

A Critical Review of Indwelling Catheter Care in Acute Practice Settings

Yeung Siu Ming

1. Introduction

Among the Nursing Interventions Classification (NIC) 433 items (Dochterman & Bulechek, 2004), urinary catheterization was identified in the top list of interventions in general acute hospitals. While calculating the quantity of patients with indwelling catheter care, they are used in 15%~25% of all hospital patients (Anonymous, 2000). As for a preliminary survey of the number of in-patients having urethral catheter in one general hospital of Hong Kong during the period of 10/2001~11/2001, it was estimated to have about 9.1%.

After a general searching in CINAHL, Medline, the Cochrane Library and some national websites, we found that each domain of clinical practice was associated with research-based investigations and summarized with guidelines and protocols. When considering catheterization as a high volume nursing intervention in acute setting, many decisions need to be made to select the optimum equipment and provide effective catheter care (Promfret, 1996). We would like to revisit four nursing interventions within urethral catheter care. It included the selection of the types of catheterization, i.e. intermittent or indwelling, appropriateness of catheter (size and balloon infill volume), management for complications and the practice of clamping catheter.

In the critical review process in the later part of the paper, 16 nurses from different ranks and different clinical settings of one general hospital, were invited to share their tacit knowledge and practicing experience regarding to the above four nursing interventions. It would be a real exploration on whether nurses were anchoring their urinary catheter management practice on unquestioned tradition rather than sounded professional and evidence-based knowledge. It was also a good comparison between theories and practices that led to suggestion of research areas. Such that, research based practice should be the goal for all nursing interventions.

Author address: Kiang Wu Nursing College of Macau

2. Critical Review of Four Nursing Interventions in Urethral Catheter Care

2.1 Selection of the types of catheterization

There are two types of catheterization commonly practised in clinical settings: intermittent and indwelling. The decision to catheterize, or be catheterized, should only be taken after full consideration of the implications of the procedure and its potential risk of complications (Promfret, 1996; Piloni et al., 2005).

Indwelling urethral catheter (IDC) is part of a disposable system consisting of catheter, tubing and drainage bag. The best-known indwelling catheter is the Foley catheter. It is a self-retaining, flexible latex tube that is retained in the bladder by means of a balloon. However, urinary tract infections are the most common problem associated with the use of IDC. As reported in the systemic review of urinary catheter policies, it reported that urinary tract infections accounted for 40% of hospital acquired infections, and about 80% of those were associated with IDC (Niel-Weise & Van de Broek, 2005). Also, other potential complications included urethritis, urethral strictures, haematuria, bladder perforation and encrustation of the catheter leading to blockage of the urine flow (Anonymous, 2000). Although not all catheter-associated urinary tract infections can be prevented, it is believed that large number of complications could be avoided by the proper management of the indwelling catheter. One of the important infection control measures is to limit the use of indwelling catheters to carefully selected patients, thereby reducing the size of the population at risk. Other efforts include aseptic catheter insertion, daily meatal cleansing and maintenance of a closed urinary drainage system (Wong et al., 2001).

Intermittent catheterization (ISC) was claimed to be an alternative device to diminish the problem of UTI, which was first pioneered in the early 1970's. It is an act of passing a catheter into a poorly functioning

bladder via the urethra in order to drain urine and the catheter will subsequently be removed. The technique is a way of reducing bladder symptoms resulting from accumulating urine, which cannot be eliminated naturally (Doherty, 1999). ISC can be performed by the patient or caregiver using sterile or clean catheter to provide intermittent routine bladder emptying. It can also be a short- or long-term intervention (Winn & Thompson, 1998). Patients for whom ISC may be suitable include those with a neurogenic bladder, a hypotonic bladder and overflow incontinence due to obstruction (Winder, 1992; Pilloni et al., 2005).

Intermittent catheterization contained several advantages over indwelling urethral catheterization:

- Urinary tract complications are minimized (Bakke et al., 1997; Perrouin et al., 1995)
- There were fewer upper urinary tract problems such as hydronephritis due to urine reflux (Wyndalle & Maes, 1990).
- A high degree of patient satisfaction reported by the technique's users within the context of safety and effectiveness (including cost-effectiveness) (Moore, 1995).
- It gives greater freedom for maintenance of sexual life (Doherty, 1999).
- It places fewer extra burdens on hospital and community resources (Webb et al., 1990).
- Barton (2000) stated that clean as oppose to sterile self-catheterization did not increase the incidence of renal damage and urinary tract infections. This result was also reported in other RCT studies (Carapeti et al. 1996; Dunn et al., 2000).

