Epidemiology of Urinary Tract Infection among Spinal Cord Injured Patients in Rehabilitation Ward at Siriraj Hospital

Teerada Ploypetch MD*, Piyapat Dajpratham MD*,
Susan Assanasen MD**, Thanitta Thanakiatpinyo MD*,
Phakamas Tanvijit MD*, Jantra Karawek BSc*

** Department of Rehabilitation Medicine, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand*
*** Division of Infectious Disease, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand*

Background and Objective: *A prophylactic antibiotic in retrograde investigations (Ix) such as an urodynamic study was suggested by the European Association of Urology in order to prevent urinary tract infection (UTI) in the neurogenic bladder. However, finding an appropriate antibiotic is questionable since bacterial types and their sensitivities are variable in different settings. Therefore, the present study was aimed to find out the epidemiology of UTI in spinal cord injured (SCI) patients within the rehabilitation ward at Siriraj Hospital.*
Material and Method: *A retrospective chart review of 100 SCI patients admitted to the rehabilitation ward between 2006 and 2010 was done. Symptomatic UTI events, urine cultures, and sensitivities (C/S) were reviewed. Demographic data and possible UTI-associated factors were collected and examined the association with the occurrence of UTI.*
Results: *There were 64 males and 36 females with a mean age of 42.9 (SD 15.8) years. Most of them (77%) were injured at cervical and thoracic spinal cords. Forty-five patients had 57 UTI episodes. Escherichia coli was the most common isolated pathogen (50%), followed by Pseudomonas aeruginosa (17.3%), and Enterococcus faecalis (7.7%). The top three most sensitive antibiotics were imipenem, amikacin, and piperacillin/tazobactam. Unfortunately, gentamicin, ceftriaxone, and ciprofloxacin, which were frequently used as a prophylactic antibiotic, had the efficacy for only 51.9%, 38.5%, and 28.8% of pathogens respectively. The mean length of stay of patients with UTI was far greater than non-UTI patients, 45.5 (SD 24.4) versus 30.4 (SD 14.8) days (p = 0.001). Vesicoureteric reflux (VUR) (OR 21.2, 95% CI 2.1 to 214.2) and increased intravesical pressure at storage phase (OR 1.1, 95% CI 1.004-1.113) were significant risk factors for post investigation UTI.*
Conclusion: *UTI was commonly observed in SCI patients within the rehabilitation ward. The most common uropathogen was Escherichia coli. Therefore, a prophylactic antibiotic such as amikacin should be prescribed in patients with VUR and increased intravesical pressure at storage phase.*

Keywords: *Urinary tract infection, Spinal cord injury, Epidemiology, Rehabilitation, Antibiotic, Vesicoureteric reflux*

J Med Assoc Thai 2013; 96 (1): 99-106
Full text. e-Journal: *http://jmat.mat.or.th*

Most spinal cord injured (SCI) patients have a neurogenic bladder problem. It is generally accepted that bladder investigations such as urodynamic study, voiding cysto-urethrography (VCUG), intravenous pyelography (IVP), and renal ultrasonography (U/S) are required for evaluation and proper management. The Consortium for Spinal Cord Medicine recommended these investigations at first and repeated annually[1]. However, the urodynamic study and VCUG are retrograde procedures that may increase the risk of urinary tract infection (UTI). Pannek J and Nehiba M found that the incidence of UTI in spinal cord injured patients after urodynamic study was 9.7%[2]. Furthermore, the incidence of post-VCUG UTI varied from 4 to 30%[3,4].

The urinary tract infection is a significant problem since it occurs commonly in spinal cord injured patients. For instance, most of the SCI patients (60.52%) who were admitted in the Rehabilitation

Correspondence to:
Ploypetch T, Department of Rehabilitation Medicine, 9th Floor Srisungwan Building, Siriraj Hospital, Bangkok 10700, Thailand.
Phone: 0-2419-7508, Fax: 0-2411-4813
E-mail: teerada_rehab@hotmail.com

center, Thai Red Cross Society, suffered with UTI[5]. This was consistent with the present study of Esclarin De Ruz A et al. in which UTI events were found 78% of SCI inpatients[6]. Moreover, an increased number of UTIs and septicemia were associated with an increased risk of mortality of 34% as calculated by adjusted hazard mortality[7].

