the sample were randomly allocated to use a reusable catheter for some or all of their catheterizations each day (the intervention group); the other half (the control group) continued to use their usual single-use catheters only. Invitation was offered by phone, followed by written information and postal written consent.

Sampling for this qualitative study was initially carried out sequentially with all participants invited as they completed the trial (first tranche); this was later amended to targeted sampling, guided by a maximum variation sampling frame[17] to achieve a purposive sample to represent a wide range of age, sex and level of independence (second tranche). Study procedures were reviewed and approved by South Central Hampshire A Research Ethics Committee (UK) Ref.: 19/SC/0334 09.08.2019.

Intervention

The reusable catheter was the Nelaton Cliny catheter (Create Medic Co, Ltd, Yokohama, Japan) provided in sizes from 10 to 16 French Gauge and in 2 standard lengths: 395 mm (15.5 inches) for males and 165 mm (6.5 inches) for females. The main difference between this reusable catheter and standard single-use catheters is that it is made of silicone whereas single-use catheters are usually plastic-based. The reusable catheter required separate lubrication in a similar way to any uncoated/unlubricated single-use catheter. The reusable catheter was cleaned by washing with soap and water then soaking in a chlorine-based cleaning solution in a covered plastic container (we used Milton™ tablets diluted following manufacturer's instructions which gives a dilution of 120 ppm free chlorine), following a method described by Wilks and colleagues.[18] Participants were advised to lubricate the catheter before insertion using a soluble lubricant gel supplied in a multi-use tube.

The mix of reusable and single-use catheters for the intervention group was determined by each participant. At the end of the trial, participants in the intervention arm, who had all used the reusable catheter, were invited to take part in a one-to-one recorded interview.

Study Procedures

Interviews were conducted either by telephone or video by one of two nurse researchers (B.C. and C.M.) experienced in research interviews and the management of intermittent catheters. A semi-structured interview guide was used to explore participants' experience of using and managing the reusable catheter and its impact on their life (Figure 1). Interviews were audio recorded and subsequently transcribed verbatim by a professional transcriber.

Data Analysis

Framework analysis based on a method described by Gale[19] was used to generate themes from the interview data. The first tranche of interview transcripts was uploaded onto a data management software tool (NVivo, release 1.7, QSR International, Burlington, Massachusetts). Following reading and familiarization, data were coded using an inductive approach to develop initial themes and subthemes. These themes were further developed by discussion with the extended research team to form an analytical framework. Areas for additional investigation were identified to further explore specific research questions and the scope of the sample was widened. This was achieved through the second tranche of interviews using the maximum variation sampling frame and an amended topic guide.

The second tranche of interviews was similarly uploaded and coded to the framework and additional codes were added from the data. Further interpretation and team discussions combined findings from both sets of interviews to identify final themes and subthemes. Data collection was stopped when novel topics were no longer generated from the interviews and the aims of the study were achieved.

RESULTS

Thirty-six participants were interviewed; 20 (56%) were male and 16 (44%) were female. Four had withdrawn from using the reusable catheter during the trial but continued in the trial using only single-use catheters. All participants had been using plastic-based, hydrophilic coated/pre-lubricated catheters prior to starting the main trial. Their median age was 71 years (range from 44 to 90). The Barthel Scale was completed in the parent study to identify level of independence with activities of daily living; possible scores for this scale range from 65 to 100; higher scores indicate higher level of independence in activities of daily living.[20] The median score for participants in this study was 95; 15 (42%) were completely independent, 5 (14%) had slight disabilities, and 16 (44%) had moderate disabilities, as defined by Shah and colleagues.[20] The median frequency of intermittent catheterization was between 5 and 6 times per day. To measure socioeconomic status, we used geographic area deprivation scores[20,21] which range from decile 1 (most deprived) to decile 10 (least deprived). These are based on UK postcodes which are equivalent to US or Canadian zip codes. Scores ranged from decile 5 to decile 10 with a median of 8 (Figure 2). The maximum

Mixing both types of catheters
- Tell me how you made use of the option for using either reusable or single-use catheters in certain situations: at home; away from home
- what influenced which one you used when out?

