

Catheter-Associated Urinary Tract Infection

A Follow-up Study in Prevention

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THE indwelling urinary is an essential device in the care of patients undergoing open heart surgeries, as it permits accurate measurement of urine output. When poorly managed, the same may present a hazard to the very patients it is designed to protect. It is the leading cause of nosocomial induced Urinary Tract Infection (UTI). A problem solving approach was selected to minimise this problem in these patients. The problem was identified, analysed, solutions tried, found to be time saving and useful and so implemented. The following practices were implemented in the care of patients having continuous urinary catheter drainage.

(i) Giving catheter care twice daily using freshly prepared savlon 1/100 and applying Neomycin ointment at the metal catheter junction.

(ii) Maintaining a closed urine drainage system by;

(a) Graduating collection bottles in 10 mls, to note the hourly urine output so as to reduce the number of times of opening the bottle.

(b) Aspirating urine from the catheter cuff under sterile precautions, rather than disconnecting the catheter-rubber tube junction to take urine sample for micro-biological investigation.

(iii) Changing collection bottle alone everyday, using another sterile bottle.

This follow-up study (to an earlier study vide *The Nursing Journal of India*, April 1986, p. 97-98) is an attempt to evaluate the effectiveness of the practices implemented.

The Method

Adult open heart surgery patients (patients whose age is 12 years or more and who underwent heart surgery under cardiopulmonary bypass) who were catheterised in the operation theatre, during the period from September 1983 to April 1984 (8 months) were included in the control group. The new practices were implemented in May 1984. A similar group of patients during the period from May 1984 to December 1984 (8 months) were included in the experimental group. All patients whose catheter urine specimens were collected for culture at the time of catheter removal were included in the study. Only those patients whose catheter care was monitored were included in the experimental group. Patients who were detected to have pre-operative bacteriuria were included from both control and experimental groups.

This research investigation is based on the re-

trospective study of patient's records. Patients were considered to be bacteriuric if their urine culture showed a colony count of 1000 colonies/ml or more with any pathogenic organisms. Standard bacteriologic methods were used to identify all organisms isolated from urine cultures.

Sample Characteristics

A total of 250 charts were reviewed. Of these 50 were excluded from the study which did not meet the study requirements. There were 97 patients in the control group and 103 patients in the experimental group who met the study requirements. The experimental and control group were similar with respect to age, sex and type of surgery (Tables 1, 2, & 3).

TABLE 1

Distribution of patients according to age

N=200

Age category	Number of patients	
	Experimental	Control
12-20	28 (27.2)	33 (34)
21-30	37 (35.9)	21 (21.6)
31-40	19 (18.5)	18 (19.6)
41-50	16 (15.5)	19 (19.6)
50	3 (2.9)	6 (6.2)
Total	103	97

TABLE 2

Distribution of patients according to sex

N=200

Sex	Number of patients	
	Experimental	Control
Male n= 90	43 (41.8)	47 (48.5)
Female n=110	60 (58.2)	50 (51.5)
Total 200	103	97

Note: Figures in parentheses are percents.

TABLE 3

Distribution of patients according to type of surgery
N=200

Type of surgery	Number of patients	
	Experimental	Control
Valve replacements	41 (39.8)	38 (39.2)
ASD Closure	35 (34)	35 (36.1)
VSD Closure	5 (4.85)	4 (4.1)
Total correction	7 (6.8)	5 (5.2)
Coronary artery by pass graft	5 (4.85)	4 (4.1)
Miscellaneous	10 (9.7)	11 (11.3)
Total	103	97

The two groups were also similar with respect to the place and mode of catheterization, type of catheter, location of hospital, stay during catheterization and exposure to systemic antibiotics while on catheter.

The two groups were not similar with respect to the time their catheters were kept in situ. Percent of patients who had their catheter kept in situ for more than 72 hours is more in experimental group (44.7%) as compared to the percent in control group (28.9%).