There are several factors that increase the risk of UTI including age more than 40 years, indwelling catheterization more than 30 days, vesicoureteric reflux, high pressure voiding, high post-void residual urine, bladder outlet obstruction, and invasive procedure without antibiotic prophylaxis[6,8]. American Urological Association and European Association of Urology recommended antibiotic prophylaxis prior to urodynamic study in the patients with risk factors: advanced age, low immunity, diabetes mellitus, smoking, poor nutritional status, anatomical anomalies of urinary tract, external catheters, bacterial colonization, history of repeated UTI, and prolonged hospitalization[9,10]. In addition, a systematic review supported the use of antibiotic prophylaxis in the patients with neurogenic bladder, transplantation, low immunity, and vesicoureteral reflux[11]. From these evidences, SCI patients seem to have a high risk of UTI and require antibiotic prophylaxis prior to retrograde investigations. However, it might be difficult to choose an appropriate prophylactic antibiotic due to various pathogens and antibiotic susceptibility in each area. Therefore, the epidemiology for UTI in SCI patients within the rehabilitation ward is of concern so that the most appropriate antibiotic will be prescribed prior to retrograde bladder investigations.

Objective

The primary objective in the present study was to determine the incidence of UTI in spinal cord injury patients who were admitted to the rehabilitation ward, Siriraj Hospital. Other objectives were to find out the causative organisms of UTI including their antibiotic susceptibility patterns and to determine factors associated with UTI.

Material and Method

The present study was approved by the Ethics Committee of Siriraj Hospital: Siriraj Institutional Review Board (SIRB). A retrospective review of 100 charts was done. The sample size calculation was based on the prevalence of UTI in spinal cord injured patients at the rehabilitation ward[5]. The inclusion criterion was all SCI patients who were admitted to the rehabilitation ward, the Department of Rehabilitation Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University between 2006 and 2010. In cases where there were repeated admissions, the authors selected the most recent admission to review. Demographic data, underlying disease, and hospital course were collected. UTI was defined if the patient had significant bacteriuria with signs and symptoms of UTI including fever, discomfort, or pain over kidney or bladder, onset of urinary incontinence, and increase in spasticity of skeletal muscles especially in lower extremities, sweating, or autonomic dysreflexia[12]. Urine culture and sensitivity tests (urine C/S) that were compatible with UTI diagnoses were collected so as to review causative organisms and antibiotic susceptibilities. The types and complications of neurogenic bladder were obtained from investigations. For instance, hypo/hyperreflexic bladder was determined by urodynamic study, and vesicoureteric reflux was detected by VCUG. However, there was missing data in some spinal cord injured patients who did not have such investigations. The correlations of UTI and various possible factors were examined.

Statistical analysis

Data was analyzed using SPSS version 13.0. It was presented as a mean ± standard variation (SD) for continuous variables such as age, length of stay, body mass index, bladder capacity, residual urine, and detrusor pressure. Categorical variables were presented as percentage (%) including sex, level of injury, type of neurogenic bladder, urinary tract complication, pathogens, and susceptible antibiotics. The incidence of UTI was expressed as number of episodes per 100 persons daily or person-days. The percentages of antibiotic susceptibility were calculated from the number of sensitive results of available sensitivity tests divided by the total UTI events (57 events), which included UTI events that had no urine C/S data. The comparison of the UTI and non-UTI groups was performed by the Chi-square test or Fisher's exact test for the qualitative data and the Independent Sample t-test for the quantitative data. The multiple variable analyses by stepwise logistic regression was used to explore the associated factors of the UTI among SCI patients. For all analyses, p-value <0.05 was considered as statistically significant.

Results

There were 64 males and 36 females with a mean age of 42.9 (SD 15.8) years. The neurological

levels of injuries included 35% cervical, 42% thoracic, and 23% lumbosacral. There were 57 UTI episodes in 45 spinal cord injured patients, some of whom had recurrent UTI on an admission. There were eight patients with two episodes, and two patients with three episodes. The incidence of UTI was 1.53 per 100-person days (95% CI 1.16 to 1.98). The average length of hospital stay was 37.2 (SD 21.0) days. There were 49 urine C/S tests from 57 UTI events due to missing data. In some cases repeated UTIs occurred in a very short time interval, urine C/S was not repeatedly collected, and some urine C/S were contaminated. The vast majority of uropathogens were gram-negative bacteria. *Escherichia coli* was the most common isolated pathogen (50%), followed by *Pseudomonas aeruginosa* (17.3%) and *Enterococcus faecalis* (7.7%) (Table 1). The top three most sensitive antibiotics were imipenem, amikacin, and piperacillin/tazobactam. Interestingly, gentamicin, ceftriaxone, and ciprofloxacin, which were frequently used as a UTI prophylaxis and for empirical UTI treatment, had susceptibility for only 51.9%, 38.5%, and 28.8%, respectively (Table 1). The mean length of stay of patients with UTI was far greater than non-UTI patients with the difference being 45.5 (SD 24.4) and 30.4 (SD 14.8) days ($p = 0.001$). Other factors such as underlying diseases, nutritional status (body mass index, hemoglobin, and serum albumin), neurological level of injury, type of neurogenic bladder, residual urine and type of urinary drainage were not associated with UTI (Table 2).

