Antibiotic Prescribing in suspected COVID-19 in acute Scottish hospitals

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Chair of SAPG
Background – April 2020

• SARS-CoV-2 infection/ COVID-19
  • Management = best supportive care
  • Antibiotic therapy if bacterial infection suspected

• Published experience
  • Low rates of bacterial co-infection at presentation (contrast with severe influenza)
  • Prolonged ventilation/organ support associated with nosocomial infection
  • High rates of antibiotic prescribing (>90% China, >75% ISARIC)
  • No qualitative prescribing data
Scottish perspective

• Scotland, 3rd March 2020
• COVID-19 poses significant AMS challenge
  • Clinical/diagnostic uncertainty
  • Overlapping syndrome with CAP/LRTI
  • SAPG produced guidance for prescribing/AMS for AMTs 12th and 23rd March
• Need to better understand hospital prescribing in context of COVID-19
Methods

• Point prevalence survey of antibiotic use designed
• AMTs invited to participate across all Scottish HBs
  • Acute hospitals
  • COVID-19 wards and critical cars (ITU, HDU) units
• Data collection
  • Single day between 20\textsuperscript{th} - 30\textsuperscript{th} April 2020
  • >80 data collectors
  • All patients on designated wards who had undergone testing for SARS-CoV-2 via NP swab RT-PCR (+/-) included
  • Antibiotics/ no antibiotics
  • Factors associated with prescribing on day of survey investigated
Results

• **Confirmed COVID-19 cases** in Scottish hospitals during PPS
  • Daily mean 1422 during survey

• **Survey population**
  • 8 Health Boards
  • 15 hospitals
  • 112 wards / critical care units
  • 1061 patients screened

• **820 patients surveyed**
  • 52% male, median age 71 (IQR 59-81)
  • 531 SARS-CoV-2 positive: 289 SARS-CoV2 negative
  • c.37% of NHS Scotland SARS-CoV-2 positive inpatient population surveyed
Timing of SARS-CoV-2 Result (n= 531)

- 15.4% Pre-admission
- 59.8% < 3 days
- 6.7% 3-7 days
- 8.6% 8-14 days
- 9.5% >14 days

22.1% Probable/Definite HAI

NB Readmission not taken into account
Antibiotics prescribed

96.5% empirical

P<0.01

Pre-hospital

Admission

Date of survey

29

62

45

38

57

All

Positive

Negative
Indication for Antibiotics on day of survey

- Resp: 270, 74%
- UTI: 37, 10%
- Systemic: 13, 4%
- SSTI: 15, 4%
- GU: 10, 3%
- Other: 19, 5%

Total: 374
491 Antibiotics prescribed in 368 patients

No of Antibiotics

1: 263 (71%)
2: 88 (24%)
3: 17 (4%)
Factors associated with a prescription of antibiotic on day of survey

Table 5
Multivariable analysis of factors associated with antimicrobial prescribing in patients who had confirmed COVID-19.

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>Lower 95% CI</th>
<th>Upper 95% CI</th>
<th>Wald test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probable or definite nosocomial COVID</td>
<td>0.54</td>
<td>0.35</td>
<td>0.83</td>
<td>0.006</td>
</tr>
<tr>
<td>COPD/Chronic lung disease</td>
<td>1.81</td>
<td>1.02</td>
<td>3.23</td>
<td>0.05</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.57</td>
<td>0.37</td>
<td>0.89</td>
<td>0.02</td>
</tr>
<tr>
<td>CRP ≥ 100 mg/l</td>
<td>1.52</td>
<td>1.00</td>
<td>2.33</td>
<td>0.06</td>
</tr>
<tr>
<td>Ward type Critical care</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward type Elderly</td>
<td>0.58</td>
<td>0.36</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Ward type Medical</td>
<td>0.98</td>
<td>0.66</td>
<td>1.44</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Seaton et al https://www.journalofinfection.com/article/S0163-4453(20)30616-2/fulltext
286 Antibiotics prescribed in 225 patients in wards with suspected RTI

Number

- Amoxicillin: 179 (75.6%)
- Doxycycline: 49 (21.8%)
- Co-amoxiclav: 6 (2.7%)
- Clarithromycin: 5%
- Azithromycin: 5%
- Levofloxacin: 5%
- Metronidazole: 5%
- Co-trimoxazole: 5%
- Gentamicin: 5%
- Vancomycin: 5%
- Ciprofloxacin: 5%
- Ceftriaxone: 5%
- Piperacillin -tazobactam: 5%
- Meropenem: 5%
- Flucloxacillin: 5%
- Temocillin: 5%

ORAL route: 61.5%
IV route: 38.5%
Factors associated with a prescription of antibiotic on day of survey in those with suspected RTI

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Lower 95% CI</th>
<th>Upper 95% CI</th>
<th>Wald test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARS-CoV-2 positive</td>
<td>0.51</td>
<td>0.33</td>
<td>0.81</td>
<td>0.005</td>
</tr>
<tr>
<td>COPD/Chronic lung disease</td>
<td>2.40</td>
<td>1.66</td>
<td>3.46</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.58</td>
<td>0.40</td>
<td>0.84</td>
<td>0.006</td>
</tr>
<tr>
<td>CRP ≥ 100 mg/l</td>
<td>1.83</td>
<td>1.28</td>
<td>2.61</td>
<td>0.001</td>
</tr>
<tr>
<td>Abnormal Chest X-ray</td>
<td>1.88</td>
<td>1.22</td>
<td>2.90</td>
<td>0.005</td>
</tr>
<tr>
<td>Purulent or bloody Sputum</td>
<td>1.85</td>
<td>1.17</td>
<td>2.91</td>
<td>0.01</td>
</tr>
<tr>
<td>Probable or definite nosocomial COVID-19</td>
<td>0.43</td>
<td>0.24</td>
<td>0.74</td>
<td>0.004</td>
</tr>
</tbody>
</table>
Prescribing indicators for RTI antibiotics on day of survey

