

## ORIGINAL ARTICLE

# Intermittent catheterization in patients with traumatic spinal cord injury: obstacles, worries, level of satisfaction

B Yılmaz<sup>1</sup>, Y Akkoç<sup>2</sup>, R Alaca<sup>1</sup>, B Erhan<sup>3</sup>, B Gündüz<sup>3</sup>, N Yıldız<sup>4</sup>, H Gök<sup>5</sup>, K Köklü<sup>6</sup>, E Çınar<sup>2</sup>, E Alemdaroğlu<sup>6</sup>, M Ersöz<sup>6</sup>, H Karapolat<sup>2</sup>, Y Demir<sup>1</sup>, AN Bardak<sup>3</sup>, I Turna<sup>3</sup>, N Çatalbaş<sup>4</sup>, S Güneş<sup>5</sup> and H Tunç<sup>6</sup>

**Objectives:** The aim of this study is to examine the obstacles in people with traumatic spinal cord injury (SCI) face performing intermittent catheterization (IC), also their worries and level of satisfaction.

**Methods:** Two hundred sixty-nine patients performing IC for at least 3 months were asked to fill-out a questionnaire about their opinions on IC.

**Results:** In total, 69.5% of patients performed IC themselves, 10.4% had performed by their mothers, 7.8% by another caregiver and 7.4% by their spouse. For the 72 (26%) patients unable to apply IC, reasons were insufficient hand function (56.1%), being unable to sit appropriately (35.4%) and spasticity (8.5%). In all, 70% of male patients had insufficient hand function, 20% could not sit and 10% had spasticity while 56.3% of female patients could not sit, 37.5% had insufficient hand function and 63% had spasticity. Difference between sexes was found to be statistically significant ( $P < 0.05$ ). Worries patients had when starting IC were fear of being dependent on IC (50.2%), accidentally injuring self (43.8%), embarrassment (43.2%), causing an infection (40.2%), bleeding (32.7%), fear of feeling pain (30.2%) and hygiene (24.7%). More women felt embarrassment; other items were similar in both sexes. In all, 46.9% of patients had urinary incontinence in intervals.

**Conclusion:** In total, 69.5% of patients performed IC themselves. Men's most common obstacle was insufficient hand function while women's was being unable to sit appropriately. Patients' most common worries were being dependent on IC for life. In all, 46.9% had incontinence in intervals; 47.9% said IC improved their life quality; and 97.4% preferred IC over continuous catheterization.

*Spinal Cord* (2014) **52**, 826–830; doi:10.1038/sc.2014.134; published online 12 August 2014

## INTRODUCTION

Bladder management has long been an important issue in spinal cord injury (SCI) rehabilitation and is one of the cornerstones of advanced survival rates in patients with SCI. Clean or aseptic intermittent catheterization (IC) is recommended as the criterion standard by different guidelines for the management of lower urinary tract in patients with SCI.<sup>1,2</sup>

IC is a socially acceptable procedure increasing the patients' independence; patients can perform it when needed and do not have to carry the catheter and the pouch with themselves. However, when quality of life (QOL) and patients' satisfaction were considered, IC was not found to be superior to any other interventional bladder management methods.<sup>3</sup> There are some issues that might diminish patients' satisfaction. First, IC is an interventional procedure as its nature that may be complicated with bleeding, self-injury, pain and failure to cath. Second, patients are not white coated people and familiar with any problem that they might have faced. Having had at least one of these complications may cause resultant worries such as fear of feeling pain and fear of accidentally injuring self. All these complications of IC and

patients' worries may have negative effects on QOL and patients' satisfaction.

The aim of this study was to examine the obstacles in people with traumatic SCI face performing IC, also their worries and level of satisfaction.

## MATERIALS AND METHODS

Traumatic spinal cord-injured patients who were performing IC for at least 3 months were asked to fill-out a questionnaire about their opinions on IC for this study (see Appendix). Patients who have non-traumatic SCI, history of urinary surgery and comorbidities such as diabetes mellitus were excluded.

Approval was obtained from the ethics committee for the study. We certify that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during the course of this research.