Cleaning & storage
- How did you find cleaning, storing and lubricating the reusable catheters?
- What alternative cleaning methods did you use – if any?

Convenience
- What were the easiest/most convenient aspects of using the reusable catheters?
- What were the more difficult/less convenient aspects of using reusable catheters?

Comparing single-use & reusables
- Were there times when using reusable catheters was impossible and, if so, why?
- Were there times when using reusable catheters was preferable and, if so, why?
- How did your choice of catheter affect carers/family members?

ADDITIONAL TOPICS ADDED FOR TRANCHE 2

The trial experience
- What were you expecting it to be like participating in the trial and using the reusable catheter? How was it different in reality?

Motivation to use or not use reusable catheters
- Would you have liked to continue to use the reusable catheter beyond the end of the trial? (In practice, as you know, this is not possible). All of the time? Some of the time? Not at all?
- Do you think there are any benefits to you personally using the reusable catheter?
- Can you think of any other benefits which don't directly benefit you personally?
- What are the negatives? How do you think the positives & negatives balance out?

Identifying future users
- Having used the reusable catheter yourself, what sort of person do you think would find it easy or difficult to get on with it? What facilities do you think you need to manage the reusable catheter? Space? Time? Privacy?
- How complicated was it?

Overall opinion
- Would you be happy to use exclusively reusables?
- Under what circumstances would you want to use single-use catheters?

Design improvements
- How does the design of the reusable catheter compare with your single-use catheter? Do you have any ideas how the design of the reusable catheters could be improved?
- Can you think of any ways to make the reusable system easier to manage?

Figure 1. Semi-structured interview topic guide.

variation sampling frame was introduced following the first 21 interviews (Table 1).

The mean duration of interviews was 21 minutes (range 9–40 minutes); the length was guided by the participant. Initial coding identified 1083 extracts coded to 23 codes and 193 subcodes which were refined down to 4 overarching themes and 11 subthemes. The final 5 interviews added substance and breadth to existing themes and subthemes but did not introduce any novel topics; therefore, data collection was stopped at this point.

Themes

We identified 4 themes: (1) the characteristics and circumstances of the trial participant, (2) the context of catheter use, (3) the characteristics of the trial catheter and reuse process, and (4) the opportunity to mix and match single-use and reusable catheters (Figure 3; Table 2).

Theme 1: Characteristics and Circumstances of the Trial Participant

Most participants developed sufficient expertise and confidence to enable them to adapt to using the reusable system. For example, although initial instructions suggested the catheter should be dried and lubricated before use, almost all adapted this method and used it wet, directly from the cleaning solution, and many women inserted the catheter wet, without the addition of lubricant.

Cleaning instructions were easily understood, although a small number did cut corners by not refreshing the sanitizing fluid each day, not renewing the catheter after 28 days, or by not cleaning the catheter after use before placing it in the sanitizer fluid. A couple of participants with physical disabilities described problems washing the catheter after use but overall, they managed to adapt successfully, commenting that the reusable catheter was no more difficult to use than a single-use IC. Some participants were initially wary of the effectiveness of the cleaning procedure and subsequent risk of developing a UTI. However, the participants who joined the study did so based on their individual perceived level of risk, which was acceptable to them, but which may not be representative of the wider population.

