

Infection Guidelines

Welcome to the Infection Guidelines App by Code Med.

This app was born out of the desire to build a comprehensive resource which would fulfill a multitude of functions. Infections are among the mainstay of patients' complaints and continue to become increasingly complex. Within this complexity needs to come clarity for frontline clinicians, whether that be treating infections in the community or in hospitals.

The Infection Guidelines app brings together the infection ecosystem from Primary Care to Secondary Care and beyond. We have designed some beautiful tools with immediate and significant relevance, which will transform the way that clinicians think about and manage infections within the clinical space.

We hope you will find our offering something which is transforms your practice and has a significant impact on outcomes.



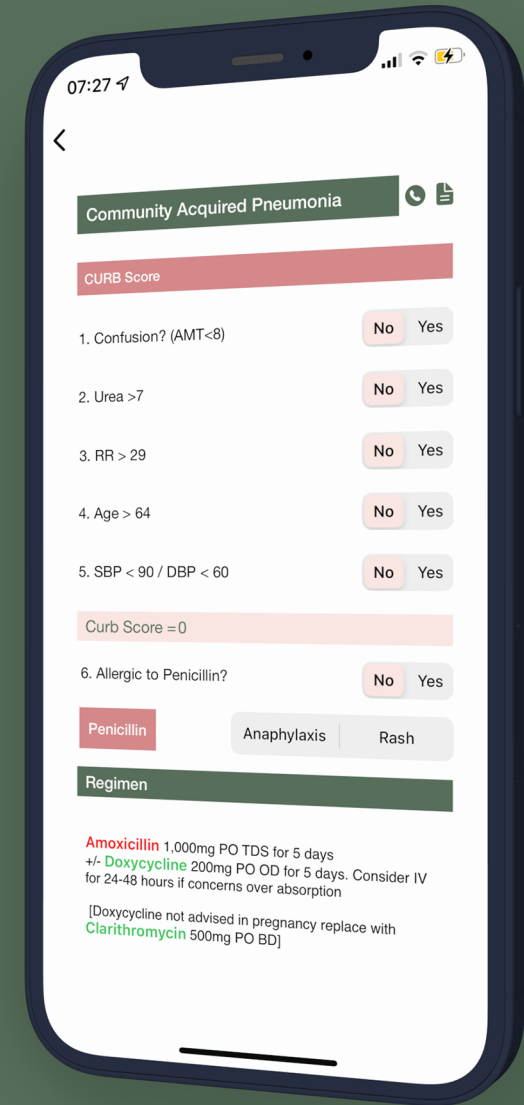
Dr Joseph Hogan
Code Med Director



Dr Imran Qureshi
Code Med Director



Dr Arron Thind
Code Med Director



07:27

<

Community Acquired Pneumonia

CURB Score

1. Confusion? (AMT<8) No Yes

2. Urea >7 No Yes

3. RR > 29 No Yes

4. Age > 64 No Yes

5. SBP < 90 / DBP < 60 No Yes

Curb Score = 0

6. Allergic to Penicillin? No Yes

Penicillin Anaphylaxis Rash

Regimen

Amoxicillin 1,000mg PO TDS for 5 days
+/- **Doxycycline** 200mg PO OD for 5 days. Consider IV for 24-48 hours if concerns over absorption

[Doxycycline not advised in pregnancy replace with **Clarithromycin** 500mg PO BD]

Inside

Owe tell you what we have put into this app you will be as excited as we are. We have tried to really innovate and bring features and functions which will help you in all aspects of managing infections.

Of course, we have included the expected infection specific guidelines for hospital inpatients (adult and paediatric), including critical care. What we have done is to go a step further and include Primary Care antimicrobial guidelines to complete the ecosystem of infection management and to improve visibility. We then took it up a notch and incorporated decision management tools into each guideline to make selecting the correct regimen easy.

Providing a comprehensive experience of managing infections meant that we not only provided detailed information around antimicrobials, how they are used and their dosing and monitoring, but also their use in surgical prophylaxis and importantly Covid19, to optimise antimicrobial stewardship.