Demographic and clinical parameters including age, gender, etiology, level, severity and duration of SCI were recorded. Patients with SCI were also classified by the American Spinal Injury Association Impairment Scale (AIS).<sup>4</sup> The AIS reflects the completeness of the lesion: A = complete lesion, no sensory or motor function is preserved in the lowest sacral segments; B = sensory incomplete (including segments S4–S5), but no motor function

<sup>1</sup>Department of Physical Medicine and Rehabilitation, Gulhane Military Medical Academy, Turkish Armed Forces Rehabilitation Center, Ankara, Turkey; <sup>2</sup>Department of Physical Medicine and Rehabilitation, University of Ege, Izmir, Turkey; <sup>3</sup>Istanbul Physical Medicine and Rehabilitation Teaching and Research Hospital, Istanbul, Turkey; <sup>4</sup>Department of Physical Medicine and Rehabilitation, Pamukkale University, Denizli, Turkey; <sup>5</sup>Department of Physical Medicine and Rehabilitation, Ankara University, Ankara, Turkey and <sup>6</sup>Department of Physical Medicine and Rehabilitation, Ankara Physical Medicine and Rehabilitation Training and Research Hospital of Ministry of Health, Yildirim Beyazıt University, Ankara, Turkey

Correspondence: Dr B Yılmaz, Department of Physical Medicine and Rehabilitation, Gulhane Military Medical Academy, TSK Rehabilitasyon Merkezi, Bilkent, Ankara 06800, Turkey.

E-mail: bijilmaz@gata.edu.tr

Received 23 February 2014; revised 27 June 2014; accepted 9 July 2014; published online 12 August 2014

below the neurological level; C = sensory and motor incomplete but more than half of the 10 pairs of key muscles have strength a grade less than 3 on a scale 0–5; D = sensory and motor incomplete, at least half of the key muscles have grade greater than or equal to 3; and E = sensory and motor function normal. In this report, there were no data available about urodynamic evaluation covering the study group.

Patients were evaluated in three groups according to the frequency of leakage: (A) have one or more incontinence episodes a day, (B) have one or more incontinence episodes a week and (C) a month (Table 4). Satisfaction (0: not at all satisfied, 10: extremely satisfied) and difficulties (0: very easy, 10: very difficult) with the catheters were measured with visual analog scale (Table 5). To assess how IC affects the QOL, a five-point Likert scale was used (1: Much better, 2: Somewhat better, 3: About the same, 4: Somewhat worse, 5: Much worse) (Table 5).

**Statistical analysis**

The PASW (Predictive Analysis Software) Statistics 19.0 (Statistical Package for Social Sciences Inc., Chicago, IL, USA) was used for statistical analysis.

**Table 1 Demographic data for both genders**

	Male (N = 199)	Female (N = 70)	P-value
Age (years)	40.73 ± 13.85	42.20 ± 14.25	0.501
Time on IC (months)	45.95 ± 44.25	54.95 ± 50.20	0.479
(min–max)	(3–340)	(3–192)	
Time since injury (months)	57.78 ± 52.66	77.25 ± 73.07	0.223
(min–max)	(3–340)	(4–324)	
AIS			0.830
A	109	39	
B	39	11	
C	25	9	
D	23	11	
E	1	0	
NA	2		
Level of injury			0.813
Cervical	33	10	
Thoracal	124	47	
Lumbosacral	40	13	
NA	2		

Abbreviations: AIS, American Spinal Injury Association Impairment Scale; IC, intermittent catheterization; NA, not available.

Descriptive statistics were used to describe demographic characteristics. Categorical variables were analyzed with a chi-square test. The distributions of the numeric variables were examined using the Kolmogorov–Smirnov test for normality and differences between the groups were determined via an independent samples *t*-test or the Mann–Whitney *U* test. The level of significance was set at *P* < 0.05.

