

## **Title**

Catheter valves: are they useful in supporting patients in a trial without catheter (TWOC)?

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## **Abstract**

A trial without catheter (TWOC) is a common urological procedure undertaken to remove an indwelling urinary catheter when no longer clinically indicated. An appropriately trained practitioner should undertake a TWOC in a controlled environment to ensure a further

urinary retention does not occur. Indwelling urinary catheters are commonly used with a free drainage system such as a leg bag, which continually empties the bladder. This article examines the potential benefits of utilising a catheter valve as an alternative to free drainage, prior to undertaking a TWOC, to optimise clinical outcomes and patient experience. This article will guide nurses to increase their knowledge of catheter valves to promote person-centred informed decision making.

## **Acknowledgments**

None

## **Conflict of interest statement**

None

## **Catheter valves: are they useful in supporting patients in a trial without catheter (TWOC)?**

### **Introduction**

A urinary catheter is a common urological intervention for the management of bladder drainage (Woodward 2013). These must be changed frequently and are prone to issues such as blockages, bypassing and infections, which require further intervention by health care professionals (Dean & Ostaszewicz 2019). It is estimated that around 90,000 adults in England are living at home with a urinary catheter in situ. However, for most people, this is an acute, short-term intervention, with evidence suggesting that 72.9% of catheterised patients are likely to have their catheter in situ for less than 28 days compared to 22.2% needing a longer-term catheter (Shackley et al. 2017).

Urinary catheters are a prevalent burden to the health care setting, utilising many hospital and community resources (Nazarko 2020). Alongside the impact on valuable resources, urinary catheters also pose risks to patients, namely an increased risk of infection, trauma to the urethra and external genitals, skin breakdown and damage, and a loss of bladder tone and muscle (Gyesi-Appiah et al. 2020). It is well documented that the length of time a catheter is in situ has a direct correlation with the rates of catheter-acquired urinary tract infections (CAUTI) with around 75% of urinary tract infections thought to be secondary to an indwelling catheter (Leontie 2021; Royal College of Nursing 2021, Public Health England 2017). The estimated annual cost to the NHS to treat a CAUTI is estimated to be around 99 million per annum (Waskiewicz et al. 2019).

A urinary catheter should be removed when it is no longer clinically necessary. Pajerski et al. (2022) state that a plan should be made for timely removal, this is often referred to as a trial

without catheter or a TWOC. The success of a TWOC depends on several factors, one of which is the retention of bladder tone and muscle. A catheter valve may help retain these and in doing so improve the chances of a successful TWOC outcome (Wilson et al. 1997). However, catheter valves do have both benefits and limitations. The nurse should ensure they understand these to empower patients to make decisions about their treatment and care, so they can choose which drainage system suits them based on their individual needs (NMC 2018).

## Indications for Urinary Catheterisation

Typically, urinary catheterisation is used to manage retention, but it is important to note that patients may also require catheterisation for a variety of other reasons (Royal College of Nursing 2021). Common indications for catheterisation can be found in table 1.

<b>Table 1: Indications for urinary catheterisation</b>	
<b>Indication</b>	<b>Rationale</b>
Retention	Acute: To relieve an acute episode  Chronic: To relieve a symptomatic retention or one with associated renal damage
Acute illness	To accurately monitor renal function
Surgery	During and post-surgery
To preserve skin integrity	To preserve skin integrity when conservative measures have failed
Bladder irrigation/lavage	To allow bladder irrigation/lavage to be undertaken
Bladder instillations	To deliver bladder treatments such as intravesical chemotherapy
Specimen collection	To obtain a sterile urine specimen

Bladder function tests	To undertake bladder function tests such as urodynamic studies
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(Royal College of Nursing 2021)

National Institute for Health and Care Excellence (2015) state that intermittent self-catheterisation (ISC) is the preferred method of bladder drainage, although it is important to note that it will not be suitable for all patients. Inserting the catheter requires a dexterity, and the patient needs to understand the importance of emptying their bladder regularly to prevent harm to the urinary and renal systems (Balhi and Arfaoui 2021). Because ISC must be carried out at regular intervals, it is not usually workable for those unable to carry this out independently. Patients can also be unwilling to perform this invasive procedure themselves (Payne 2021). If the patient is unwilling or unable to perform ISC, an indwelling urinary catheter would be used as an alternative. At the point a catheter is inserted, this is usually left on free drainage using a leg bag system. However, this causes the detrusor muscles to relax, and this inactivity can cause a loss of muscle tone in the bladder (Woodward 2013). If a catheter valve is used instead this can help keep muscle tone in the bladder.