Beyond that, we have developed tools for aiding understanding and management of blood cultures, Infection Control and Outpatient Parenteral Antimicrobial Therapy. We will go on to focus on each section in more detail.

Guidelines Menu



Advice & Contacts



Antimicrobials



Adult Guidelines



Adult Surgical Prophylaxis



Blood Cultures



Covid-19



Critical Care Guidelines



Infection & Prevention Control



OPAT & Ambulatory



Paediatric Guidelines



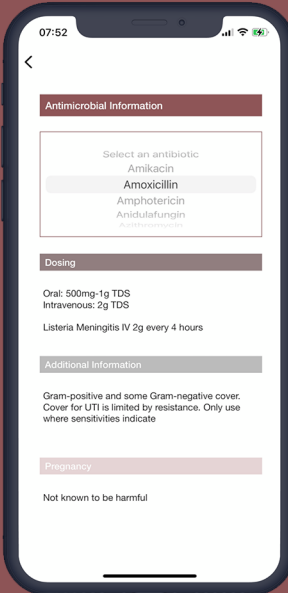
Primary Care Guidelines



Dosing and Monitoring



Antimicrobials



07:52

<

Antimicrobial Information

Select an antibiotic

- Amikacin
- Amoxicillin**
- Amphotericin
- Anidulafungin
- Antiviral agents

Dosing

Oral: 500mg-1g TDS
Intravenous: 2g TDS

Listeria Meningitis IV 2g every 4 hours

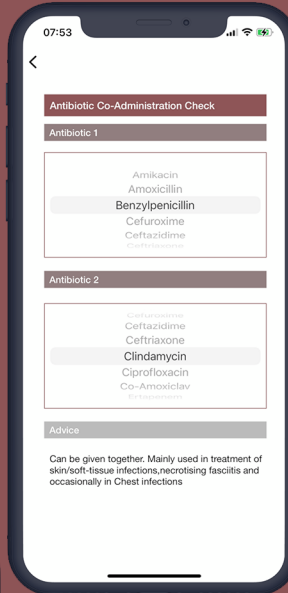
Additional Information

Gram-positive and some Gram-negative cover.
Cover for UTI is limited by resistance. Only use where sensitivities indicate

Pregnancy

Not known to be harmful

◀ The antimicrobial information provides guidance about different antibiotics including dosing, use in pregnancy and additional useful information relating to activity and considerations when prescribing



07:53

<

Antibiotic Co-Administration Check

Antibiotic 1

- Amikacin
- Amoxicillin
- Benzylpenicillin**
- Cefuroxime
- Ceftazidime
- Cloxacillin

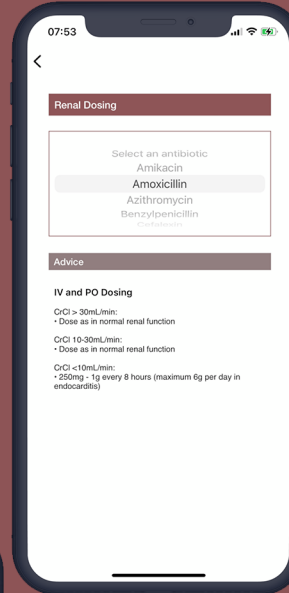
Antibiotic 2

- Cefazolin
- Ceftazidime
- Ceftriaxone
- Clindamycin**
- Ciprofloxacin
- Co-Amoxiclav
- Erythromycin

Advice

Can be given together. Mainly used in treatment of skin/soft-tissue infections, necrotising fasciitis and occasionally in Chest infections

◀ Clinicians who may not be familiar with the spectra of different antibiotics may prescribe them together. The co-administration tool, helps clinicians to check if antibiotics can be given together or not