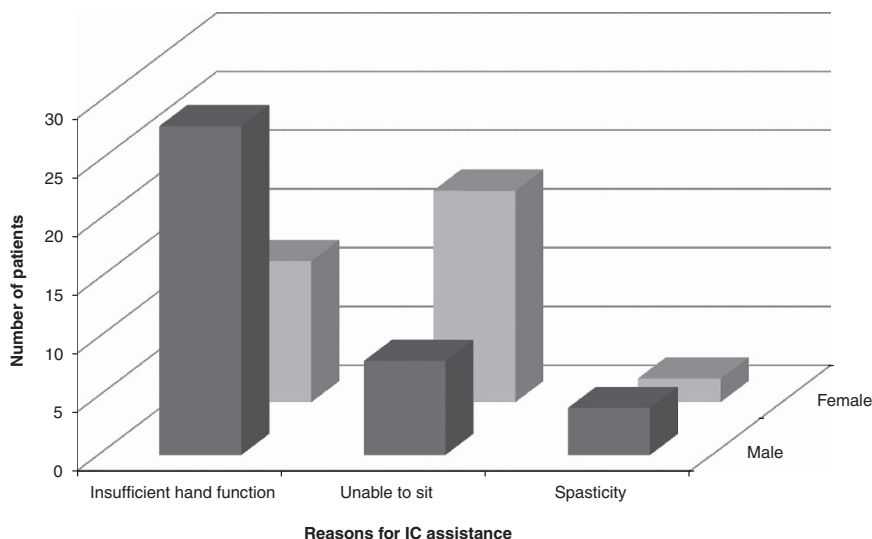
**RESULTS**

Of the total 269 patients, 199 (74%) were male and 70 (26%) were female. The mean age during the follow-up was 41.11 ± 13.95 years and the mean time since injury was 62.85 ± 59.13 months. The mean time since patients has performed IC was 48 months. Of the total 269 patients, 145 (54%) performing IC six times a day. Of these, one of them could not be evaluated for AIS and one refused to have AIS examination. Because of this reason, data relevant to severity and level of the lesion were analyzed from 267 subjects. In all, 148 (55%) had a complete lesion and 119 (45%) had an incomplete lesion in total. In all, 46 (17%) individuals had tetraplegia and 221 (83%) had paraplegia (Table 1).

In total, 69.5% of patients performed IC themselves, 10.4% performed by their mothers, 7.8% by another caregiver and 7.4% by their spouse. In all, 154 (84%) male patients and 33 (47%) female patients have been performing IC themselves and there was a statistical significant difference between sexes (*P* < 0.0001). For the 72 (26%) patients unable to apply IC, reasons were insufficient hand function (55.6%), being unable to sit appropriately (36.1%) and spasticity (8.3%). In all, 70% of male patients had insufficient hand function, 20% could not sit and 10% had spasticity while 56.3% of female patients could not sit, 37.5% had insufficient hand function and 63% had spasticity (Figure 1). Difference between genders was not statistically significant for any needs of assistance (*P* < 0.05) (Table 2).

Worries patients had when starting IC were fear of being dependent on IC (50.2%), accidentally injuring self (43.8%), embarrassment (43.2%), causing an infection (40.2%), bleeding (32.7%), fear of feeling pain (30.2%) and hygiene (24.7%) (Figure 2). More women felt embarrassment; other items were similar in both sexes (Table 3).

In total, 47.1% of patients had urinary incontinence in intervals. Of those, 45.7% had one or more incontinence episodes a day; 37.9%



**Figure 1** Reasons for IC assistance.

had one or more incontinence episodes a week while 16.4% had one or more incontinence episodes a month (Table 4).

When catheter types evaluated, 75.7% used pre-lubricated catheters, 19.9% used hydrophilic, 4.5% used other types. The mean score of satisfaction with the catheters was 7.86 over visual analog scale (0 dissatisfied, 10 very satisfied) and there was statistically significant difference between the female (7.2) and the male (8.07) patients ( $P=0.002$ ). In all, 66.6% expressed satisfaction with their catheters.

In all, 63.2% stated IC was very easy and mean score was 2.92 over visual analog scale (0 very easy, 10 very difficult). Female patients (3.79) had more difficulties when performing IC in comparison with males (2.39), but it was not statistically significant. Majority of the patients (97.4%) did not regard IC as a barrier.

One hundred twenty-eight patients (47.9%) of the individuals said IC changed their QOL somewhat better. Only eight (3%) patients stated IC made much worse their QOL. When asked which they would prefer 261 patients (97.4%) chose IC over indwelling catheterization (Table 5).

