ASSESSING RESEARCH EVIDENCE FOR THE USE OF CATHETER VALVES

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This is the second in a series of articles that will explore and discuss various 'myths' concerning continence practice, in particular those aspects where the basis for practice appears to be predicated on either anecdotal or insufficient evidence, or where there is a lack of consensus within the available literature. Although it is positive to debate different ways of working, such variations in the views of experts can lead to problems when developing evidence-based procedures. This review provides a summary of the evidence relating to the use of catheter valves.

Key Words

Continence
Urinary incontinence
Catheter valves
Best practice

A catheter valve is a small device, similar in many ways to a urine bag drainage tap, which fits into the end of catheter. Catheter valves allow urine to be stored and drained from the bladder without the need for a permanently attached urine drainage bag. The catheter valve must be released at regular intervals to prevent over-distension of the bladder, which can cause urinary tract infection or dilation of the upper renal tract (Lapides et al, 1972).

Patients can use a catheter valve constantly over a 24-hour period and most can last through the night without emptying their bladders. However, for some, attaching a night bag may have benefits and the valve can be left to drain freely into a night bag. The cost of a catheter valve is between £2.19 and £2.59 (Department of Health, National Assembly for Wales, 2007), thus they do not present a significant cost difference to the use of a leg bag drainage system.

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Catheter valves are suitable for individuals who:

- Have good manual dexterity
- Have adequate sensation of bladder fullness
- Have cognitive awareness
- Have adequate bladder capacity.

Catheter valves can be used in both male and female patients who have indwelling urethral or suprapubic Foley catheters and can be fitted to both short and long-term catheters (Addison 1999). There are many advantages associated with the use of catheter valves including:

- Reduction of catheter associated urinary tract infections (CAUTIs) due to the 'flushing' effect of urine leaving the bladder when the valve is released (Doherty, 1999; Addison and Rigby, 1998; Fader et al, 1997)
- Maintenance of bladder tone and bladder capacity as the bladder may fill and empty in a more 'normal' way (Addison and Rigby, 1998; Fader et al, 1997)
- Improvement to patient's quality of life as catheter valves are more discreet than a leg bag, especially under swim wear (German et al, 1997; Fader et al, 1997, Addison, 1999). Also, when using a catheter valve with a urethral catheter, men can continue to stand up when emptying their bladders (Rowley et al, 1995)
- The reduction of trauma to the bladder wall and urethra through the intermittent lifting of the bladder wall from the catheter when the bladder fills. Bladder neck traction may also be prevented as the weight of the leg bag is not hanging from the catheter (Doherty, 1999).

The literature

Catheter valves have been used in clinical practice since 1986. However, despite the literature cited above, a systematic review of data (using CINAHL, Cochrane library, Medline, Google, Scholar and hand searches) revealed a paucity of research-based literature to support the physiological and microbiological benefits of catheter valves.

It is well recognised that CAUTIs are a significant problem for those in hospital or care homes, representing the most common incidence of healthcare associated infections (HAIs) in these areas (Plowman et al, 1999). The highest risk for CAUTIs in hospitals is prolonged catheterisation, and studies

suggest that by day 30 of an inpatient stay a CAUTI is almost inevitable in some groups (Maki and Tambyah, 2001).

So can catheter valves help in the prevention of CAUTI? Interestingly, neither the National Institute for Health and Clinical Excellence (NICE) (2003) guidelines on infection control or the epic2guidelines (2007) on preventing HAIs in the NHS make any reference to the use of catheter valves. Both of these guidelines are based on systematic reviews of the available research, therefore, the omission of catheter valves suggest there is little evidence to support their use in reducing CAUTI.

Wilson et al (1997) conducted a prospective randomised study with a sample consisting of 84 male and 16 female participants. The researchers found no statistical evidence that the incidence of CAUTIs was reduced in those patients using catheter valves.

A later systematic review of the research on the evidence of catheter valves in reducing bladder spasm or CAUTIs demonstrated no statistical difference, but did reveal a statistically significant patient preference and satisfaction towards catheter valves (Van den Eijkel and Griffiths, 2006).

Petterson and Fader (1997) suggest that infection and catheter blockage often co-exist and that the flushing action of catheter valves can reduce blockage. To test this hypothesis, the School of Biosciences at Cardiff University tested whether the valve-regulated intermittent flow of urine from a catheterised bladder decreases catheter encrustation. The results demonstrated that catheters fitted with valves took significantly longer to become blocked than those on continuous drainage (Sabbuba et al, 2005).

Electron microscopic scanning of the catheters confirmed that crystalline biofilm was less extensive on the valve regulated catheters. These results are significant but need to be reviewed with the knowledge that most common cause of catheter encrustation is the colonisation of gram-negative urease-producing bacteria, in particular *Proteus mirabilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and the *Klebsiella* species, whereas colonisation of gram-positive bacteria is the commonest cause of most CAUTI.