The reusable catheter required more effort to maintain than a single-use catheter by some individuals, who often endured other burdens associated with illness or disability. For some this was minimal and easily accommodated; others found it

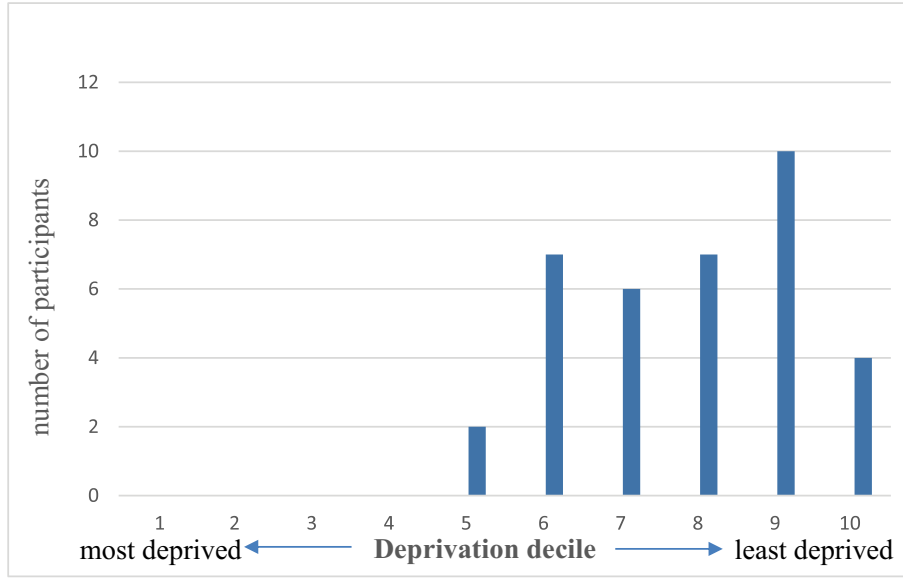

Figure 2. Index of multiple deprivation by geographical area using UK postcodes.[21,22] Scores range from decile 1 (most socially and economically deprived) to decile 10 (least deprived).

inconvenient. It was clear that for some there was a strong drive to make the reusable catheter work despite the additional burden.

Theme 2: Context of Catheter Use

Participants found managing reusable catheters at home was more straightforward than outside the home. At home most people stored the catheter in the bathroom, in its sterilizing solution; this arrangement was particularly acceptable to participants with a private bathroom. The few who shared a bathroom or had limited space experienced more problems, although these users were under-represented in the sample. Several people commented that the reusable catheter and kit took less storage space at home than boxes of single-use catheters. People who catheterized at home just once or twice a day found reusable catheters particularly manageable.

Using the reusable catheter when outside the home was problematic for many participants who described the unpredictability of finding suitable facilities as a major barrier. Very few participants would use a public toilet without additional private handwashing facilities and because of this many did not attempt to venture out with the reusable catheter. The catheter with its carrying tube, plus the tube of lubricant, were considered too bulky for some participants to carry around; others were put off by the planning required before going out, and several did not trust the effectiveness of the cleaning