07:53

<

Renal Dosing

Select an antibiotic

- Amikacin
- Amoxicillin**
- Azithromycin
- Benzylpenicillin
- Cloxacillin

Advice

IV and PO Dosing

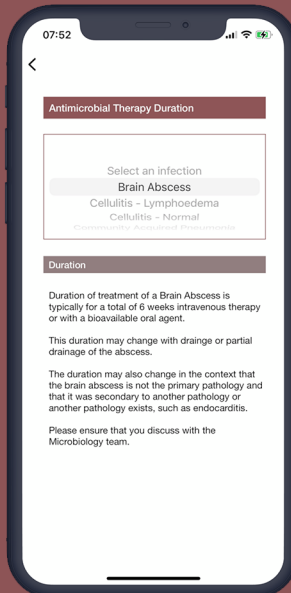
CrCl < 30mL/min:
• Dose as in normal renal function

CrCl 10-30mL/min:
• Dose as in normal renal function

CrCl < 10mL/min:
• 250mg - 1g every 8 hours (maximum 6g per day in endocarditis)

◀ Knowing how to dose antibiotics in renal impairment is critical to preserve kidney function. This tool provides advice about dose conversion in renal impairment for common antibiotics

▶ The antimicrobial therapy duration tool provides advice about duration of antimicrobial therapy for common infections. Where relevant, it will also provide information about referral to the OPAT service



07:52

<

Antimicrobial Therapy Duration

Select an infection

- Brain Abscess
- Cellulitis - Lymphoedema
- Cellulitis - Normal**
- Community-acquired pneumonia

Duration

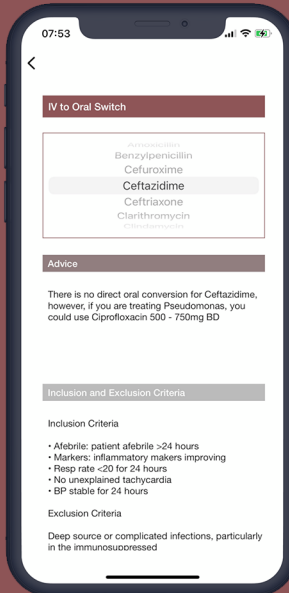
Duration of treatment of a Brain Abscess is typically for a total of 6 weeks intravenous therapy or with a bioavailable oral agent.

This duration may change with drainage or partial drainage of the abscess.

The duration may also change in the context that the brain abscess is not the primary pathology and that it was secondary to another pathology or another pathology exists, such as endocarditis.

Please ensure that you discuss with the Microbiology team.

▶ The IV to Oral Switch tool provides advice of the oral equivalents to intravenous antibiotics. It also advises which patients are appropriate for oral switch and for those who are not



07:53

<

IV to Oral Switch

Select an antibiotic

- Benzylpenicillin
- Cefuroxime
- Ceftazidime**
- Ceftriaxone
- Clarithromycin
- Cloxacillin

Advice

There is no direct oral conversion for Ceftazidime, however, if you are treating Pseudomonas, you could use Ciprofloxacin 500 - 750mg BD

Inclusion and Exclusion Criteria

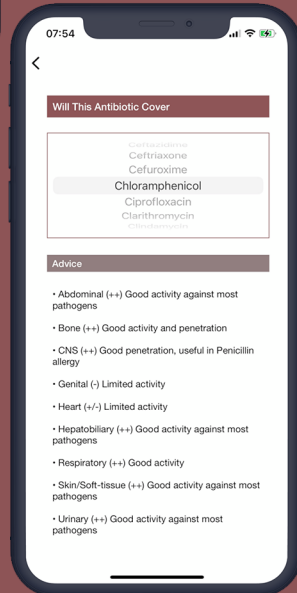
Inclusion Criteria

- Afebrile: patient afebrile >24 hours
- Markers: inflammatory markers improving
- Resp rate <20 for 24 hours
- No unexplained tachycardia
- BP stable for 24 hours

Exclusion Criteria

Deep source or complicated infections, particularly in the immunosuppressed

▶ A common question asked by clinicians is whether an antibiotic will cover other infections. This tool provides an indication of whether or not an antibiotic will cover other infections by system / organ



07:54

<

Will This Antibiotic Cover

Select an antibiotic

- Cefazolin
- Ceftriaxone
- Cefuroxime
- Chloramphenicol**
- Ciprofloxacin
- Clarithromycin
- Cloxacillin