<table>
<thead>
<tr>
<th>Therapy Type</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV therapy</td>
<td>80</td>
<td>35.9</td>
</tr>
<tr>
<td>Oral therapy only</td>
<td>143</td>
<td>64.1</td>
</tr>
<tr>
<td>Oral (IVOST)</td>
<td>48</td>
<td>35.6</td>
</tr>
</tbody>
</table>

- **Median duration of IV**
  - 2 days (IQR 2 to 3)

- **Median duration of IV (IVOST)**
  - 2 days (IQR 1 to 3)

- **Proposed oral therapy duration**
  - 112 (76.7%)

- **Median planned oral therapy duration**
  - 5 days (IQR 3-7)
Antibiotic differences between Med/Elderly care and Critical care

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Med/Elderly</th>
<th>Crit care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amox/doxy</td>
<td>49</td>
<td>11.1</td>
</tr>
<tr>
<td>Pp-Taz</td>
<td>6.7</td>
<td>22.2</td>
</tr>
<tr>
<td>Meropenem</td>
<td>1.9</td>
<td>24.1</td>
</tr>
</tbody>
</table>

[Graph showing antibiotic usage differences between Med/Elderly and Crit care]
Antibiotic prescribing differences between Wards and Critical care

![Bar chart showing antibiotic prescribing differences between Wards and Critical care.](chart.png)
Antifungal Prescribing

- 12 (9.8%) patients in critical care
  - 7 Caspofungin
  - 5 Fluconazole
- Median 19 days post admission (IQR 16.5 – 20)
- Median 18 days post admission to critical care
- **All** on broad spectrum antibiotics
COVID-19 Treatment Advisory Group, RCPL

Medical management of hospitalised adults with COVID-19

1. Adults hospitalised with proven or suspected COVID-19
   - Critical or severe COVID-19 (as per WHO) or new oxygen requirement?
     - Yes: Dexamethasone 6mg orally once daily for up to 10 days
     - No: Assess for trial eligibility
     - Eligible for remdesivir under NHS Interim Commissioning policy?
       - Yes: Add remdesivir for 5 days
       - No: Assess for trial eligibility

https://www.ctag-support.org.uk/
Antimicrobial Prescribing in Suspected/ Proven COVID-19

1. Suspected COVID-19, no purulent sputum and no radiological evidence of pneumonia: Do not prescribe antibiotics and discontinue those that have been commenced prior to admission.

2. Do not use CRP to guide initiation or escalation of antibiotics

3. Infective Exacerbation of chronic obstructive pulmonary disease (IECOPD)
   I. **Without** purulent sputum: Do not prescribe antibiotics.
   II. **With** purulent sputum: 5 days doxycycline or amoxicillin (unless course completed prior to admission).

4. Suspected bacterial pneumonia (community or healthcare onset): follow local severity-based pneumonia guidance. Review with SARS-CoV-2 result and limit antibiotic duration to 5 days.

5. Avoid broad spectrum antibiotics: Do not use antibiotics such as co-amoxiclav or levofloxacin unless indicated by laboratory sensitivities or recommended in local pneumonia guidance.

6. Avoid empirical escalation of antibiotics in the COVID-19 patient in non-critical care setting

7. Review all antibiotics following a SARS-CoV-2 result:
   
   I. SARS-CoV-2 positive: Stop antibiotics unless strong evidence of non-respiratory bacterial infection.
   
   II. SARS-CoV-2 negative (late presentation, “false negative” and COVID-19 still suspected): Stop antibiotics unless strong evidence of non-respiratory bacterial infection.
   
   III. SARS-CoV-2 negative (true negative): Consider other diagnosis and treat as appropriate.

8. Review IV antibiotic therapy daily: IVOST when clinical improvement and oral route available. Do not use CRP to guide IVOST decision.

9. Antibiotics in Critical Care: Follow these principles
   
   I. Optimise microbiological sampling (including for fungi) to guide targeted therapy
   
   II. Do not use PCT to guide initiation of antimicrobial therapy in severe COVID-19
   
   III. Optimise treatment de-escalation through careful interpretation of microbiology results
   
   IV. Limit duration of therapy to shortest possible. PCT may support early stopping of antimicrobials

Good Practice Recommendations for use of antibiotics towards the end of life

• Not specific to COVID-19 (but relevant)
  • Make shared decisions about future care
  • Agree clear goals and limits of therapy
  • Review all antibiotic prescribing decisions regularly

https://www.sapg.scot/media/5446/gprs-for-use-of-antibiotic-towards-eol.pdf
Conclusions

• HAI COVID-19 ≥ 22% (readmission not included)
• Antibiotic prescribing 61% on admission
• Predominantly for suspected RTI and 97.5% empiric
• Differences between critical care and med/elderly suggest HAI bacterial and fungal infection
• Evidence of antibiotic review, IVOST and good recording of duration
• Urgent need to further limit antibiotic prescribing in COVID-19 during the second, third waves......
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