Clinical Pharmacist x ADE

- The presence of a pharmacist on rounds as a full member of the patient care team in a medical ICU was associated with a substantially lower rate of ADEs caused by prescribing errors. Nearly all the changes were readily accepted by physicians. JAMA 1999 Jul 21;282(3):267-70

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São Paulo

ICU EINSTEIN
- Intensivists
- Medical residents
- Multidisciplinary residents
- In 2000 - Joint Commission Certificate

Clinical Pharmacy – Einstein Hospital
- 2000 – First clinical pharmacist - ICU
- 2003 – Geriatric and oncologic patients
- 2005 – All hospital’s units

Nowaday
- 55 pharmacists - ~30 clinical pharmacists
- 15 different activities and protocols
- Daily Analyse Antibiotics orders (prophylactics and treatments)
- Opioids use
- Human Albumin use
- Anticoagulants
- Drug interactions
- Adverse drugs reactions

Pharmacy Service
- Unit dose
- Injectable preparations
- Orders analyses
- Electronic system - Pyxis
- Satelits Pharmacist

<table>
<thead>
<tr>
<th>Year</th>
<th>Intervention (n)</th>
<th>Patient day</th>
<th>Intervention/ patient day</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>1726</td>
<td>124736</td>
<td>0.014</td>
</tr>
<tr>
<td>2004</td>
<td>2577</td>
<td>137443</td>
<td>0.019</td>
</tr>
<tr>
<td>2005</td>
<td>6099</td>
<td>241941</td>
<td>0.041</td>
</tr>
<tr>
<td>2006</td>
<td>18672</td>
<td>140144</td>
<td>0.132</td>
</tr>
<tr>
<td>2007</td>
<td>27337</td>
<td>188790</td>
<td>0.151</td>
</tr>
<tr>
<td>2008</td>
<td>23369</td>
<td>150445</td>
<td>0.159</td>
</tr>
<tr>
<td>2009</td>
<td>23655</td>
<td>159740</td>
<td>0.161</td>
</tr>
<tr>
<td>2010</td>
<td>30727</td>
<td>181045</td>
<td>0.168</td>
</tr>
</tbody>
</table>

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Rational Use of Antibiotics

An*bio*c prophylaxis protocol

- Preintervention stage (2001 jan to may) a survey of all antimicrobial prescriptions in the ICU - 50.5% (53/105) of the surgical patients with antimicrobial prophylaxis in the ICU actually had discontinuation of prophylaxis within 48 hours after surgery

Antibiotic prophylaxis protocol

- In 2001, a project was designed to improve compliance with discontinuation of antimicrobial agents within 48 hours after surgery in ICU patients

- Pharmacist and an infectious diseases physician identified the surgical patients daily and followed up on the duration of antimicrobial prophylaxis.

- Goal: to improve compliance with discontinuation of antimicrobial agents within 48 hours after surgery in ICU

- Patients included: those with length of stay over 48 hours in the ICU

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Results

No associated increase in the SSI rates, and there was no impact on consumption of antimicrobials

Conclusion

• There was increased compliance with discontinuation of antimicrobials within 48 hours for surgical prophylaxis in the ICU of our institution,
• The results were sustained over time.
• There was no associated increase in the SSI rates, and there was no impact on consumption of antimicrobials.
• Implementation, maintenance, and follow-up of the protocol were activities that involved a multidisciplinary team, which is absolutely essential, considering the importance of continuing education to ensure sustained success

Results

Independent predictors of death

• Patient age - an estimated increase of 14% in likelihood of death for each additional year of age
• Length of stay - an increase of 4% in likelihood of death for each hospital day
• Surgical time - and an increase of 46% in likelihood of death for each hour of surgery

Results

No associated increase in the SSI rates, and there was no impact on consumption of antimicrobials

Results

No associated increase in the SSI rates, and there was no impact on consumption of antimicrobials
limiting antimicrobial therapy duration

Antimicrobial therapy duration

- The prospective study - from November 2006 to August 2007.
- Antimicrobial therapy was reviewed on a daily basis by a physician and a pharmacist.
- Interventions were performed in the use of antimicrobial agents when they had been prescribed for more than 14 days.
- Avoidance of carbapenems was emphasized.

Antimicrobial therapy duration

- In phase 1 less than 50% of the prescribed antibiotics in the ICU were discontinued before 14 days.

DDD/1000 patient days – Before and after protocol – difference of consumption.

<table>
<thead>
<tr>
<th>Name</th>
<th>System 1</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>% difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st generation cephalosporins</td>
<td>54.8</td>
<td>49.7</td>
<td>87.4</td>
<td>30.8% (↓)</td>
</tr>
<tr>
<td>2nd generation cephalosporins</td>
<td>14.4</td>
<td>22.2</td>
<td>13.9</td>
<td>30.8% (↑)</td>
</tr>
<tr>
<td>3rd generation cephalosporins</td>
<td>-</td>
<td>13.9</td>
<td>13.9</td>
<td>30.8% (↑)</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>37.8</td>
<td>44.4</td>
<td>18.5</td>
<td>34.5% (↓)</td>
</tr>
<tr>
<td>Ceftaxime</td>
<td>32.9</td>
<td>14.9</td>
<td>44.4</td>
<td>34.5% (↑)</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>6.8</td>
<td>15.6</td>
<td>15.6</td>
<td>14.4% (↑)</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>3.4</td>
<td>4.4</td>
<td>4.4</td>
<td>14.4% (↑)</td>
</tr>
<tr>
<td>Erythromycin/Aminoglycosides</td>
<td>-</td>
<td>4.4</td>
<td>4.4</td>
<td>14.4% (↑)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>122.8</td>
<td>118.5</td>
<td>114.3</td>
<td>3.7% (↓)</td>
</tr>
</tbody>
</table>


Proportion of antimicrobial resistant strains among pathogens causing nosocomial infection in the ICU

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>% difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acinetobacter spp.</td>
<td>6.9</td>
<td>5.7</td>
<td>3.7% (↓)</td>
</tr>
<tr>
<td>Pseudomonas spp.</td>
<td>1.9</td>
<td>1.5</td>
<td>21% (↓)</td>
</tr>
<tr>
<td>Enterococcus spp.</td>
<td>3.2</td>
<td>3.2</td>
<td>0% (↓)</td>
</tr>
<tr>
<td>Staphylococcus spp.</td>
<td>5.6</td>
<td>5.3</td>
<td>5.3% (↓)</td>
</tr>
<tr>
<td>Other coagulase-negative staphylococci</td>
<td>1.2</td>
<td>1.2</td>
<td>0% (↓)</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>1.2</td>
<td>1.2</td>
<td>0% (↓)</td>
</tr>
<tr>
<td>Other enteric bacteria</td>
<td>3.2</td>
<td>3.2</td>
<td>0% (↓)</td>
</tr>
<tr>
<td>Bacillus spp.</td>
<td>1.2</td>
<td>1.2</td>
<td>0% (↓)</td>
</tr>
<tr>
<td>Other gram positives</td>
<td>1.2</td>
<td>1.2</td>
<td>0% (↓)</td>
</tr>
<tr>
<td>Total</td>
<td>1.2</td>
<td>1.2</td>
<td>0% (↓)</td>
</tr>
</tbody>
</table>


Conclusion

- Our results suggest that the intervention contributed to the use of antimicrobial agents in a more rational way and to the reduction of bacterial resistance in the ICU of the hospital.
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Antimicrobial therapy
Acceptance of the medical protocol - adequacy antimicrobial therapy in 14 days

Antibiotic prophylaxis protocol

Future
- Antibiotic pharmacist specialist

Thanks!
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