Subgroup analysis in 76 patients, who underwent 124 retrograde bladder investigations including 62 urodynamic studies, 58 VCUGs, and four cystoscopies, revealed that there were 14 UTI events in 12 patients (11.3%, 95% CI 6.8 to 18.1%) following eight VCUGs, five urodynamic studies, and one cystoscopy. There were only 43 urine C/S tests taken before retrograde investigations, 29 of which showed significant bacteriuria. Nonetheless, no UTI occurred in these 29 patients. Regarding antibiotic prophylaxis, among 124 retrograde investigations, a kind of antibiotic was prescribed prior to 99 investigations, but only 16 sensitive antibiotics were appropriately prescribed. Using univariate analysis and Stepwise Logistic Regression Analysis, vesicoureteric reflux (VUR) (OR 21.2, 95% CI 2.089 to 214.199) and increased intravesical pressure at storage phase (OR 1.1, 95% CI 1.004 to 1.1113) were significantly associated with UTI following retrograde investigations (Table 3, 4).

Discussion

The present study revealed that the incidence of UTI in spinal cord injured patients was very high (45%) which supports previous studies[5,6]. However, the UTI incidence in each study would be difficult to be directly compared due to various risk factors in subjects. Interestingly, the cumulative incidences of UTI in spinal cord injured patients were much higher than other kinds of patients; for instance, the incidences of catheter-associated UTI in Intensive Care Units were 9 to 29%[13]. It is noticeable that the pattern is reversed when the incidence was correlated with number of days in a hospital; the present study revealed the incidence of 1.53 per 100 person-days while it was 2.37 per 100 catheter-days in the Intensive Care Unit. The possible reason is that the lengthy hospital stay of spinal cord injured patients in a rehabilitation ward. It is generally accepted that longer admission results in higher risk of nosocomial infection[14].

Escherichia coli was the major cause of UTI in spinal cord injured patients, which was similar to other studies[5,15,16]. The sensitivity of commonly used antibiotics such as gentamicin, ceftriaxone, and ciprofloxacin was quite low. This was consistent with other studies which revealed the prevalence of antimicrobial resistance in uropathogens is increasing worldwide[15,16]. Since the incidence of UTI in spinal cord injured patients is very high, there is very high chance of multi-drug resistant strains transmission among patients in a ward. Therefore, hospital staff should be strictly concerned about the infection control policy, such as hand washing and contact precautions, in order to prevent cross-infection. In addition, the crucial cause of this problem is inappropriate use of antibiotics. SCI patients with symptomatic urinary infections should be treated with the most specific, narrowest spectrum antibiotics available for the shortest possible time[17]. The National Institute on Disability and Rehabilitation Research concluded that prophylactic antibiotics for asymptomatic bacteriuria in SCI patients were unnecessary. The only exceptions were patients with vesicoureteric reflux and colonization with urease-producing bacteria[12]. This recommendation was consistent with the result of the present study, which revealed that vesicoureteric reflux was a significant risk factor for post investigation UTI. Surprisingly, antibiotic prophylaxis seems to be excessively used in the present study. This kind of antibiotic was prescribed prior to 99 retrograde investigations from the total of 124 investigations. However, only 16 antibiotics were sensitive according

