

Thesis Title Risk of Catheter-Associated Urinary Tract
Infection in Pediatric Intensive Care and
Pediatric Surgery Units

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ABSTRACT

A randomized clinical trial was undertaken to compare the risk of catheter-associated urinary tract infection (UTI) between closed and open drainage urinary catheterization system. This study was conducted during February to August 1992 in pediatric intensive care unit (PICU) and pediatric surgery unit (PSU) at "Harapan Kita" Children and Maternity Hospital, Jakarta Indonesia.

Patients who met the eligibility criteria of the study were randomized to receive a closed or open drainage catheterization system. Urine samples were collected at the time of catheter insertion and every morning during the period of indwelling catheterization for 7 days, or until the development of catheter-associated UTI (growth of $\geq 10^5$ CFU of any organism per ml urine), or until discontinuation of catheterization. Blood-sheep and McConkey agar plates were used for culture examination of urine samples.

Sixty nine patients were included in this study, their age range from 2 months to 13 years old, consist of 25 males and 44 females; 34 were allocated to closed and 35 to open drainage system groups. Patients randomized to the two drainage system were comparable in their baseline characteristics.

Approximately 23% of all patients monitored daily acquired UTI after the period of catheterization from one to seven days. *E.coli* was the etiologic agent of half of patients with catheter-associated UTI. Nearly 80 per cent of microorganisms isolated in urine culture were sensitive to many antibiotics.

Female patient who required catheterization have 8.5 times higher risk of developing catheter-associated UTI than

do male patients in this study ($p = 0.01$). The risk of catheter-associated UTI relates to the duration of catheterization and ranges from 7% - 20% per day, over the first 7 days of catheterization. The mean duration of hospitalization among patient with catheter-associated UTI was 3.4 days longer than patients without UTI, but the difference was not statistically significant ($p=0.17$).

Eight patients in each group developed catheter-associated UTI and the total number of catheterization days observed were 127 in closed and 118 in open drainage system groups. Computation of cumulative incidence ratio (\widehat{CIR}), incidence density ratio (\widehat{IDR}) and survival analysis indicated that there is no statistical significance different in occurrence of catheter-associated UTI between closed and open drainage system groups. The relative risk according to cumulative incidence for patient with open drainage system was 0.97 (95% CI = 0.41 - 2.29, and $p = 0.83$) comparing to closed system. Crude incidence density ratio (\widehat{cIDR}) for open system was 1.08 (95% CI = 0.40 - 2.87, and $p = 0.88$), comparing to closed system. When adjusted for sex, age and diarrhea, the adjusted incidence density ratio (\widehat{aIDR}) increase to 1.39 (95% CI = 0.46 - 4.21) but still not statistically significant ($p=0.56$). The median survival times of developing UTI for both group were exactly the same, at the 7 days of catheter-

ization. Comparison of survival times of developing UTI between two groups by Gehan-Wilcoxon and logrank methods were not statistically significant different ($p = 0.41$ and 0.63 , respectively).

Leukocyte count and nitrite test have very low sensitivity for diagnosis of catheter-associated UTI comparing to urine culture as the "gold standard" (36% and 28%, respectively). The use of unstained centrifuged urine to detect the presence of bacteria as the test for UTI has the highest sensitivity (60%) compare to leukocyte count and nitrite test. Specificity of that three tests were high (87% - 98%).

Comparing the results of urine culture between our laboratory and the reference laboratory by Kappa statistic method revealed Kappa value = 0.69, which reflect a good agreement between two laboratories.