Not all nosocomial Escherichia coli bacteriurias are catheter associated

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Not All Nosocomial Escherichia coli Bacteriurias Are Catheter Associated

Urinary tract infections (UTIs) are the most common hospital-acquired infections and are thought to be primarily a consequence of urinary catheterization. Strategies to prevent hospital-acquired UTIs focus almost exclusively on urinary catheter management. However, data to support the assumption that hospital-acquired UTIs can be equated with catheter-associated UTIs are very limited. In a recent editorial for a nationwide survey of practices to prevent hospital-acquired UTIs, the author stated that 80% of these infections were catheter associated but did not provide a reference.

We performed a 12-month prospective cohort study involving inpatients with Escherichia coli bacteriuria (defined as greater than or equal to 5 × 10⁵ colony-forming units/mL in a clean-voided urine culture, or greater than or equal to 5 × 10⁴ colony-forming units/mL in urine culture from a catheterized patient) starting August 1, 2009, at Barnes-Jewish Hospital, a 1,250-bed teaching hospital in Missouri. Adult patients with a first positive urine culture 48 hours or more after admission were included. Urine cultures were performed at the treating physician’s discretion. We excluded patients with polymicrobial bacteriuria and/or concurrent, non–catheter-associated bacteriuria ( ). Independent factors predisposing to catheter-associated bacteriuria were more likely to be male ( ), to have renal insufficiency ( ), and to have undergone a recent urological procedure ( ). There was no difference in the prevalence of ASB ( ).

One hundred fifty-one patients with bacteriuria (83%) received antibiotic treatment, including 64 (83%) of the patients with ASB. The presence of a catheter did not determine whether antibiotics matched susceptibilities (70 [99%] of 71 with catheter vs 77 [96%] of 80 without catheter; ). Among those patients tested for bacteremia, there was no difference in the frequency of bacteremia ( ), as was the length of hospital stay after bacteriuria ( ). Independent factors predisposing to catheter-associated bacteriuria in bacteriuric patients are shown in Table 1.

It is widely assumed that the terms “hospital-acquired bacteriuria” and “catheter-associated bacteriuria” are synonymous. However, few data actually quantify urinary catheterization as a precursor of bacteriuria. The 1983 Centers for Disease Control and Prevention guidelines for prevention of catheter-associated UTI state that 66%–86% of episodes of hospital-acquired bacteriuria are secondary to urinary instrumentation. The corresponding reference does not explicitly provide this information. Also, to our knowledge, this statement has not been reevaluated over the past 3 decades. We found that only 46% of cases of hospital-acquired bacteriuria in a tertiary-care hospital were catheter associated, which is lower than was previously suspected. Why there was such a high proportion of noncatheterized patients with bacteriuria is unclear. Changes in genitourinary hygiene during hospitalization may play a role, as could medications that alter the bladder function. It is possible that hospital policies to reduce unnecessary device use resulted in a lower proportion of catheter-associated bacteriuria. The development of targeted preventive measures clearly depends on a better understanding of the pathogenesis of non–catheter-associated nosocomial bacteriuria.

In noncatheterized patients, ASB may have been present before hospital admission but remained undetected until later in the hospital course, leading to patients being mislabeled as having nosocomial bacteriuria. Testing this hypothesis would require that admission urine samples for culture be obtained from patients. Antibiotic treatment of ASB was common (occurring in 83% of cases), independent of catheter status. Although ASB-related antibiotic overuse in long-term care fa-
TABLE 1. Comparison of Patients with Catheter-Associated and Non-Catheter-Associated Hospital-Acquired Escherichia coli Bacteriuria

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (n = 183)</th>
<th>Catheter-associated (n = 85)</th>
<th>Non-catheter-associated (n = 98)</th>
<th>P</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex</td>
<td>46 (25)</td>
<td>30 (35)</td>
<td>16 (16)</td>
<td>.003</td>
<td>2.8 (1.4–5.7)</td>
</tr>
<tr>
<td>White race</td>
<td>124 (68)</td>
<td>60 (71)</td>
<td>64 (65)</td>
<td>.4</td>
<td>...</td>
</tr>
<tr>
<td>Age, median years (range)</td>
<td>70 (20–98)</td>
<td>68 (24–96)</td>
<td>71 (20–98)</td>
<td>.9</td>
<td>...</td>
</tr>
<tr>
<td>Body mass index, median index (range)</td>
<td>27.1 (12.1–64.2)</td>
<td>27.0 (17.2–64.2)</td>
<td>27.3 (12.1–63.1)</td>
<td>.7</td>
<td>...</td>
</tr>
<tr>
<td>Charlson comorbidity score, median score (range)</td>
<td>3 (0–13)</td>
<td>3 (0–13)</td>
<td>3 (0–11)</td>
<td>.4</td>
<td>...</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>64 (35)</td>
<td>31 (37)</td>
<td>33 (34)</td>
<td>.7</td>
<td>...</td>
</tr>
<tr>
<td>Renal insufficiency (Cr level &gt;1.5 mg/dL)</td>
<td>42 (23)</td>
<td>26 (31)</td>
<td>16 (16)</td>
<td>.02</td>
<td>2.2 (1.0–4.6)</td>
</tr>
<tr>
<td>Any malignancy</td>
<td>50 (27)</td>
<td>26 (31)</td>
<td>24 (25)</td>
<td>.4</td>
<td>...</td>
</tr>
<tr>
<td>Dementia</td>
<td>32 (18)</td>
<td>10 (12)</td>
<td>22 (22)</td>
<td>.06</td>
<td>0.5 (0.2–1.2)</td>
</tr>
<tr>
<td>Benign prostatic hyperplasia</td>
<td>12 (7)</td>
<td>8 (9)</td>
<td>4 (4)</td>
<td>.1</td>
<td>...</td>
</tr>
<tr>
<td>Urinary results results &gt;10 WBC/hpf</td>
<td>121 (66)</td>
<td>61 (72)</td>
<td>60 (61)</td>
<td>.1</td>
<td>...</td>
</tr>
<tr>
<td>Outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacteremia</td>
<td>9/70 (13)</td>
<td>3/33 (9)</td>
<td>6/37 (16)</td>
<td>.5</td>
<td>...</td>
</tr>
<tr>
<td>Length of hospital stay after bacteriuria, median days (range)</td>
<td>4.9 (0.1–66.1)</td>
<td>5.6 (0.2–36.5)</td>
<td>4.2 (0.1–66.1)</td>
<td>.08</td>
<td>...</td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>13 (7)</td>
<td>6 (7)</td>
<td>7 (7)</td>
<td>&gt;.99</td>
<td>...</td>
</tr>
</tbody>
</table>

Note. Data are no. (%) of patients unless otherwise specified. Hosmer-Lemeshow goodness-of-fit P = .635 (for the multivariate logistic regression model). Body mass index was calculated as the weight in kilograms divided by the square of height in meters. CI, confidence interval; Cr, creatinine; hpf, high-power field; OR, odds ratio; WBC, white blood cell.

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REFERENCES