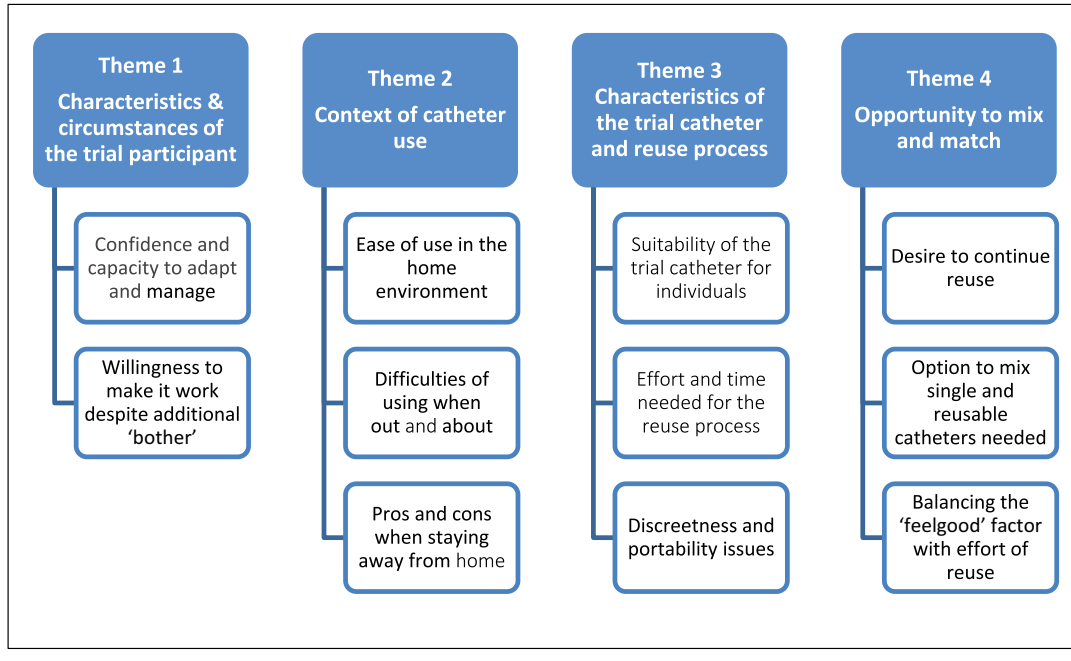

Figure 3. Summary of themes and subthemes: barriers and facilitators to successful reuse.

TABLE 1.
Maximum Variation Sampling Frame

	Barthel Score				
	≤90		>90		
	Male	Female	Male	Female	Total
Age ≤70	4	4	4	4	16
Age >70	4	4	8	4	20
Total	8	8	11	8	36

method away from home. Use at work was seen as a significant barrier for some.

Staying away from home presented practical and privacy challenges for some participants who found the additional time and effort to prepare and manage reusable catheters problematic for trips and visits. Most users found single-use catheters more convenient and preferable when away from home. The exception was for longer periods away from home when some users found advantage in reusable catheters occupying less luggage-space, and there was less chance of running out of catheters while away.

Theme 3: Characteristics of the Trial Catheter and Reuse Process

Participants entered the trial already using their single-use catheter, with which they were very familiar. They were given a silicone reusable catheter to use for the trial, which had no additional design features of the type that may be important to users in their single-use catheter. The absence of an integrated lubricant or insertion aid meant that the catheter required more handling than their usual catheter and this raised concerns for some.

The most profound difference was the flexibility of the reusable catheter. This presented significant problems for many (particularly men) as the "floppiness" sometimes made it difficult to insert.

Though cleaning and preparation of the reusable catheter presented few problems for most participants, some reported that it took longer to prepare. Participants who used significant amounts of lubrication (again particularly men) found cleaning and preparation for reuse messy. The requirement for lubricant influenced the acceptability of the reusable catheter for many individuals.

The difficulties of inserting a catheter that did not entirely suit the individual's needs and the additional time taken by some participants to use the catheter added to the worry of public embarrassment. In addition, the kit required for safe cleaning and lubrication made it quite bulky to take out.

Theme 4: Opportunity to Mix and Match Single-Use and Reusable Catheters

Nearly all participants felt positively toward the concept of reusability, due to the assumed societal benefits of reducing environmental waste and financial cost to the Health Service and would have been keen to continue using the trial catheter beyond the end of the trial, had it been available.

However, most participants wanted to use single-use catheters as well as reusable ones particularly for certain situations, such as when going out, going away for short periods or during the night when single-use catheters were more convenient. Several participants became unwell (unrelated to the trial) and reverted to single-use catheters temporarily. Several reported they would not be willing to use reusables unless single-use catheters were also available.

Most participants believed they were contributing positively to the environment by using a reusable catheter; however, some were conflicted when faced with the practicalities involved and several described feeling "selfish" at their desire to use single-use catheters in some situations. Although they were keen to "do their bit" to reduce the environmental impact of single-use catheters, some stated this was a step too far.

