CAUTIs - How big is the problem?

CAUTI Project Improvement Launch
18th February 2016

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@IHDjournal @bgm_2012
Disclosures

• Editor-in-Chief, *Infection, Disease and Health*

• Previous recipient Covidien research grant – exploring staffing, completely unrelated to the topic of UTIs

• ACIPC research grant, exploring impact UTIs

• Ian Potter Foundation & ACU grant, exploring prevalence UTIs
What’s the problem?

1. Antimicrobial resistance
2. Prevalence
3. Impact for patients and for health services
4. Preventable
Background

• Urinary tract infections (UTIs) are common infections (Laupland et al., 2007)

• 150 million people/year globally (Gupta et al., 2001)

• 15%-25% of episodes have positive blood cultures (Bahgon et al., 2007)

• >80% caused by *Escherichia coli (E. coli)* (Nicolle, 2008)

• Community acquired (CA) or healthcare associated (HCA) classification
Problem 1: Antimicrobial resistance
Antimicrobial resistance

**Escherichia coli**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Year: 2000</th>
<th>Year: 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin %R</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Ampicillin %</td>
<td>47.8</td>
<td>50.5</td>
</tr>
<tr>
<td>Cefazolin %R</td>
<td>20.7</td>
<td>22.3</td>
</tr>
<tr>
<td>Ceftriaxone %NS</td>
<td>7.2</td>
<td>9.6</td>
</tr>
<tr>
<td>Ciprofloxacin %NS</td>
<td>8.1</td>
<td>10.6</td>
</tr>
<tr>
<td>Gentamicin %R</td>
<td>6.8</td>
<td>8.2</td>
</tr>
<tr>
<td>Meropenem %NS</td>
<td>0</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**Klebsiella species**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Year: 2000</th>
<th>Year: 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cefazolin %R</td>
<td>27.2</td>
<td>31.1</td>
</tr>
<tr>
<td>Ceftriaxone %NS</td>
<td>10.2</td>
<td>11.4</td>
</tr>
<tr>
<td>Ciprofloxacin %NS</td>
<td>5.5</td>
<td>6.1</td>
</tr>
<tr>
<td>Gentamicin %R</td>
<td>7.3</td>
<td>8.4</td>
</tr>
<tr>
<td>Meropenem %NS</td>
<td>0.4</td>
<td>0.4</td>
</tr>
</tbody>
</table>


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Cumulative annual change in urinary *E. coli* antimicrobial resistance

(Sanchez et al., 2012)
Urinary *Escherichia coli* antimicrobial susceptibility profiles and their relationship with community antibiotic use in Tasmania, Australia

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Fig. 1. Antimicrobial use and *Escherichia coli* resistance to that antimicrobial for (a) amoxicillin, (b) amoxicillin/clavulanic acid (AMC) and (c) cefalexin. The left y-axis shows the proportion of isolates in each month for 2010–2012, and the right y-axis shows the mean usage in that month for the 3 years. DDD, defined daily dose.

Table 3
Effects of season and time lag following increased antimicrobial use on resistance to amoxicillin.

<table>
<thead>
<tr>
<th>Outcome: Amoxicillin resistance</th>
<th>Univariate regression</th>
<th></th>
<th></th>
<th></th>
<th>Full model, multivariate</th>
<th></th>
<th></th>
<th>Final model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>P-value</td>
<td>OR (95% CI)</td>
<td>P-value</td>
<td>OR (95% CI)</td>
<td>P-value</td>
<td></td>
<td></td>
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<tr>
<td>Time (months from start)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Season (peak July)</td>
<td>1.00 (1.00–1.00)</td>
<td>0.96</td>
<td>1.00 (0.99–1.01)</td>
<td>0.09</td>
<td>1.18 (1.05–1.33)</td>
<td>&lt;0.01</td>
<td>1.19 (1.10–1.29)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Amoxicillin use</td>
<td>1.10 (1.02–1.18)</td>
<td>&lt;0.01</td>
<td>0.98 (0.92–1.04)</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin use, 1-month lag</td>
<td>1.06 (1.01–1.11)</td>
<td>0.02</td>
<td>1.06 (1.00–1.12)</td>
<td>0.05</td>
<td></td>
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<tr>
<td>Amoxicillin use, 2-month lag</td>
<td>1.07 (1.02–1.12)</td>
<td>&lt;0.01</td>
<td>1.12 (1.05–1.20)</td>
<td>&lt;0.01</td>
<td>1.11 (1.05–1.18)</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin use, 3-month lag</td>
<td>1.07 (1.02–1.13)</td>
<td>&lt;0.01</td>
<td>0.97 (0.92–1.02)</td>
<td>0.19</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