TABLE 4

Distribution of patients according to duration of Catheterisation

N=200

Number of hours catheter kept in situ	Number of patients	
	Experimental	Control
Less than 72 hours n=126	57 (55.3)	69 (71.1)
More than 72 hours n=74	46 (44.7)	28 (28.9)
Total	103	97

Results

In the control group 30 patients (30.9%) acquired bacteriuria, whereas in the experimental group only 19 patients (18.5%) acquired bacteriuria. This reduction was found to be significant at .05 level using Chi-square (Table 5).

TABLE 5

Rates of acquired Bacteriuria in the experimental and Control group

N=200

Group	Number of patients		Chi-square
	Bacteriuric	Not Bacteriuric	
Experimental n=103	19 (18.5)	84 (81.5)	4.21*
Control n=97	30 (30.9)	67 (69.1)	

Note: figures in parentheses are percents

* significant at .05 level

TABLE 6

Rates of acquired bacteriuria in relation to risk factors

Risk factors	Number of patients		Chi-square Value
	Bacteriuric	Not Bacteriuric	
<i>Sex</i>			
Male n= 90	21	69	0.12
Female n=110	28	82	
<i>Number of hours Catheter kept in situ</i>			
Less than 72 hrs. n=126	13	113	37.03**
More than 72 hrs. n= 74	36	38	

** Significant at 0.01 level.

Chi-square test was used to find out association between risk factors and acquisition of bacteriuria. Sex was not found to be a significant risk factor in the acquisition of bacteriuria whereas prolonged period of catheter in the urinary bladder (72 hrs. or more) was found to be a significant risk factor in the acquisition of bacteriuria (Table 6).

In spite of the fact that the experimental group had a higher percentage of patients with prolonged period of catheter in the urinary bladder (Table 4), which is a significant risk factor in the acquisition of bacteriuria, only a lesser percentage acquired bacteriuria in experimental group as compared to the control group (Table 5). Chi-square was used to find out (Table 7) whether the implemented practices were effective in reducing bacteriuria in patients who had prolonged period of catheter in the urinary bladder and was found to be effective (Chi-square value significant at .01 level). This shows that the implemented practices were effective in reducing the acquisition of

bacteriuria, specially in case of patients with prolonged period of catheter in the urinary bladder. But the same practices did not show a significant effect in case of patients with short period of catheter in the urinary bladder (Table 7).

TABLE 7

Rates of Acquired Bacteriuria in relation to risk factors for patients in the experimental and control groups

Risk factor	Experimental		Control		Chi-square
	No. of patients	Bacteriuric	No. of patients	Bacteriuric	
Sex Male n= 90	43	9	47	12	.27
Female n=110	60	10	50	18	5.37*
No. of hrs. catheter kept in situ					
Less than 72 hrs.					
n=126	57	6	69	7	.005
More than 72 hrs.					
n= 74	46	13	28	23	20.23**

* Significant at .05 level

** Significant at .01 level

The implemented practices were also effective in reducing the acquisition of bacteriuria in the case of females. But it was found to have no effect in case of males (Table 7).

Conclusion

The result of this study is significant in that it is effective in reducing the incidence of acquired bacteriuria in adult open heart surgery patients on indwelling Foley's catheter (specially those who are on prolonged period of urine drainage and in females). Out of the three practices implemented, which were the cardinal ones in reducing the acquisition of bacteriuria could not be found out. All of them may not have helped in reducing the acquisition of bacteriuria. Many authors have found out that closed drainage system alone can reduce the incidence of urinary Tract Infection to 15-25% and it has been adopted by many countries. Twice daily antibacterial cleansing of the metal catheter junction

and use of sterile technique during catheter insertion reduced the incidence of bacteriuria in both open and closed collecting system (Stamm 1975). But catheter care using Povidone-Iodine solution and ointment and also with nonantiseptic soap and water were found to be ineffective in two experimental studies done by Burke *et al* (1981).

The results of the present study should serve to encourage the use of closed drainage system and twice daily catheter care using freshly prepared savlon 1/100 and application of Neomycin ointment, specially in case of females and also those who are on prolonged period of urine drainage.

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