DISCUSSION

To the best of our knowledge, this is the first published study exploring the experiences of people using both reusable and single-use catheters together, enabling them to compare the two types and assess their strengths and weaknesses. Individuals who entered the trial and consented to interview initially felt positively toward the concept of trying a reusable catheter. These findings, therefore, may not reflect the views of the wider population who may be less accepting of reusable catheters.

We identified characteristics of individuals and situations that were most suited to a reusable system. Having the time and space to manage, both physically and mentally, are important. Most of our sample resided in more affluent areas of the UK (Figure 2).[21,22] Most had access to at least 1 private bathroom and this may have contributed to the relative unimportance of storage space and privacy at home. While multiple participants commented that reusables took longer to clean and manage, most were willing to tolerate this inconvenience. Confidence and the ability to adapt were also important in working around new routines, involving planning and self-organization.

The most important difference between single-use and reusable catheters was location of use. When catheterizing in the predictability and privacy of home we identified few problems and individuals were often happy to continue using the reusable system at home. However, most participants chose to use their hydrophilic coated/pre-lubricated single-use catheters when away from home finding them to be more convenient with no additional lubrication or cleaning kit required.

The reusable trial catheter did not suit everyone; for example, some participants found it to be too soft and flexible compared to their usual plastic-based catheter. Participants were also familiar with using hydrophilic coated/pre-lubricated catheters and some found problems with the requirement for separate lubrication. These differences in the reusable catheter design are likely to have affected their overall views about catheter reuse. Different levels of catheter stiffness, more discreet designs and advanced "super-smooth" materials that minimize the need for additional lubricant could help overcome these problems.

Almost all reported at least some inconvenience and, for a few, this added to the burden of a pre-existing long-term health condition. Despite this, many participants expressed a desire to continue using reusable catheters for at least some catheterizations. Such findings indicate that if available, reusable catheters should not be mandated but offered as a choice alongside single-use catheters.