### Assessing removal

Patients with an indwelling urinary catheter require a management plan to ensure it is removed when no longer required (Schweiger et al. 2020). This plan will vary based on the patient's condition, reason for initial insertion, and if there are any appropriate interventions which need to be undertaken prior to its removal (Holroyd 2020). To help with this decision, the HOUDINI checklist can be used (Yatim et al. 2016).

Trovillion et al. (2011) developed the HOUDINI checklist, which is an evidence-based protocol for the assessment and timely removal of urinary catheters (see table 2). This checklist can prevent unnecessary catheter use as well as reduce the incidence of CAUTI (Adams et al. 2012; Ballard 2018). If any of the HOUDINI acronyms are present, it would indicate to the nurse that the catheter is still required (Dawson et al. 2017). This prompts the nurse to think critically about their patient's needs, continually assess their condition, and make plans for removal if required. If none of the HOUDINI acronyms are present, then a plan should be made for a TWOC.

<b>Table 2: HOUDINI Checklist</b>	
H	Haematuria (Frank, visible)
O	Obstruction (Urinary obstruction)
U	Urological surgery
D	Decubitus ulcer (Sacral or perineal wound)
I	Input/output monitoring
N	Not for resuscitation/end of life care
I	Immobility

(Adams et al. 2012)

## TWOCs and Catheter Valves

Once a urinary catheter is no longer indicated, a plan for a TWOC should be made. TWOCs often fail when a catheter is removed, and retention of urine occurs. The patient must be monitored appropriately during a TWOC as an unresolved urinary retention is a clinical emergency (Holroyd 2020; Cheekooree et al. 2021). Once the catheter is removed, the patient is monitored for several hours to ensure they can pass urine normally. A bladder scan is typically undertaken to confirm that the patient is fully voiding their bladder (Royal

College of Nursing 2021). If the patient cannot void their bladder successfully, they would require re-catheterisation, or they may need to be taught how to do ISC (Payne 2021).

There is little available data on how many catheters are removed without retention issues, however it is estimated that around 60% of TWOC are unsuccessful after an acute retention (Fitzpatrick et al. 2012). Patients may need to have further attempts to remove the catheter or require long-term catheterisation (Bansal & Arora 2017). A TWOC, if done properly, is time and resource intensive, requiring either multiple visits from a community nurse, or spending several hours in hospital. These are costly to the NHS and may be inconvenient for patients (Holroyd 2020). It is therefore important to look at potential interventions to raise the success rate of TWOCs to minimise these disruptions to patients and to release the burden on health care providers.

One intervention that might raise the success rate of TWOCs are catheter valves. They offer a discrete alternative to a leg bag and allow the patient to live an otherwise normal life (Woodward 2013). Carr (2019) states that the bladder needs to be emptied every 3-4 hours, which mimics a typical voiding pattern. There are also further physical benefits to the use of catheter valves. They may reduce trauma to the external genitals and urethra, as a leg bag can become full and heavy, pulling on the catheter tube (Tremayne 2020). A catheter valve is lighter, which also prevents trauma to the bladder neck. A catheter valve allows the bladder to fill with urine, which lifts the internal balloon off the bladder wall, reducing friction and damage (Simpson 2017). Holroyd, 2019 have suggested that using a catheter valve may also help reduce blockages because of the intermittent flushing of the catheter with urine. However, there is no evidence to show they reduce CAUTI (van den Eijkel & Griffiths 2006).