German et al (1997) in a small randomised crossover trial of 22 male patients demonstrated that male patients prefer to use a catheter valve instead of a leg bag, finding it more comfortable and discreet. Participants commented that the use of catheter valves prevented the sensation of urine 'sloshing about' in a leg bag. However,

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the preference could have been because the study only recruited ambulant subjects – those patients with limited mobility may not have demonstrated the same preference.

Fader et al (1997) and German et al (1997) both conclude that the ideal management strategy would be for patients to have a catheter valve during the day and a leg bag at night, especially in patients who are troubled by nocturnal polyuria. Fader et al (1997) conducted a multicentred comparative evaluation of available catheter valves. The results confirmed that the performance and cost of these products varied considerably, suggesting that those who prescribe catheter valves need to be aware of the strengths and limitations of the different valves available. The study identifies four criteria for a successful catheter valve:

- Ease of manipulation
- Leak free
- Comfortable
- Inconspicuous.

Female patients

The available research on the advantages of catheter valves is limited but it appears that male patients find them comfortable and discreet. There is little data on females and the use of catheter valves. This probably reflects the dominance of male subjects in the trials who tend to have outflow obstruction due to prostatic disease.

Assessment

Whether prescribing a catheter valve for men or women there are certain assessment criteria that need to be taken into account. Users must have sound cognitive ability as they have to remember when to release the valve in order to avoid over-distending the bladder. Users also need to have the necessary manual dexterity to be able to manipulate the valve. A competent carer can help with this task, although there are a wide range of catheter valves on the market with different release mechanisms and careful assessment should identify the most suitable valve for these patients.

Assessment of bladder capacity also needs to be undertaken as a small bladder capacity would require frequent release of the valve. A catheter valve would be inappropriate for those with uncontrolled detrusor overactivity, ureteric reflux or renal impairment (Fader et al 1997).

Kristiansen et al (1983) note that after six months of continual drainage the bladder shrinks and capacity can be lost. However, it has been suggested that the use of catheter valves can help maintain bladder function, capacity and tone (Doherty, 1999). Some stroke rehabilitation units in the UK have instigated the use of catheter valves in an attempt to maintain bladder capacity following urethral catheterisation. However, a Cochrane review on the effects of interventions designed to promote continence in patients after a stroke suggests there is little evidence from stroke-specific studies to guide practice (Hankey et al, 2006). Seven trials were included in the review but none of these used catheter valves, leading the researchers to state that further trials using catheter valves were needed.

Tissue damage to the urethral and bladder mucosa can also occur due to indwelling catheterisation. Damage

occurs as a result of trauma as the catheter is a foreign body that has the potential to cause inflammation. This can result from the bladder lining 'sucking' into the catheter eyelets (Roe, 1996), the catheter tip pressing on the bladder lining or heavy, unsupported drainage bags causing pressure sores and necrosis (Nazarko, 2007). The use of catheter valves to mimic the normal emptying and filling of the bladder may reduce the risk of tissue damage by allowing the bladder wall to periodically lift away from the catheter. However, there is no research evidence to support this theory and practice is based entirely on expert opinion.

Conclusion

The NHS has adopted the principles of evidence-based practice in order to prevent patients receiving treatment based on the unproven opinions of individual clinicians. The sheer volume of available literature on evidence-based practice illustrates this point. Evidence can be presented in many forms and is usually ranked according to credibility. The hierarchy of evidence is discussed in the first part of this series (Bardsley and Kyle, 2007).

The evidence for catheter valves presented here is mainly taken from non-experimental studies and the opinions of expert clinicians. However, research does demonstrate that patients prefer to use a catheter valve rather than a leg bag drainage system. Hek (2000) states there are three components to evidence-based practice:

- Patients' and carers' views
- The expertise of the practitioner
- Best available evidence.

It appears from the evidence presented here that the use of catheter valves meets the first two of the above components. However, it is also clear that further research is required to support practitioners' and patients' views on the physiological benefits of catheter valves. This is especially necessary as the use of catheter valves as an alternative to traditional leg bag drainage systems is growing in popularity due to the potential long-term benefits to the bladder.

It is important when deciding whether or not to use a catheter valve to consider the contraindications alongside any potential benefits. Patients should be provided with choice, in order to ensure independence, comfort and dignity. CUK

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Key Points

- A catheter valve is a small device, similar in many ways to a urine bag drainage tap, which fits into the end of catheter.
- Catheter valves can be used in both male and female patients who have indwelling urethral or suprapubic Foley catheters and can be fitted to both short and long-term catheters.
- The evidence for catheter valves presented here is mainly taken from non-experimental studies and the opinions of expert clinicians.
- It is important when deciding whether or not to use a catheter valve to consider the contraindications alongside any potential benefits.

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