Advice

- Abdominal (++) Good activity against most pathogens
- Bone (++) Good activity and penetration
- CNS (++) Good penetration, useful in Penicillin allergy
- Genital (-) Limited activity
- Heart (+/-) Limited activity
- Hepatobiliary (++) Good activity against most pathogens
- Respiratory (++) Good activity
- Skin/Soft-tissue (++) Good activity against most pathogens
- Urinary (++) Good activity against most pathogens

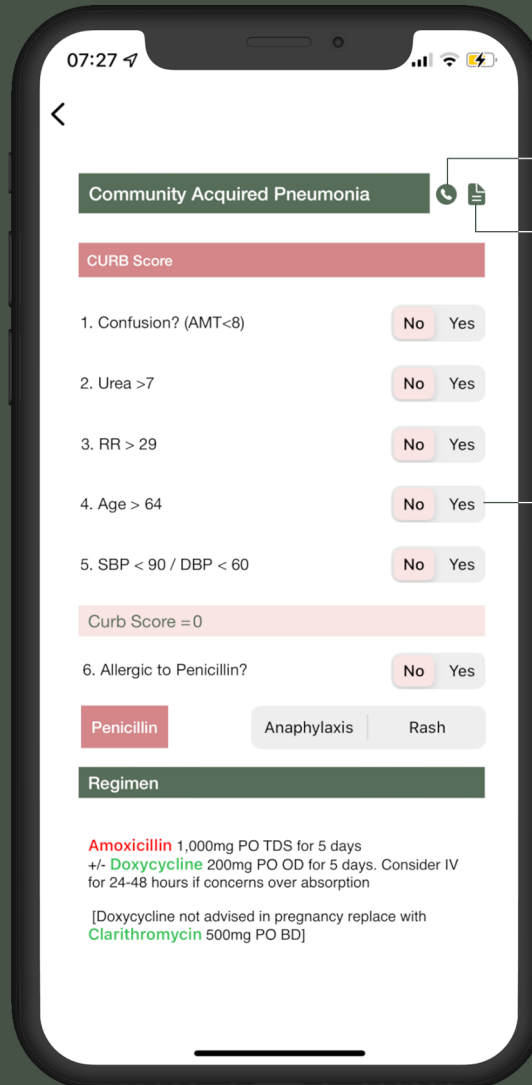
Adult Guidelines

Guidelines

Antimicrobial guidelines are an essential part of managing patients with infections. Infections are amongst the most common reasons that patients present to hospital. They need to be started on antibiotic therapy which comes from the Trust's empirical guidance.

We know that with an accessible set of guidelines, adherence improves as well as a reduction in the use of broad spectrum antimicrobials, which can have significant implications with resistance and increase in infections such as *Clostridioides difficile*

- Bone and Joint Infections
- Cardiovascular Infections
- CNS Infections
- Gastrointestinal Infections
- Respiratory Infections
- Sepsis
- Skin and Soft Tissue Infections
- Urinary Tract Infections
- Urogenital Infections



The smartphone screen displays the UpToDate app interface for 'Community Acquired Pneumonia'. At the top, there's a title bar with a back arrow and a contact icon. Below the title, a 'CURB Score' section lists five criteria with 'No' and 'Yes' buttons. The score is calculated as 0. A 'Regimen' section shows 'Amoxicillin 1,000mg PO TDS for 5 days +/- Doxycycline 200mg PO OD for 5 days. Consider IV for 24-48 hours if concerns over absorption'. A note mentions '[Doxycycline not advised in pregnancy replace with Clarithromycin 500mg PO BD]'. Callout lines connect specific app features to descriptive text on the right.