When a urinary catheter with free drainage is removed for a TWOC, the bladder often cannot return to its pre-catheterisation function, and inevitably retention occurs (Royal College of Nursing 2021). Kristiansen et al. (1983) has suggested that after 6 months with an indwelling catheter on free drainage, the bladder no longer functions normally, and the detrusor muscles no longer contract because of under use. This suggestion was further investigated by Wilson et al. (1997) in a randomised control trial, which showed an 83% success TWOC rate with a catheter valve when compared to 60% success rate using a free drainage system. This suggests that the theory posed by Kristiansen et al. (1983) which showed the rapid decline of bladder tone and function whilst a catheter using free drainage is in situ is likely the reason Wilson et al. (1997) found a significant improvement in TWOC outcomes when using a catheter valve prior to removal. It is important to note that the findings of both studies have not been repeated in the last decade. However, the process and rationale behind a TWOC has not changed since this data was collected (Holroyd 2021). There are no new interventions or methods suggested when undertaking a TWOC and therefore the evidence is still arguably relevant to modern practice, but it should be used cautiously. Catheter valves have the potential to improve TWOC outcomes and overall patient satisfaction (Holroyd 2021).

### **Other benefits of catheter valves**

At a time where the NHS is under significant financial pressure, it is also important to note that catheter valves are also a cheaper alternative to a leg bag, although this should not take priority over patient choice (Gibney 2010; NHS Business Services Authority 2019).

Those caring for, and involved in, clinical decision making for these patients should explain the advantages and disadvantages of both systems (Carr 2019). This conversation should



ideally take place prior to insertion of the urinary catheter, but sometimes there is no opportunity to do this, for example with an acute urinary retention. Using a catheter valve as a viable alternative to a free drainage system can be discussed with a patient at any time, but particularly when planning for a TWOC. Gibney (2010) states that this would allow patients to make an informed decision over whether they want to use a catheter valve or a free drainage system. This should be a patient-led decision, made with the knowledge and experience of practitioners to guide patients through this choice (Andreou 2021). Ultimately the patient should be at the centre of decision making when considering a TWOC and a catheter valve.

Alongside the clinical benefits, it is important to recognise and counsel patients on the psychological and psychosocial benefits of using a catheter valve (Wilson 2015). They are shorter and therefore more discrete than a traditional leg bag and patients prefer a catheter valve for this reason (Woodward 2013). Holroyd (2021) explains that using catheter valves may also help with a patient's sexual identity and activity. A qualitative study by Baker-Green (2017) suggested that nurses felt ill-equipped to discuss sexual identity and activity in patients with a urinary catheter. Potential reasons for this were cited as a lack of education and knowledge, embarrassment of the practitioner, and a fear of embarrassing the patient. Despite this, catheters can affect a patient's sexual identity, sexual activity, and their body confidence. Sexuality is an integral human need, and its importance should not be overlooked (Åling et al. 2021). It is therefore wholly appropriate that nurses support patients by discussing this important aspect of daily living by providing both practical and emotional support.

Using catheter valves could also successfully complement other clinical interventions prior to a TWOC. Some interventions to improve TWOC outcomes, such as medication, often require long periods of time to take full effect (Fisher et al. 2014; Joint Formulary Committee 2022). Patients can become unhappy and frustrated with their indwelling catheter and may request their TWOC takes place sooner, not allowing for the full effectiveness of the intervention to take place (Son et al. 2013; Vlotman-Novinuk 2019). This could cause another failed TWOC. The psychological benefits of a catheter valve may help patients during this waiting period, allowing them to regain control over their condition and wait until their TWOC outcome could be improved (Son et al. 2013; Vlotman-Novinuk 2019). Chadwick & Murphy (2019) support the view that patient-focused critical thinking is an important demonstration of how nurses can use a variety of approaches to get the best outcomes for their patients.

### **Limitations to catheter valves**

Despite the obvious advantages when using a catheter valve, there are also some limitations that should be considered. There are certain patients and situations where the use of a catheter valve would not be appropriate. For example, patients with impaired renal function or those post-bladder or prostate surgery should have continuous drainage of urine to prevent the bladder exerting pressure on the kidneys (Virdi & Hendry, 2016).

Carr (2019) explains that patients with poor manual dexterity may not be able to manipulate the valve mechanism. However, catheter valves operate using a mechanism similar to a leg bag. If the patient can empty a leg bag either independently or with assistance, then a catheter valve should be considered (Virdi and Henry 2016). However,

despite the mechanism to empty the bag/valve being similar, a valve drainage system will need to be emptied more frequently than a free drainage system (Yates 2017). For those unable to do this independently, this may not be a suitable option.