Table 1. Uropathogens and their antibiotic susceptibility pattern

Uropathogens	n = 52*	Number of sensitive tests/total number of available tests						
		Ampicillin	Ciprofloxacin	Ceftriaxone	Gentamicin	Piperacillin/tazobactam	Amikacin	Imipenem
E. coli	18	1/17	4/17	11/12	11/17	16/16	17/17	16/16
ESBL-producing *E. coli*	8	0/7	1/8	0/7	5/8	7/8	8/8	8/8
P. aeruginosa	9	NA	2/9	0/9	3/8	5/9	4/9	6/9
Enterococcus fecalis	4	4/4	1/4	NA	1/4[#]	NA	NA	NA
Enterobactor cloacae	3	0/3	1/3	1/2	0/3	2/3	2/3	3/3
Klebsiella pneumoniae	3	0/3	3/3	3/3	3/3	3/3	3/3	3/3
Gram negative rods	2	0/1	1/2	1/2	1/2	2/2	1/2	1/2
Serratia marcescens	2	0/2	2/2	2/2	2/2	2/2	2/2	2/2
ESBL-producing *K. pneumonia*	1	0/1	0/1	0/1	0/1	0/1	1/1	1/1
Morganella morganii	1	0/1	0/1	1/1	0/1	1/1	1/1	1/1
Citrobacter freunclii	1	0/1	0/1	1/1	1/1	1/1	1/1	1/1
Total sensitivity (%)**		9.6	28.8	38.5	51.9	75.0	76.9	80.8

* Actually, there were 49 urine C/S tests from 57 UTI events because of missing data. However, fifty two organisms were reported because some of the tests revealed polymicrobial organisms.

** Total sensitivity was calculated by the number of sensitive organisms/total organisms (52)

NA = not applicable

[#] Gentamicin 120 microgram disc (synergistic effect)

Table 2. Comparison of variables of the patients with and without UTI (n = 100)

Variables	UTI (n = 45)	No UTI (n = 55)	p-value
Age (years)*	41.87 (14.87)	43.71 (16.58)	0.564
Male gender	32 (71.11%)	32 (58.18%)	0.258
Length of hospital stay (days)*	45.49 (24.44)	30.42 (14.82)	0.001#
Body mass index (kg/m^2)*	22.17 (3.61)	22.98 (6.31)	0.531
Albumin (g/dl)*	4.05 (0.45)	4.11 (0.37)	0.541
Hemoglobin (g/dl)*	12.83 (1.95)	12.56 (1.79)	0.480
Underlying disease			
Diabetes mellitus	7 (15.56%)	5 (9.09%)	0.496
Hypertension	12 (26.67%)	10 (18.18%)	0.438
Dyslipidemia	13 (28.89%)	10 (18.18%)	0.304
Complete spinal cord injury**	6 (13.64%)	13 (23.64%)	0.318
Cervical level	20 (44.44%)	15 (27.27%)	0.221
Type of urinary drainage (admission)			
Urethral catheter	27 (60.00%)	27 (49.09%)	0.489
CIC	11 (24.44%)	15 (27.27%)	
Void/condom/diaper	7 (15.56%)	13 (23.64%)	
Type of urinary drainage (discharge)**			
Urethral catheter	18 (40.91%)	13 (24.07%)	0.193
CIC	20 (45.45%)	30 (55.56%)	
Void/condom/diaper	6 (13.64%)	11 (20.37%)	
Bladder capacity (ml)*	353.73 (172.01)	400.48 (133.50)	0.222
Low bladder compliance (<10 ml/cmH_2O)**	15 (51.72%)	13 (32.50%)	0.064
Detrusor pressure at storage (cmH_2O)*	40.08 (23.56)	29.92 (18.01)	0.056
Detrusor pressure at voiding (cmH_2O)*	63.44 (27.35)	58.39 (28.09)	0.551
Residual urine >100 ml**	23 (71.88%)	36 (81.82%)	0.454
Urinary tract status			
Vesicoureteric reflux	10 (22.22%)	7 (12.73%)	0.322
Hydronephrosis	6 (13.33%)	3 (5.45%)	0.170
Stone	3 (6.67%)	5 (9.09%)	0.742

Statistical significant at p-value <0.05
* Mean (SD)
** There was missing data

to the results of urine C/S. It is noticeable that nearly all of post-investigation UTI events happened without urine C/S prior to the investigations. Even though, many of them received antibiotic prophylaxis, which is the second-generation cephalosporin and fluoroquinolone as a recommendation from standard guideline[18], they were not effective due to using non-sensitive antibiotics. This reflected that in some settings where multi-drug resistance strains prevailed, the standard guideline for the choice of antibiotics could not be applied. Each setting should regularly study and monitor the epidemiology of UTI, since during antibiotic prophylaxis a doubling of antibiotic resistance was found[19]. The authors recommend taking urine C/S several days before the investigation, so that an appropriate antibiotic will be considered in case of significant bacteriuria. A prophylactic antibiotic should only be prescribed in patients with risk factor(s).