**Table 2 Assistance status in the study group**

	Male (N = 199) (%)	Female (N = 70) (%)	P-value
<i>IC performer</i>			<b>&lt;0.0001</b>
Self	154	33	
Mother	19	9	
Father	2	0	
Child	1	4	
Brother	1	0	
Relative	1	4	
Caregiver	7	14	
Spouse	14	6	
<i>Reason for assistance</i>			<b>0.006</b>
Insufficient hand function (%)	40 (20.1)	32 (45.7)	
Unable to sit appropriately (%)	28 (70)	12 (37.5)	
Spasticity (%)	4 (10)	2 (6.3)	
	8 (20)	18 (56.3)	

Abbreviation: IC, intermittent catheterization.  
P value in bold is statistically significant.

## DISCUSSION

The results of this study revealed that the most common barriers on IC were insufficient hand function, being unable to sit properly and spasticity, whereas the most frequent worries about IC were fear of being dependent on IC, accidentally injuring self and embarrassment. Majority of the patients preferred IC over continuous catheterization and nearly half of all patients said IC improved their QOL.

SCI can result in impairment to one or more of the neural pathways which manage micturition. During the past 30 years, IC has been used for the management of neurogenic bladder. IC has been shown to lower the risk of upper urinary tract problems including retention, incontinence and infections after SCI.<sup>5</sup>

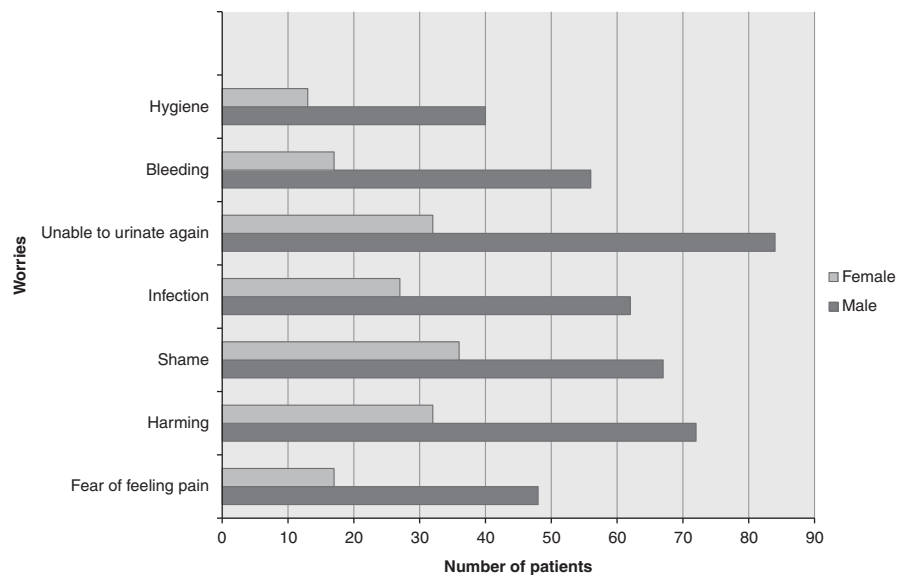
IC may be easily applicable for patients with paired hand functions such as paraplegics but it can be difficult for the patients who do not have enough hand functions. IC may be possible with assistive devices for C6 tetraplegic patients with the help of tenodesis. C7-C8 level SCI patients are to be expected to perform with some assist or they can be independent for catheterization. Bladder management method should be planned according to the injury level and functional outcomes. To increase insufficient hand function in these patients, functional electrical stimulation or assistive devices may be helpful.<sup>6</sup>

Barriers related with performing IC can be different from a study to another. Bolinger and Engberg<sup>7</sup> reported that lack of access to a bathroom was the most common hurdle, affecting 34%. In the

**Table 3 Worries about IC**

	Male N (%)	Female N (%)	P-value
Fear of pain	48 (30.4)	17 (29.8)	0.94
Doing right or wrong	72 (40.9)	32 (52.5)	0.12
Shame	67 (39)	36 (54.5)	<b>0.03</b>
Bleeding	56 (33.9)	17 (29.3)	0.52
Infection	62 (38.8)	27 (44.3)	0.46
Hygiene	40 (25.5)	13 (22.8)	0.69
Worry of unable to urinate again	84 (49.7)	32 (51.6)	0.8
Other	2 (4.5)	0	0.39

Abbreviation: IC, intermittent catheterization.  
P value in bold is statistically significant.