Criteria	No	Yes
1. Confusion? (AMT<8)	<input type="button" value="No"/>	<input type="button" value="Yes"/>
2. Urea >7	<input type="button" value="No"/>	<input type="button" value="Yes"/>
3. RR > 29	<input type="button" value="No"/>	<input type="button" value="Yes"/>
4. Age > 64	<input type="button" value="No"/>	<input type="button" value="Yes"/>
5. SBP < 90 / DBP < 60	<input type="button" value="No"/>	<input type="button" value="Yes"/>

Curb Score = 0

Criteria	No	Yes
6. Allergic to Penicillin?	<input type="button" value="No"/>	<input type="button" value="Yes"/>

Penicillin | Anaphylaxis | Rash

Regimen

Amoxicillin 1,000mg PO TDS for 5 days
+/- **Doxycycline** 200mg PO OD for 5 days. Consider IV for 24-48 hours if concerns over absorption

[Doxycycline not advised in pregnancy replace with **Clarithromycin** 500mg PO BD]

Contact

A touch of a button puts hospital colleagues in direct contact with the Microbiology advice line at Croydon Hospital

Information

All Croydon Hospital staff are eligible to use UpToDate for free. All of the guidelines are linked to relevant UpToDate material to provide you with extra information

Decision Tools

Functions have been added into each clinical guideline which will act as decision tools in helping the clinician to arrive at the correct regimen for the patient. All you need to do is to select the relevant options and the output will dynamically change to provide the relevant regimen.

Prophylaxis

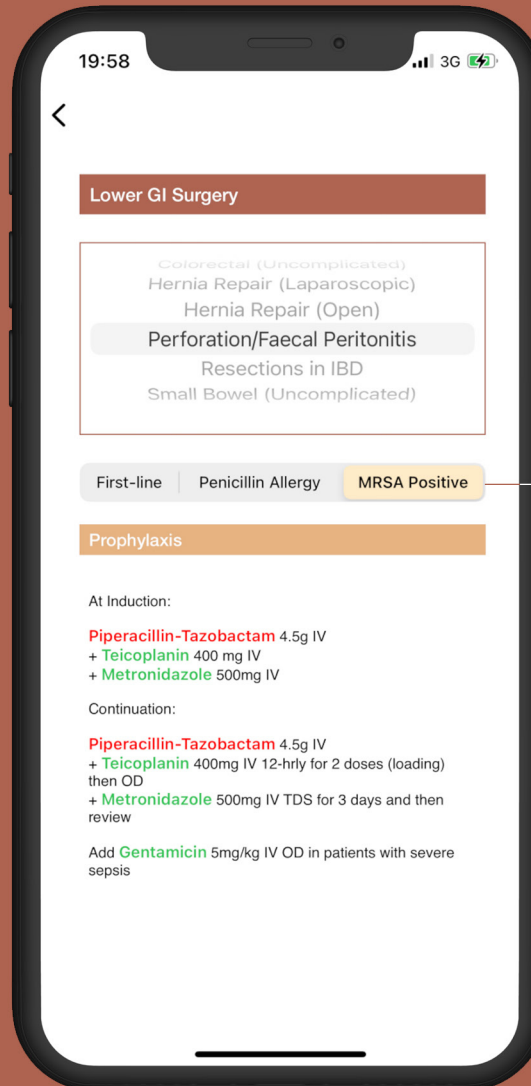
Surgical Prophylaxis

Routine surgical prophylaxis is a critical part of preventing post-operative infections.

Ensuring that the correct choices are made to cover the microbial flora at the anatomical site prevent subsequent superficial and deep infections.

Whilst it is vital to prevent post-operative infections, the desire to over-prescribe prophylaxis needs to be curbed and having robust surgical prophylaxis guidance will help to prevent it.

- Cardiac Procedures
- Endocarditis Prophylaxis
- Gastrointestinal Endoscopy
- Gynaecology & Obstetrics
- Lower GI Surgery
- Orthopaedic Surgery
- Upper GI & Hepatobiliary Surgery
- Urology
- Vascular Surgery