Nonetheless, in case the patients have many risk factors and no significant bacteriuria in pre-investigation urine C/S, amikacin can be an antibiotic of choice to prevent post-investigation UTI. Please note that the dosage of amikacin must be adjusted by renal function and ideal body weight. Amikacin is preferred because most of the uropathogens were susceptible to it and the cost is much lower when

Table 3. Comparison of variables of the patients with and without UTI following retrograde investigations (n = 76)

Variables	UTI (n = 12)	No UTI (n = 64)	p-value
Age (years)*	39.25 (17.75)	43.27 (15.26)	0.417
Male gender	10 (83.33%)	38 (59.38%)	0.192
Length of hospital stay (days)*	49.25 (37.24)	36.06 (17.73)	0.253
Body mass index (kg/m^2)*	21.60 (4.28)	23.25 (5.66)	0.464
Albumin (g/dl)*	3.95 (0.45)	4.13 (0.41)	0.255
Hemoglobin (g/dl)*	12.87 (2.94)	12.70 (1.74)	0.853
Underlying disease			
Diabetes mellitus	3 (25.00%)	9 (14.06%)	0.390
Hypertension	4 (33.33%)	14 (21.88%)	0.463
Dyslipidemia	4 (33.33%)	17 (26.56%)	0.727
Complete spinal cord injury**	3 (27.27%)	14 (21.88%)	0.704
Cervical level	4 (33.33%)	21 (32.81%)	0.856
Bladder capacity (ml)*	305.63 (182.02)	410.17 (135.92)	0.057
Detrusor pressure at storage (cmH_2O)*	47.33 (28.47)	31.09 (17.17)	0.046#
Detrusor pressure at voiding (cmH_2O)*	74.50 (26.32)	56.65 (28.46)	0.161
Residual urine >100 ml**	4 (50.00%)	46 (83.64%)	0.050
Urinary tract status			
Vesicoureteric reflux	7 (58.33%)	8 (12.50%)	0.001#
Hydronephrosis	1 (8.33%)	6 (9.38%)	1.000
Stone	2 (16.67%)	6 (9.38%)	0.742

Statistical significant at p-value <0.05
* Mean (SD)
** There was missing data

Table 4. Multivariate analysis of the factors associated with post retrograde investigation UTI

	Crude OR (95% CI)	Adjusted OR (95% CI)
Vesicoureteric reflux	8.7 (1.4 to 52.9)	21.2 (2.089 to 214.199)
Detrusor pressure at storage phase	*	1.1 (1.004 to 1.113)

* There is no crude OR for detrusor pressure because it was quantitative data

compared with imipenem and piperacillin/tazobactam. However, the cost-effectiveness should be researched in the near future.

Unfortunately, the present study could not address as many risk factors of UTI in SCI patients as other studies. The risk factors could be found from subgroup analysis; vesicoureteric reflux and increased intravesical pressure at storage phase significantly correlated with post-investigation UTI. Siroky MB. reviewed pathogenesis of UTI in SCI patients and found that risk factors of UTI were vesicoureteric reflux, increased residual urine, high intravesical pressure and indwelling urethral catheter[17]. As there were the limitations of the sample size calculation and methodology in the present study, some of potential risk factors such as increased residual urine did not reach statistical significance, considering that p-value was nearly less than 0.05.

Conclusion

The incidence of UTI in spinal cord injured patients was very high. Gram-negative bacteria, especially *E. coli*, were the most common uropathogens. Unfortunately, commonly used antibiotics such as ciprofloxacin, gentamicin, and ceftriaxone revealed low sensitivity. Amikacin might be an antibiotic of choice for empirical treatment and prophylaxis in cases of waiting for urine C/S result or finding no significant bacteriuria. The recommended practice is to prescribe narrowest sensitivity spectrum antibiotic according to

the uropathogen from urine C/S. Antibiotic prophylaxis prior to retrograde bladder investigations should be preserved for patients with risk factors especially vesicoureteric reflux (OR 21.2, 95% CI 2.1 to 214.2) and high intravesical pressure at storage phase (OR 1.1, 95% CI 1.0 to 1.1).

Potential conflicts of interest

The authors appreciate grant support from the Routine to Research (R2R) of Siriraj Hospital, Mahidol University, Thailand.