**Figure 2** Worries patients had when starting IC.

**Table 4** Frequency of leakage

	Female		P-value
	Male N (%)	N (%)	
Have one or more incontinence episodes a day	35 (40.2)	18 (62.1)	0.07
Have one or more incontinence episodes a week	38 (43.7)	6 (20.7)	
Have one or more incontinence episodes a month	14 (16.1)	5 (17.2)	

**Table 5** Patients' perspective in the study group

	Male N (%)	Female N (%)	P-value
<b>Satisfaction with cathing</b>			<b>0.02</b>
0-3 (dissatisfied)	4 (2)	5 (7.2)	
4-7 (neutral)	54 (27.3)	26 (37.7)	
8-10 (satisfied)	140 (70.7)	38 (55.1)	
<b>Difficulties with cathing</b>			0.102
0-3 (easy)	106 (65.4)	21 (53.8)	
4-7 (neutral)	49 (30.2)	13(33.3)	
8-10 (difficult)	7 (4.3)	5(12.8)	
<b>Effect on quality of life</b>			0.299
1 Much better	29 (14.6)	5 (7.2)	
2 Somewhat better	91 (46)	37 (53.6)	
3 About the same	52 (26.3)	16 (23.2)	
4 Somewhat worse	19 (9.6)	10 (14.5)	
5 Much worse	7 (3.5)	1 (1.4)	

P value in bold is statistically significant.

current study, one-third of the patients who were not able to apply IC themselves reported insufficient hand function, lack of sitting balance and spasticity as most common reasons. In our study, the most common barrier for male patients was insufficient hand function, whereas lack of sitting balance for female individuals. To overcome these barriers, therapeutic targets may be increasing hand dexterity and decreasing muscle tonus.

Fear of accidentally injuring self was a common worry in the current study. To handle this worry, it seems like detailed training sessions and increasing patients' knowledge may be useful. Another important worry was infection which was reported by 40% of the patients. Prevalence of urinary tract infection (UTI) varies widely in the literature. This is due to the various methods used for evaluation, to the different techniques of IC, different frequencies of urine analysis, different criteria for infection and others.<sup>8</sup> Biering-Sorensen *et al*<sup>9</sup> found that 81% had been treated for at least one UTI; 22% had two to three UTI per year and 12% four or more UTI per year in 77 SCI patients on IC for 5 years. Although infection is a common problem in patients on IC, potential risk of infection is lower in patients on IC than in patients on indwelling catheterization. Nursing education is a very important, cost-effective mean to decrease the risk of UTI's in individuals with SCI.<sup>10</sup>

IC has some other beneficial effects, such as improved body image and increased QOL.<sup>11</sup> Oh *et al.*<sup>12</sup> reported that patients with neuropathic bladder had much lower QOL values than the general population. In our study, nearly half of the patients reported that IC

improved their QOL. IC encourages patients to attend social activities compared with indwelling or condom catheter. Lower UTI rates also increases QOL of patients performing IC.

Catheter types also might be related with QOL and cause difficulties on performing IC. In a study nearly one-fourth of the patients claimed that hydrophilic catheters were too slippery in the hands and 11% felt some sticking during catheter removal.<sup>13</sup> In our study, most of the patients preferred pre-lubricated type, only 19.9% used hydrophilic catheters. SCI patients usually want to perform catheterization as quick as possible and do not want to lose time. Therefore, this may be a reason for them preferring the pre-lubricated type, because it can be used immediately and it does not need any lubrication procedure.

The most prominent limitation of the current study to consider was the method used for QOL measurement. Another widely used generic instrument might be used to assess health quality. Lack of some detailed data relating to bladder management especially any potential prior history of traumatic catheterization or catheter-related complications and data about long-term follow-up, using a not self-administrated and not validated questionnaire which was not including information about the treatment results are other limitations of our study.

In conclusion, obstacles and worries in patients with SCI performing IC for bladder management should always be kept in mind to get better results.

#### DATA ARCHIVING

There were no data to deposit.