Reid et al. (2021) describes certain patients where a catheter valve may be contraindicated. Those with uncontrolled detrusor overactivity, ureteric reflux or renal impairment due to the potential for further harm. Post-surgical patients may have reduced consciousness and/or mobility meaning a catheter valve would not be an appropriate intervention. Further to that, post urological surgery patients are also at risk of bladder perforation or rupture if the bladder is not continually emptied (Yates 2017). Patients with a small bladder capacity are also typically not recommended to use a catheter valve. The catheter valve would need to be opened often as the bladder is unable to hold significant volumes of urine which may be bothersome to those patients (Carr 2019). However, it is important not to discount the use of a catheter valve purely because of the limitations, the patient should have the right to choose and be supported in this choice wherever possible (Gibney 2010, NMC 2018).

A summary of the potential benefits and limitations of catheter valves can be found in table 3.

<b>Table 3: Summary of potential catheter valve benefits and limitations</b>	
Benefits:	<ul style="list-style-type: none"> <li>• Potential for improved TWOC outcomes</li> <li>• More discrete than a leg bag</li> <li>• Reduced bladder neck trauma</li> <li>• Reduced risk of blockages</li> <li>• Maintaining independence</li> </ul>
Limitations:	<ul style="list-style-type: none"> <li>• Require frequent emptying</li> <li>• Unsuitable for certain groups of patients such as: <ul style="list-style-type: none"> <li>○ Those with impaired renal function or those at risk of renal damage (such as ureteric reflux)</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Those with dexterity issues or those who cannot access frequent help to open the valve</li> <li>○ Post-surgery</li> <li>○ Uncontrolled detrusor overactivity</li> <li>○ Small bladder capacity because of the need to empty more frequently</li> </ul>
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(Woodward 2013; Yates 2017)

## Recommendations for practice

- Utilise the HOUDINI checklist to ensure catheters are removed when no longer required.
- Provide staff and patient education on the use of catheter valves as an alternative to a free drainage system.
- Recognise the benefits and limitations of catheter valves.
- Consider the use of catheter valve prior to a TWOC.
- Ensure a holistic assessment takes place to support patient-centred decision making.
- Promote use of catheter valves and advocate for these where appropriate.

## Conclusion

In conclusion, it can be suggested that the outcome of a TWOC could be improved with the addition of a catheter valve to replace the tradition leg bag. When TWOC outcomes are considered in conjunction with the other benefits of a catheter valve, this change to practise could have a profound impact on not only clinical outcomes but also patient satisfaction and experience. The decision to use a catheter valve as an intervention to improve TWOC outcomes is complex and requires both a thorough understanding of the current research and comprehensive patient assessment skills to make an informed decision. The

combination of clinical and patient focused outcomes demonstrates a holistic patient focused view, allowing practitioners to make appropriate clinical decisions in the best interest of their patients. The benefits and limitations should be explained to patients to allow them to make an informed decision, but the nurse should have the requisite knowledge of catheter valves and TWOC to do this. There is a need for future research in relation to the benefits of catheter valves in improving TWOC outcomes. This would provide high-quality evidence to further inform nursing practice. Despite the limitations around catheter valve evidence for clinical TWOC outcomes, it is still important to recognise the additional benefits catheter valves offer. Catheter valves can substantially improve patients' quality of life if used correctly.

## Keywords

Catheter valve, TWOC, trial without catheter, urinary catheter, catheter removal, patient-centred decision making

## Key points

- Catheter valves can be used as a viable alternative to a free drainage system.
- There are benefits and limitations to the use of a catheter valve.
- A catheter valve has the potential to improve TWOC outcomes.
- Holistic assessment of the patients' needs is central to decision making around catheter valves.
- Catheter valves can lead to increased patient satisfaction and improved sexual identity.

## Reflective questions

- Do you feel you have the knowledge and skills to holistically assess a patient's catheter drainage needs?
- Do you feel confident in your knowledge about catheter valves to promote person-centred informed decision making?
- Are there instances in your practice where you could promote the use of catheter valves?
- Do you work in an area where you could consider implementing catheter valves as a pre-TWOC intervention?

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