OR, odds ratio; CI, confidence interval.
Antimicrobial resistance: UTIs and patients

- UTIs are common
- Are becoming increasingly resistant to antimicrobials
- Treatment challenges in the future
  - Increased treatment failure
  - Increased demand / use other ABs (cost, resistance, increase hospitalisation)
Problem 2: Prevalence
Problem 2: Prevalence

Breakdown of HAIs

% total of HAIs

Gastro.  Urinary  Surgical  Pneum.  Soft tiss.  BSI  Other

- Catheter-associated

Problem 2: Prevalence

STRUTI Project (2013): (Surveillance to reduce UTIs)

• HAUTI = 1.4%
• CAUTI 0.9%

• 26% of patients received a catheter
Problem 3: Impact for patients and for health services
Problem 3: Patients and health services

STRUTI Project (Phase 2) (2015)

• 82 acute care hospitals; 17 aged care facilities

• HAUTI prevalence
  – X% (95% (CI XX-XX%)) in acute care
  – XX% (95% CI XX-XX%) in aged care.

• Catheter use
  – acute care (XX%)
  – aged care (XX%)

(currently under review)
Problem 3: Patients and health services

- Mortality & length of stay associated with HAUTIs
- Noncurrent cohort study, 4.5 years, 8 NSW hospitals
- Mortality: Cox regression model
- LOS: Multistate model

(accepted Journal Hospital Infection)
Problem 3: Patients and health services

• HAUTI incidence: 1.73% (95% CI 1.67–1.80)
• Females more likely (unadjusted OR 2.5; 95% CI 2.3–2.7).
• Mortality: varies….
• Extra LOS = four days (95% CI 3.1–5.0)
• Infection significantly reduced the rate of discharge
• Women were more likely to acquire an infection and more likely to be discharged. The elderly were less likely to be discharged

(accepted Journal Hospital Infection)
Problem 4: Preventable
Problem 4: Preventable

UTIs are one most common HAIs
CAUTIs represent a large proportion of these
Reducing CAUTIs = Reduction in HAIs overall

Preventable: Catheter use, common & inappropriate

- Tertiary hospital, 54% inappropriate use, 13% documented reason (Gokula et al, 2004)

- Of 886 admissions, 10.7% catheter first 24hrs, 38% no justifiable reason (Munasinghe et al, 2001)

- STRUTI study: 26% patients received a catheter. 61% no documented reason; 71% no idea who inserted it (Mitchell, 2015)

- Survey 288 physicians, 31% didn’t know pt had catheter, 41% inappropriately catheterised - Saint et al (2000)
Preventable: Risk Factors

- Female
- Older age
- Non maintenance of closed system
- Catheter duration
- Risk of bacteruria increases with days of catheterisation
  5% per day that catheter is in place

Preventable: Guidelines

- ACIPC / ASID (HICSIG)
- HICPAC
- European and Asian guidelines
- EPIC3
- SHEA/IDSA
- NHMRC ICGs
The impact of HAUTIs and CAUTIs

• Emerging problem for patients and the health service
• Current impact is not insignificant
• Common
• Preventable

• QI programs
• Research
• Surveillance


References

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