Updated advice on hospital antibiotic management and antimicrobial stewardship in the context of the COVID-19 pandemic

Current epidemiology indicates that the UK is now experiencing a COVID-19 surge with increasing hospitalisations, critical care admissions and disruption of normal clinical care predicted in the coming weeks and months. Inevitably infection management "business as usual" including delivery of antimicrobial stewardship programmes and outpatient parenteral antimicrobial therapy services will be challenged.

Management of COVID-19

There is now a better understanding and supporting evidence base for optimal patient management including use of controlled oxygen therapy, fluid balance, prone breathing, anticoagulation, treatment escalation planning and use of invasive and non-invasive ventilation. Dexamethasone (and equivalent steroids) are proven to reduce progression to ventilation/ death in hypoxic COVID-19 patients except in those with milder illness in whom they should be avoided unless otherwise indicated e.g. for asthma. Remdesivir is associated with reduction in progression of disease but not mortality in those with hypoxia. Hydroxychloroquine should not be used due to lack of efficacy in clinical trials, toxicity and drug interaction concerns. Other antiviral or immunomodulatory agents should only be used in the context of a clinical trial.

Respiratory tract infections (RTI)

Bacterial co-infection outside of critical care is uncommon and unlike in influenza secondary Staphylococcal and Pneumococcal pneumonia have not been observed in association with severe COVID-19 infection. However, overlapping clinical presentations may make bacterial RTI difficult to differentiate from COVID-19, particularly in those with chronic respiratory conditions. During the winter this will be further complicated by respiratory viral infections including influenza. Healthcare associated COVID-19 should be considered in hospitalised patients with new onset fever or respiratory symptoms but may be confused with hospital acquired pneumonia. Efforts should be made to limit unnecessary escalation of antibiotic therapy in COVID-19 patients in the pre-critical care setting in order to reduce future ecological impact and risk. Lack of purulent sputum, presence of lymphopenia, transaminitis and bilateral interstitial changes on chest x-ray are typical of COVID-19 although radiological features vary. C-reactive protein (CRP) is significantly raised in COVID-19, is not predictive of bacterial co-infection and should not be used to guide antibiotic therapy.

Critical care management

In the challenging infection control environment of critical care, presumptive and proven nosocomial infections (bacterial and to a lesser extent fungal) have emerged complicating prolonged mechanical ventilation, other invasive interventions and resulting in widespread use of WHO Watch and Reserve antibiotics. De-escalation strategies are crucial and should be guided by microbiological sampling and careful interpretation of results. Whilst increase in Procalcitonin (PCT) correlates with COVID-19 severity, it is unclear if this represents bacterial co-infection, severity of acute respiratory distress syndrome or immune dysregulation. The value of PCT in antibiotic decision making is currently undefined and it should not be used in isolation to initiate or continue antibiotic therapy. However, there may be value in PCT monitoring to promote earlier discontinuation of antibiotics in the critical care setting.

The following Good Practice Recommendations have been agreed by infections specialists from across Scotland to support NHS boards with local clinical practice and to maintain antimicrobial stewardship.

Supporting general infection management during the COVID-19 pandemic

1. **Promote antimicrobial guidance / stewardship principles:** Appropriate investigations, timely IV to oral antibiotic switch (IVOST), short course therapy, antibiotic review, careful interpretation of biomarkers and microbiology.
2. **Optimise ambulatory management of infection**: Important for elderly and vulnerable populations during COVID-19. Consider how OPAT can maximise admission avoidance (e.g. skin and soft tissue infections) and early supported discharge (e.g. bone/joint infections) and consider technology to support remote patient care.
3. **Promote local Patient Group Directions (PGDs):** This will support prompt triage in hospitals and the community. This may be supported by availability of pre-pack antibiotics for suspected community associated bacterial lower RTI.
4. **Maximise use of the multi-disciplinary infection management teams:** Include Antimicrobial Pharmacists and Infection Specialist nurses to support infection management & antimicrobial stewardship ward rounds/reviews.

Antimicrobial prescribing in suspected or proven COVID-19 infection

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 SARSCoV-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 SARSCoV-2 result:**
    I. **SARSCoV-2 positive:** Stop antibiotics unless strong evidence of non-respiratory bacterial infection.
    II. **SARSCoV-2 negative (late presentation, "false negative" and COVID-19 still suspected):** Stop antibiotics unless strong evidence of non-respiratory bacterial infection.
    III. **SARSCoV-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
10. **Antibiotics in patients at End of Life:** As part of treatment escalation planning and shared decision making, if a patient is identified as at end of life discuss, agree and document limits on current antimicrobial treatment and further escalation of therapy.