TABLE 2.
Themes with Example Quotes

Subtheme	Example quotes
Theme 1: The Characteristics and Circumstances of the Trial Participant	
Confidence and capacity to adapt and manage	"Initially it was a voyage of discovery in lots of ways -how it would work and also because my husband had to do it with me it was a case of working out how it worked for us. Once we got the idea it was fine. In fact, it was good."
	"The single use one it says whatever you do don't touch the catheter and everything has got to be clean and sterile. That was my only concern at the start."
	"Particularly if I'm tired at the end of the day I found it more of a challenge sometimes to insert. And often I needed both hands to use it whereas the other [single-use] one I don't. Given my mobility problems I usually hang on to a rail when I go to the toilet."
Willingness to make it work despite additional "bother"	"No, it was fine. I mean alright a little bit longer to clean them again and put them back in the solution but then you are washing your hands and everything and you've got all that to do anyway"
	"It's not that dissimilar from the disposable ones except that you have to actually use the lubricant so a bit more preparation and perhaps a bit messier in public loos that don't have a disabled facility. But that's a minor thing"
Theme 2: The Context of Catheter Use	
Ease of use in the home environment	"They don't really take up any space. So, space wise, if I didn't use any disposable ones – yes I'd have probably about three extra shelves empty."
	"I can't see anybody living a normal life in a normal house or flat or whatever with a bathroom and a place to put it – I don't see any problems at all."
Difficulties of using when out and about	"It takes up a lot more space than my single use catheters [when going out] which I just have one in my bag or one in my coat pocket."
	"Anything that made life more difficult I didn't do when I was out."
Pros and cons when staying away from home	"If you are in a hotel you don't want this jug in the middle of nowhere, do you, because anybody coming to clean the room or tidy up the room, what's that? You know what I mean? It's just me being embarrassed I suppose."
	"When I go away for periods I have to fill a suitcase up at the moment. I actually had to send for them when I was in Australia, and it cost me £84 in postage because I didn't have enough with me."
Theme 3: Characteristics of the Trial Catheter and Reuse Process	
Suitability of the trial catheter for individuals	"It's a bit more flexible so it doesn't go through the prostate as easily as a single because you can force the single one through. You have to coax the [reusable catheter] through"
	"[the reusable catheter] was like a bit of spaghetti, cooked spaghetti!"
	"It didn't seem to empty my bladder as well as mine – in that the wee comes out faster when I use mine than when using yours."
Effort and time needed for reuse process	"I think you just feel like your day is taken up with your bladder if you see what I mean. I think to add anything else to that just feels like oh my God my whole life is dominated by my bladder problems!"
	"…and of course there is all the extra lubrication that goes with it which I found to be very messy."
Discreetness and portability issues	"I did not use the reusable one because it was such a fag having to take that blue thing, that blue plastic, the tube that you put them in. I didn't find the tube difficult, but I just found it difficult to carry around"
	"I suppose for women it might work better with a handbag. I do know some people who do carry a bag all the time, men I'm talking about. But I don't."
Theme 4: The Opportunity to Mix and Match Single-Use and Reusable Catheters	
Desire to continue reuse	"I think it's a fantastic idea that there is the possibility that we can have one catheter and save all the plastic that we're throwing away with these disposable catheters"
	"My main thing is that I cost the NHS a lot of money because I have several needs, so there's a cost issue for me where I do try and save the NHS money if I can."
Option to mix single and reusable catheters needed	"If we just went out for the day, I also had the single use with me in case I got stopped somewhere and couldn't get home or whatever, or just needed to use one for instance"
	"If I get up in the night the last thing I want to be doing is fiddling around. I just want to go to the loo and come back and get back in bed."
	"I had a bit of a downward turn in my mental health and then I went back to using the disposable ones for about month"
Balancing the "feelgood" factor with effort of reuse	"It makes me feel better that I'm not using that much plastic. it makes you feel guilty using the single use if you know what I mean?"
	"If I'm honest about it I think I would choose convenience over green intent and I would probably use the single use."
	"I think as a responsible citizen I would have to go for having multi-use as the staple… you have to put up with inconvenience"

The motivation for trying reusable catheters was most commonly the perceived societal benefits of reducing the environmental impact, estimated to be around 85 million pounds of nondegradable waste in the United States per year.[23] In a systematic review of lifetime costs Bermingham[24] found that clean, uncoated catheters were a less expensive option when compared with sterile, single-use catheters and this difference resonated with many participants. By contrast, we found few personal benefits such as those identified by Avery and colleagues.[8] We found few supply issues associated with single-use catheters, and only a small number of individuals taking advantage of the benefits of long-stay travel, suggesting the overwhelming advantages of reusable catheters are less individual and more societal.

Changing from an established single-use catheter to a reusable catheter has been associated with a reduction in health-related quality of life.[8] Similarly, changing from an established reusable catheter to a single-use hydrophilic coated catheter has been associated with an improvement in quality of life.[25] However, neither of these studies examined the "mix and match" approach whereby reusable catheters are used alongside single-use catheters enabling users who wish to use reusable catheters to support their desire to reduce plastic waste and costs, to also benefit from the convenience of single-use catheters. Most participants in this study were content to tolerate any perceived risks of using the reusable catheter, together with the inconvenience of a reusable system in order to pursue their contribution to the green agenda and health care costs.

CONCLUSIONS

Intermittent catheter users who volunteered to test reusable catheters were motivated to do so for environmental and economic reasons. Most wanted to be able to use reusable catheters despite the burden of cleaning and the shortcomings of the tested catheter. Reuse was found to be much easier at home, whereas single-use catheters were found to be more convenient away from home indicating that a "mix and match" approach could offer the benefits of both. The limitations of the tested reusable catheter were not trivial, and widespread adoption of reusable catheters requires product innovation to create a more extensive range of catheters suitable for users' needs.

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