In many procedures of ISC, there are potential complications. The main ones were urinary tract infections, bleeding, pain/soreness, urethral stricture. It was probably due to the problems arising from the catheterization techniques, choice of catheter or the physical status of the patient. While going back to the discussion of clean Vs sterile intermittent catheterization method, some researchers have examined methods of catheter cleaning and there is still debate about which method is the best (Barton, 2000).

When investigating the types of catheterization available in clinical practice settings with reference to the mini-survey result for 16 nurses, the informal

survey reported that IDC was still popular in the Medical Unit whereas ISC began to implement in the Surgical Unit. Outpatient with ISC might refer to Community Nursing Service (CNS) for follow-up health education and skills assessment. It was noted that ISC was a recognized mainstay in the treatment of adults and children who were cognitively competent to demonstrate the techniques individually or be demonstrated by their caregivers. These types of patients were commonly located in the Surgical Unit. Generally, all nurses have known about the complications of IDC. However, only Surgical Unit has developed assessment tool, standard, guideline and teaching kit for this nursing intervention. Therefore, the practice of ISC was mostly confined to these clinical settings.

2.2 Appropriateness of the catheter (size and balloon water infill)

In the process of urethral catheter care, the decision on selecting an appropriate catheter was essential. As a general guide, size 12~16 Ch catheters are used to drain clear, dilute urine; size 16~18 Ch catheters are used for urine containing debris, and size in excess of 18Ch are reserved for patients with haematuria and clots which may occlude the smaller lumen (Pomfret, 1996). However, some nurses might have incorrect perception of taking the decision of the size of catheter according to the physical size of their patients and not the nature or special gravity of their urine. As such, the smallest size of catheter that will provide adequate drainage should be selected (Pomfret, 1996; Wong et al., 2001). In NIC's guideline regarding choice of catheter, it also addressed that smallest size catheter should be used as appropriate (Dochterman & Bulechek, 1992). As noted, urethral irritation and trauma would be the result from the use of larger size catheter. It would cause bypassing or leakage of urine and in some patients might even increase the early risk of infection.

Another area of choice was the capacity of the balloon. For most patients requiring indwelling urethral drainage, the 10 ml volume balloon was used to minimize irritation and promote effective drainage. The 30 ml balloon water infill was for post-operative haemostasis. There was a common nursing practice in

nurses' traditional thought that was to increase the catheter size and balloon size to "plug the leak" (Evans, 1999). It would cause bladder spasms while increasing the balloon size. Urine leakage and residual urine left in the bladder leading to other health problems would be resulted.

Another issue regarding to the balloon was its shape. If the balloon is not filled to an equal spherical shape, the unequal pressure may cause a bladder wall mucosal laceration. Therefore, assessing the amount of sterile water needed in the balloon to create an equal spherical shape before inserting the catheter was imperative. This suggestion was recommended by many urological specialists and it was also highlighted in Evans' (1999) article.

One general nursing advice recommended by Promfret (1996) was worth to mention. He stated the importance of maintaining patient's adequate fluid intake to reduce the risk of constipation or the irritant effect of concentrated urine in the bladder. A good fluid intake will result in dilute urine output, enabling the use of smaller gauge catheter.

2.3 Management of complication: Leakage and Blockage

Once the optimum catheter has been selected according to individual patient's needs, the issue of catheter care would be addressed to the objective of minimizing urinary tract infection. The next attention focused on the act of catheterization was catheter-related problem management. As reflected from the mini-survey done in the target hospital, urine leakage and blocked catheter were two common problems related to urethral catheterization.

Evan (1999) listed out the key factors leading to the leak that were irritation from the catheter balloon, improper catheter size, bacteruria, fecal impaction, catheter blockage, sensitive to the catheter composition, unstable bladder because of the underlying disease process such as multiple sclerosis. A common nursing intervention is to increase the catheter size or the balloon size to "plug the leak" with 62.5% (N= 10). It was noted in the mini-survey result (Q5) that this concept was quite a direct nurse's response for managing the urine leakage. However, the rest of the nurses who were mainly from CNS and

surgical unit made good suggestion of reducing the size of catheter and balloon water infill so as to tackle the underlying problem which was associated with bladder spasm and irritation from catheter.

Immediate nursing intervention that commonly overlooked was the assessment for the causes. For instance, constipation would be a contributory factor in causing leakage and bypass in some patients (Promfret, 1996). After comprehensive assessment, nurses should consider downsizing the catheter to smaller size with a 5 ml balloon. If these interventions were unsuccessful, anti-cholinergic medications would be indicated (Evans, 1999).