#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

- Abrams P, Agarwal M, Drake M, El-Masri W, Fulford S, Reid S *et al*. A proposed guideline for the urological management of patients with spinal cord injury. *BJU Int* 2008; **101**: 989-994.
- Consortium for Spinal Cord Medicine. Bladder management for adults with spinal cord injury: a clinical practice guideline for health-care providers. *J Spinal Cord Med* 2006; **29**: 527-573.
- Brillhart B. Studying the quality of life and life satisfaction among persons with spinal cord injury undergoing urinary management. *Rehabil Nurs* 2004; **29**: 22-26.
- Kirshblum SC, Burns SP, Biering-Sorensen F, Donovan W, Graves DE, Jha A *et al*. International standards for neurological classification of spinal cord injury (Revised 2011). *J Spinal Cord Med* 2011; **34**: 535-546.
- Lapides J, Diokno AC, Silber SM, Lowe BS. Clean, intermittent self-catheterization in the treatment of urinary tract disease. *J Urol* 1972; **107**: 458-461.
- Alon G, McBride K. Persons with C5 or C6 tetraplegia achieve selected functional gains using a neuroprosthesis. *Arch Phys Med Rehabil* 2003; **84**: 119-124.
- Bolinger R, Engberg S. Barriers, complications, adherence, and self-reported quality of life for people using clean intermittent catheterization. *J Wound Ostomy Continence Nurs* 2013; **40**: 83-89.
- Wyndaele JJ. Complications of intermittent catheterization: their prevention and treatment. *Spinal Cord* 2002; **40**: 536-541.
- Biering-Sorensen F, Nielans HM, Dørflinger T, Sørensen B. Urological situation five years after spinal cord injury. *Scand J Urol Nephrol* 1999; **33**: 157-161.
- Barber DB, Woodard FL, Rogers SJ, Able AC. The efficacy of nursing education as an intervention in the treatment of recurrent urinary tract infections in individuals with spinal cord injury. *SCI Nurs* 1999; **16**: 54-56.
- Weld KJ, Dmochowski RR. Effect of bladder management on urological complications in spinal cord injured patients. *J Urol* 2000; **163**: 768-772.
- Oh SJ, Ku JH, Jeon HG, Shin HI, Paik NJ, Yoo T. Health-related quality of life of patients using clean intermittent catheterization for neurogenic bladder secondary to spinal cord injury. *Urology* 2005; **65**: 306-310.
- Taskinen S, Fagerholm R, Ruutu M. Patient experience with hydrophilic catheters used in clean intermittent catheterization. *J Pediatr Urol* 2008; **4**: 367-371.

**APPENDIX–QUESTIONNAIRE:**

**The mean time since you performed intermittent catheterization (IC) (month/year):**

**How many times do you perform IC in a day?**

**IC performer:**

- Self ( )  
 Mother ( )  
 Father ( )  
 Child ( )  
 Brother ( )  
 Relative ( )  
 Caregiver ( )  
 Spouse ( )

**Which physical obstacles do you experience while you perform IC?**

- Insufficient hand function ( )  
 Spasticity ( )  
 Unable to sit appropriately ( )

**Did you have any worries when you began performing IC?**

- Fear of feeling pain ( )  
 Worry of harming by applying IC wrongly ( )  
 Shame ( )  
 Worry of unable to urinate again ( )  
 Infection ( )  
 Bleeding ( )  
 Hygiene ( )  
 Other:

**Do you have any leakage in spite of regularly getting your anti-cholinergic pills?**

- Yes ( ) No ( )

**If yes, choose one them:**

- I have one or more incontinence episodes a day ( )  
 I have one or more incontinence episodes a week ( )  
 I have one or more incontinence episodes a month ( )

**If yes, choose one them:**

- It causes changing my clothes ( )  
 It makes my clothes wet ( )  
 Amount of the urine leakage is not important ( )

**Which type of catheter do you use for IC?**

- Nelaton ( )  
 Hydrophilic ( )  
 Pre-lubricated ( )

**Mark your level of satisfaction with IC (0: not satisfied at all, 10: extremely satisfied)**

0	1	2	3	4	5	6	7	8	9	10

**Mark the level of difficulty you have while performing IC (0: very easy, 10: very difficult) (only for patients performing IC themselves)**

0	1	2	3	4	5	6	7	8	9	10

**Do you think that IC is an obstacle for daily life?**

- Never ( )  
 Rarely ( )  
 Sometimes ( )  
 Often ( )  
 Always ( )

**How IC affected your quality of life?**

- Much better ( )  
 Somewhat better ( )  
 About the same ( )  
 Somewhat worse ( )  
 Much worse ( )

**Which type of method for bladder evacuation do you prefer for the future?**

- IC ( )  
 Indwelling catheterization ( )