A DESCRIPTIVE STUDY OF THE RISK FACTORS FOR CATHETER- ASSOCIATED BACTERIURIA IN A MEDICAL INTENSIVE CARE UNIT OF ADESH GROUP HOSPITAL, BATHINDA & MUKTSAR (PB)

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ABSTRACT

Catheter-associated bacteriuria (CAB) is the most common nosocomial infection acquired in medical ICUs. The objective of this study was to examine the independent risk factors for CAB in medical ICU patients. The study included 110 adult catheterized patients who were admitted to the Adesh Group Hospital, Bathinda & Muktsar (Pb) intensive care unit in a one –year period between Feb. 2011-12. The selected patients were required to have a negative urine culture at the time of admission and duration of catheterization >48 hours. The following variables were analyzed as possible risk factors for CAB, defined as a quantitative culture with > or=105 organisms/ml: age , sex ,apache II score at admission , duration of catheterization, duration of ICU stay and prior systemic antibiotic exposure during hospitalization. In this study 12 out of 110 patients developed CAB following bladder catheterization (10.9 %). The risk was significantly higher for patients on prolonged catheterization. The study shows that the most significant independent risk factor for CAB is the duration of catheterization. Hence, to decrease the rate of CAB acquisition in medical ICUs the use of urinary catheters must be limited and when necessary removal of the bladder catheter must be performed as soon as possible.

Keywords: catheter-associated; bacteriuria; risk factor; medical intensive care unit

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BACKGROUND OF THE STUDY

The urinary tract is the most common site of nosocomial infection[1,2,3] and most of these infections follow instrumentation of the urinary tract, mainly urinary catheterization and is a frequent cause of significant morbidity, sepsis and death.[4]

Intensive care units are a meeting point between the most severely ill patients receiving aggressive therapy and the most resistant pathogens which are selected by the use of broad-spectrum antimicrobial therapy.[5]

NEED OF THE STUDY

Most ICU patients require an indwelling urinary catheter to monitor urine output, a practice which increases infectious risk.

The fact that 25-50% of nosocomial infections are due to the combined effect of the patient's own flora and these invasive devices highlights the importance of improvements in the use and design of such devices.[6]

E.coli, Proteus, Pseudomonas, Klebsiella, Serratia, Staphylococci, Enterococci, and Candida are the pathogens that usually cause these infections.

OBJECTIVES

The study aims to assess the independent risk factors for catheter associated bacteriuria such as age , sex, severity score at admission using apache 2 scoring, duration of catheterisation, duration of ICU stay and antibiotic exposure during hospitalisation.

RESEARCH METHODOLOGY

The study included 110 adult catheterised patients who were admitted to the Adesh Group Hospital, Bathinda & Muktsar (Punjab) intensive care unit in a one-year period between Feb. 2011-12. The selected patients were required to have a negative urine culture at the time of admission and duration of catheterisation >48 hours. The following variables were analysed as possible risk factors for CAB, defined as a quantitative culture with > or=105 organisms/ml: age , sex ,apache II score at admission (estimated with the Apache II scoring system – i.e, acute physiology and chronic health evaluation system. This system estimates the risk of hospital death based on the severity of the disease. There are 3 components, [a]- physiological variables, [b]- age points, [c]- chronic health points. Total apache II is the sum of a+b+c), duration of catheterisation, duration of ICU stay and prior systemic antibiotic exposure during hospitalisation.

Table-1: Variables under Study

Characteristics	No. of patients	Percentage
Gender		
Male	80	72.72
Female	30	27.27
Age in years		
45-55	26	23.63
56-65	68	61.81
66-75	16	14.54
Apache score		
15-19	46	41.80
20-24	35	31.80
25-29	20	18.10
30-35	09	8.10
Antibiotic exposure		
Yes	105	95.45

No	05	04.50
Duration of Catheterisation		
3-7 days	30	27.20
8-14 days	68	61.80
15-21 days	12	10.90
ICU stay		
<1 week	39	29.00
1-2 week	72	65.40
2-3 week	6	5.40

Table – 2: Development of CAB **(n=12)**

Male	11	91.6%
Female	1	8.3%
Total	12	10.9%

Table – 3: Organisms causing CAB **(n=12)**

Organisms	No. of patients	Percentage
E.COLI	5	41.6
ENTEROCOCCUS	3	25.0
PSEUDOMONAS	2	16.6
PROTEUS	2	16.6

Table-4: Time of Development of CAB **(n=12)**

First Week	2 patients	2/12 (16.6%)		No Symptoms	Routine culture at the end of 1st week
Second Week	10 patients	10/12 (83.4%)	6 patients	No symptoms	Routine culture at the end of 2nd week
			1 patient	Dysuria & Fever	Day-9 (Female)
			1 patient	Dysuria & Fever	Day-12
			1 patient	No symptoms	Day -10
			1 patient	No symptoms	Day-12 (at the time of removal of catheter)

Table-5: Mortality

No. of deaths	Week	Percentage
2 patients	**First week**	**1.81**
6 patients	**Second week**	**5.45**

Table-6: Variable analysis (CAB vs Non CAB Patient)

	Age		Apache score		Duration of catheterization		ICU stay	
Group	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Group-1 (98)	**58.12**	**6.52**	**21.32**	**4.98**	**10.97**	**3.47**	**10.19**	**2.69**
Group-2 (12)	**56.83**	**6.89**	**21.00**	**5.05**	**11.75**	**2.80**	**13.83**	**2.33**

Table-7: Variable analysis (Gender)

	Age		Apache score		Duration of catheterization		ICU stay	
Gender	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	58.31	6.72	21.27	5.02	10.56	3.36	10.81	2.90
Female	57.10	6.05	21.33	4.91	9.77	3.58	10.00	2.77

RESULTS

Out of 110 patients who received an indwelling urinary catheter, 12 patients (10.9%) acquired CAB. Two out of the 12 patients (16.6%), who did not have any symptoms, were detected to have CAB during routine examination at the end of 1st week, while the rest of the patients acquired CAB (83.3%) during the 2nd week

Duration of catheterisation that can produce CAB was found to be approximately 10.5 days. 11 out of 12 patients were males (91.6%).

The pathogens isolated among the patients with bacteriuria were E.coli (41.6%), Enterococcus (25%), Pseudomonas aeruginosa (8.3 %) and Proteus (8.3%).

Patients with bacteriuria had longer duration of catheterisation than patients who did not acquire bacteriuria.

Thus according to statistical analysis, duration of catheterisation was the only variable that attained statistical significance.

The other variables like age, female sex, length of ICU stay, antibiotic exposure and severity score did not attain statistical significance.

DISCUSSION

As reported in other studies, we found the duration of catheterisation to be the major independent risk factor for CAB.[22,29,30] These results may be attributed to the pathogenesis of CAB, including the following two previously identified mechanisms of infection: (1) extraluminal infection by direct inoculation at the time catheter insertion or infection ascending from the perineum in the mucous film contiguous to the external catheter; and (2) intraluminal infection by reflux of the organisms into the catheter lumen, facilitated by either failure of the system or contamination of the urine collection bag.

In both cases, the duration of catheterisation increased the risk of an external mucous film being formed and the risk of faulty catheter management. This result underlines the necessity to reduce the duration of catheterisation to avoid the occurrence of bacteriuria in ICU patients.

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