Catheter blockage is a serious problem and should be treated as emergency. It is caused by a tubing kink, an air-vacuum lock or encrustation or mucous build-up in the catheter lumen which lead to an increase in pressure inside the bladder and subsequently affect the blood supply to the bladder and result in reflux to the kidneys (Doherty & Winder, 2000).

The nursing management suggested by nurses (from the mini-survey) was quite straightforward. It was either "change catheter" or "inform doctor for further management". Quick assessment to exclude any extrinsic and intrinsic causes such as catheter twisted or compressed, patient being constipated was the initial step before changing catheter. Some studies might consider the use of bladder washout, which reported the effectiveness of prescription irrigants in eliminating or treating encrustation (Doherty & Winder, 2000; Evans, 1999). However, the value of bladder irrigation has been questioned. Any break in the closed drainage system could increase the risk infection (Promfret, 1996). Winder (1992) found that the duration of catheterization was associated with presence of sediment in the urine and increased the chance of encrustation. Thus, review of the catheter changing schedule to a shorter interval and encouraging high fluid intake were two recommendations preventing catheter from blocking. Also, keeping a catheter diary and asking patient to note any unusual occurrences such as smelly and cloudy urine, pain or discomfort and urine amount could help to plot out the potential for blockage and even urinary infection.

2.4 Do we need to clamp catheter?

In the past, the practice of urethral catheter clamping was common. It was a widely held belief that clamping catheters would improve bladder tone and sensation. Some of the respondents (56.3%; N=9) still had this belief as shown in mini-survey result (Q6). However, we should take critical review of where did this belief come from and was there any research-based evidence to support it? Roe (1990) searched for just a small numbers of researches touched with this topic. He cited Oberst et al. (1981) studies and findings suggested that catheter clamping for short-term catheterized post-operative population might reduce voiding dysfunction after removal. But, clamping catheter showed no evidence of increasing bladder tone. It was further recommended that patients could be achieved successful continence after training in intermittent catheterization and bladder training class. Also, a more pertinent approach would be to restrict the use of long-term urethral catheters (Roe, 1990). On the contrary, clamping would induce chance of upper urinary tract infection in the case of overflow bladder. Also, improper clamping at the site above bifurcation point might lead to occlusion of the inflation and deflation lumen (Pomfret, 1996).

3. Implications for Research

Researches about indwelling urinary catheterization and intermittent self-catherization have grown dramatically in the past decades. Some of the studies were in randomized control trials, which aimed at examining particular urinary products, function of the products or catheterization techniques vulnerable acquired infection or clinical complications. Some might be conducted in comparative mode to explore the effectiveness of different catheterization methods or care devices.

Within the four nursing interventions, significant research topics could be generated. As for the research-based studies, comparative studies between the two patient groups, i.e. the IDC and the ISC group, their exposure to clinical complications, to hospital acquired infection or even psychosocial adjustment and quality of life would be the interesting topics. As mentioned

just before, some literature suggested the use of clean versus sterile intermittent catheterization has no correlation with the urinary tract infection. This would be a controversial study in present clinical area since we have not yet taught our patient to use a clean method for ISC. But, it would be possible if the practice was guided by a safe and effective procedure or covered by an evidence-based clinical protocol. As such, evidence-based researches by systematic review should be the initial step ahead.

In addition, catheter clamping for bladder training would be another highlight for evidence based research that used evidence to change practice. Last but not the least, nursing knowledge about urinary catheter care also needed to explore to help educators and those in staff development plan programs (Wilde, 1997). Nursing interventions needed research to support its effectiveness. Research-based practice would be the goal of all nursing interventions.

4. Conclusion

Nurses involved all aspects of catheter care and were able to advise the best options to enable their patients to achieve the optimum quality of life and to fight away from any clinical complications. After revisiting the four nursing interventions within a board spectrum of urethral care, we identified the rationale behind every choice to reflect why nurses do it, what nurses do for patients and find better ways of caring their patients. These ways should be done through revision of the nursing interventions by comparing with the updated guidelines, protocol or recommendations from the outside world. Nonetheless, this should be testified through research endeavor.

In the critical review process, we tried to use additional information from mini-survey and made a real exploration of what knowledge and skills related to urethral catheter care acquired by our nurses. It would be a good reflection on whether our nurses were anchoring their catheter management skills on unquestioned tradition rather than sound professional and scientific-based knowledge.

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