Factors influencing clinician’s coherence with local antimicrobial guidelines in the management of sepsis

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Sir,

Sepsis is frequent, potentially fatal condition characterised by organ dysfunction as a result of a dysregulated host response to infection [1]. We estimated that the combined point-prevalence of sepsis is around 5.5% amongst hospital in-patients in Wales [2, 3]. It has been argued that rapid administration of an appropriately chosen antibiotic is the cornerstone of the effective treatment of sepsis [4].

Recently, a standardised sepsis screening tool and the Sepsis 6 treatment protocol has been rolled out across Wales [5]. However, the antibiotic prescribing element has been traditionally based on local guidance and antimicrobial resistance patterns [6]. Evidence suggests that incorrect antibiotic prescribing may lead to an increased emergence of antibiotic resistant organisms [7]. Therefore, it is crucial that local guidance is followed.

Our aim was to explore adherence to local guidelines and establish an understanding as to why, in clinical practice, prescribing patterns may differ.

We obtained data based on the antibiotic prescribing patterns across hospitals in Wales from the Defining Sepsis on the Wards Study which has been described previously in detail (ISCRTN: 86502304) [3]. Briefly, it was a point-prevalence study in every Welsh hospital over a 24-hour period on the 19/10/2016. Patients with National Early Warning Score of 3 or above with clinical suspicion of infection were recruited following informed consent. Various demographic, care process and outcome data were collected, including antibiotic prescribing and administration.

We contacted the critical care outreach or acute intervention teams in the hospitals where this service is provided, to identify barriers to successfully implement early and appropriate antibiotic therapy as part of the Sepsis 6 initiative. Data were analysed using Microsoft Excel.

Within the study period there were similar numbers of patients with sepsis in each hospital (Table 1). Antibiotic treatment within one hour was administered at a variable rate, from 27% to 64%. In 35% of all cases of sepsis, the cause was unknown and within this sub-group the percentage of antibiotics prescribed was slightly higher, varying from 20% to 90%.

In accordance to local guidelines, antibiotic prescribing for patients with sepsis of unknown origin was correct in 22% of cases (Table 2). Out of the patients who did receive antibiotics, the majority of them received either an incorrect antibiotic regime (59%) or a partially correct antibiotic regime (19%).

There was significant inter-hospital variability in the correct prescription of antimicrobials. In many cases, partially correct antibiotic regimes were administered, as only one of the two suggested antibiotics were prescribed (Table 2).

Four key barriers to effectively implementing the antibiotic therapy in the Sepsis 6 initiative were identified:
1. Lack of education — understanding when to trigger the pathway.
2. Complexity of guidelines.
3. Lack of a leadership role — giving IV antibiotics requires communication between different healthcare professionals.
4. Practical issues — sourcing equipment or acute bed shortages.

Table 1. Patterns of antibiotic prescribing in sepsis across hospitals with outreach services in Wales

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Number of patients with sepsis</th>
<th>% of patients with sepsis who received antibiotics</th>
<th>% of patients with sepsis of unknown origin</th>
<th>% of patients with sepsis of unknown origin who received any antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morriston Hospital</td>
<td>37</td>
<td>27.0</td>
<td>35.1</td>
<td>30.8</td>
</tr>
<tr>
<td>Princess of Wales Hospital</td>
<td>39</td>
<td>53.9</td>
<td>35.9</td>
<td>78.6</td>
</tr>
<tr>
<td>Prince Charles Hospital</td>
<td>39</td>
<td>53.9</td>
<td>35.9</td>
<td>57.1</td>
</tr>
<tr>
<td>Royal Glamorgan Hospital</td>
<td>38</td>
<td>44.7</td>
<td>36.8</td>
<td>57.1</td>
</tr>
<tr>
<td>Royal Gwent Hospital</td>
<td>38</td>
<td>57.9</td>
<td>29.0</td>
<td>90.9</td>
</tr>
<tr>
<td>University Hospital of Wales</td>
<td>33</td>
<td>63.6</td>
<td>30.3</td>
<td>70.0</td>
</tr>
<tr>
<td>Wrexham Maelor Hospital</td>
<td>34</td>
<td>58.8</td>
<td>44.1</td>
<td>66.7</td>
</tr>
<tr>
<td>Nevil Hall Hospital</td>
<td>33</td>
<td>54.6</td>
<td>30.3</td>
<td>20.0</td>
</tr>
<tr>
<td>Average</td>
<td>36</td>
<td>51.8</td>
<td>34.7</td>
<td>58.9</td>
</tr>
</tbody>
</table>
Table 2. Percentage of times antibiotic prescribing was correct, partially correct or incorrect, based on local guidelines

<table>
<thead>
<tr>
<th>Hospital</th>
<th>% of time correct antibiotic regime given</th>
<th>% of time partially correct antibiotic regime given</th>
<th>% of time incorrect antibiotic regime given</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morriston Hospital</td>
<td>75</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Princess of Wales Hospital</td>
<td>27</td>
<td>0</td>
<td>73</td>
</tr>
<tr>
<td>Prince Charles Hospital</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Royal Glamorgan Hospital</td>
<td>13</td>
<td>75</td>
<td>13</td>
</tr>
<tr>
<td>Royal Gwent Hospital</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>University Hospital of Wales</td>
<td>0</td>
<td>29</td>
<td>71</td>
</tr>
<tr>
<td>Wrexham Maelor Hospital</td>
<td>60</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Nevil Hall Hospital</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Average</td>
<td>22</td>
<td>19</td>
<td>59</td>
</tr>
</tbody>
</table>

NB — antibiotic prescribing was partially correct in cases where local guidelines recommended two different antibiotics and only one was prescribed.

Despite ongoing awareness campaigns and generalised belief that sepsis care is improving, none of the hospitals had clinicians that prescribed antibiotics in every case.

Compliance was reduced when guidelines became more detailed and critical care outreach teams identified the complexity of administrating intravenous antibiotics as one of the barriers to successfully implementing the Sepsis 6 bundle. Others identified barriers included; inadequate education, lack of a leadership role within departments and practical issues such as bed space and access to equipment.

Evidence suggests that early antibiotic use may be associated with a better outcome in sepsis [8]. Whilst only half of our patients received antibiotics in the first hour, this is better than the 35–40% observed in a recent cluster-randomised trial [8]. Unfortunately, those who did receive antibiotics, prescribing was often inconsistent with local guidelines. Previously it was found that less than half of doctors use local guidelines when choosing an appropriate antibiotic but instead use the British National Formulary due to the perceived validity of a national guideline [9].

Compliance with local guidelines is influenced by key factors, including the doctor’s knowledge, attitude and behaviour [10]. Poor guideline adherence could also result from inadequate dissemination of the recommended information [9]. We suggest that the knowledge of healthcare professionals is one of the most important aspects and it is therefore vital that they are trained in the recognition and early management of sepsis.

A multifaceted approach is needed to improve compliance with local guidelines. This may include the following: simplification of existing guidelines, their dissemination and reinforcement; the recruitment of local champions, frequent educational sessions for healthcare professionals and having a tangible goal or outcome that is regularly audited i.e. percentage of antibiotics correctly prescribed in cases of sepsis [8].

In conclusion, this study has highlighted the lack of coherence with local antimicrobial guidelines in hospitals across Wales. Our study’s results suggest that the success of quality improvement in sepsis care depends on the existence of an embedded patient safety-centered local leadership and the capability for interdisciplinary cooperation.

ACKNOWLEDGEMENTS

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formed by the members of the WDDCP collaborators. PM and TSZ performed the data analysis. The manuscript was drafted by PM and revised following critical review by TSZ.

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