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ระบาดวิทยาการติดเชื้อทางเดินปัสสาวะของผู้ป่วยไขสันหลังบาดเจ็บที่เข้ารับการรักษาฟื้นฟูในโรงพยาบาล

ธีรดา พลอยเพชร, ปิยะภัทร เดชพระธรรม, สุสัณห์ อาศนะเสน, ธนิษฐา ธนาเกียรติภิญโญ, ผกามาส ตันวิจิตร, จันทรา การะเวก

วัตถุประสงค์: ศึกษาระบาดวิทยาของเชื้อก่อโรคติดเชื้อทางเดินปัสสาวะในผู้ป่วยไขสันหลังบาดเจ็บที่เข้ารับการรักษาในหอผู้ป่วยเวชศาสตร์ฟื้นฟู และปัจจัยที่สัมพันธ์กับการเกิดการติดเชื้อทางเดินปัสสาวะ เพื่อนำไปสู่การเลือกยาต้านจุลชีพที่เหมาะสมสำหรับป้องกันการติดเชื้อภายหลังการตรวจการทำงานของกระเพาะปัสสาวะและการรักษาเบื้องต้น

วัสดุและวิธีการ: ศึกษาข้อมูลย้อนหลังจากเวชระเบียนของผู้ป่วยไขสันหลังบาดเจ็บ 100 ราย ที่เข้ารับการรักษาในหอผู้ป่วยเวชศาสตร์ฟื้นฟู โรงพยาบาลศิริราช ในช่วงปี พ.ศ. 2549 ถึง 2553 โดยเก็บข้อมูลการติดเชื้อทางเดินปัสสาวะที่มีอาการ ผลการเพาะเชื้อปัสสาวะความไวต่อยาต้านจุลชีพ และคำนวนหาความสัมพันธ์ระหว่างการเกิดการติดเชื้อทางเดินปัสสาวะกับปัจจัยที่อาจเกี่ยวข้อง

ผลการศึกษา: ผู้ป่วยชาย 64 ราย และหญิง 36 ราย อายุเฉลี่ย 42.9±15.8 ปี เกิดการติดเชื้อทางเดินปัสสาวะ 57 ครั้ง ในผู้ป่วย 45 ราย โดยพบ *E. coli* เป็นเชื้อก่อโรคถึงร้อยละ 50 รองมาเป็น *P. aeruginosa* (ร้อยละ 17.3) และ *E. faecalis* (ร้อยละ 7.7) เชื้อก่อโรคส่วนใหญ่ไวต่อยาต้านจุลชีพ imipenem, amikacin และ piperacillin/tazobactam แต่พบว่ายาต้านจุลชีพที่แนะนำให้ใช้กันทั่วไปเพื่อป้องกันและรักษาการติดเชื้อทางเดินปัสสาวะ ได้แก่ gentamicin, ceftriaxone, ciprofloxacin มีสัดส่วนของเชื้อก่อโรคที่ไวต่อยาเหล่านี้เพียงร้อยละ 51.9, 38.5 และ 28.8 ตามลำดับ จำนวนวันนอนโรงพยาบาลเฉลี่ยของผู้ป่วยที่ติดเชื้อทางเดินปัสสาวะนานกว่าผู้ที่ไม่ติดเชื้ออย่างมีนัยสำคัญทางสถิติ (45.5±24.4 และ 30.4±14.8 วัน, $p = 0.001$) และการติดเชื้อภายหลังการตรวจการทำงานของกระเพาะปัสสาวะสัมพันธ์กับผู้ป่วยที่มีภาวะปัสสาวะไหลย้อนกลับ (OR 21.2, 95% CI 2.1-214.2) และแรงดันในกระเพาะปัสสาวะสูงขณะกักเก็บปัสสาวะ (OR 1.1, 95% CI 1.004-1.113)

สรุป: การติดเชื้อทางเดินปัสสาวะพบได้บ่อยในผู้ป่วยไขสันหลังบาดเจ็บที่นอนโรงพยาบาล เชื้อก่อโรคที่พบมากที่สุดคือ *E. coli* โดยเชื้อก่อโรคมีแนวโน้มดื้อต่อยาที่แนะนำให้ใช้ตามมาตรฐานทั่วไป ยาต้านจุลชีพที่มีความไวสูงและราคาไม่แพงนักคือ amikacin จึงเหมาะสำหรับใช้ป้องกันการติดเชื้อภายหลังการตรวจการทำงานของกระเพาะปัสสาวะ โดยเฉพาะในผู้ป่วยที่มีภาวะปัสสาวะไหลย้อนกลับและแรงดันในกระเพาะปัสสาวะสูงขณะกักเก็บปัสสาวะ