The image shows a smartphone screen with a surgical prophylaxis decision tool. At the top, the status bar shows the time 19:58, 3G signal, and battery level. The app interface has a back arrow in the top left. Below it is a header 'Lower GI Surgery' in a brown box. A list of surgical procedures is shown in a white box with a thin border: 'Colorectal (Uncomplicated)', 'Hernia Repair (Laparoscopic)', 'Hernia Repair (Open)', 'Perforation/Faecal Peritonitis' (highlighted in grey), 'Resections in IBD', and 'Small Bowel (Uncomplicated)'. Below this is a row of three tabs: 'First-line', 'Penicillin Allergy', and 'MRSA Positive' (highlighted in yellow). Underneath is a header 'Prophylaxis' in an orange box. The main content area lists the regimen: 'At Induction:' followed by 'Piperacillin-Tazobactam 4.5g IV', '+ Teicoplanin 400 mg IV', and '+ Metronidazole 500mg IV'. Then 'Continuation:' followed by 'Piperacillin-Tazobactam 4.5g IV', '+ Teicoplanin 400mg IV 12-hrly for 2 doses (loading) then OD', and '+ Metronidazole 500mg IV TDS for 3 days and then review'. At the bottom, it says 'Add Gentamicin 5mg/kg IV OD in patients with severe sepsis'.

Decision Tools

A decision tool has been introduced to help clinicians make the right choice for antimicrobial prophylaxis in a variety of situations, whether the patient be allergic to Penicillin or colonised with MRSA

Results Interpretation

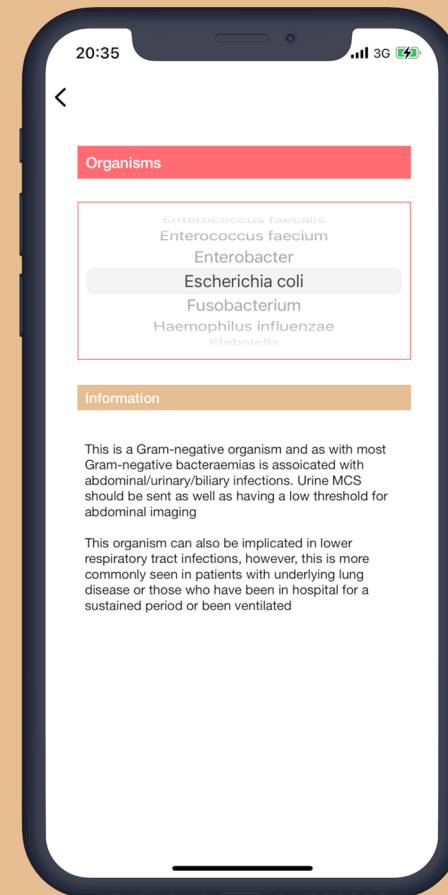
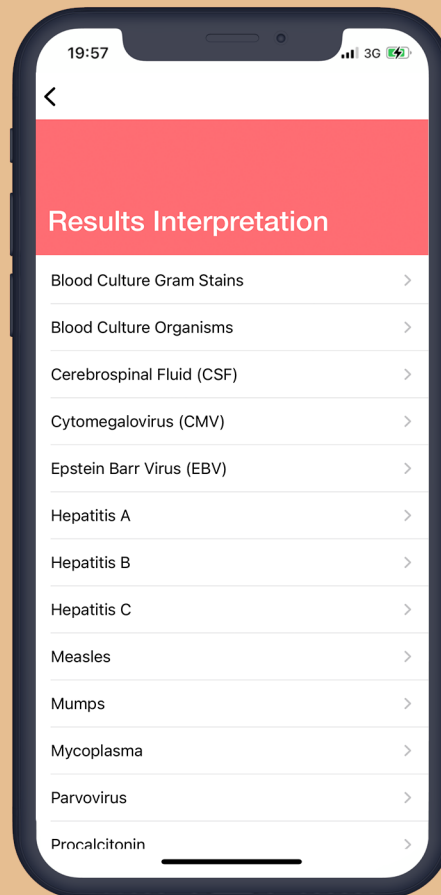
Results Interpretation

A common problem scenario for clinicians is being able to interpret the results of various diagnostic tests.

Whether that be a blood culture Gram stain result or a serological test, understanding what the different terms mean can be challenging, which in turn can lead to a delay in appropriate management for the patient.

Within this section, a number of tools have been provided to help clinicians interpret results with a greater level of confidence and surety. Given the number of different clinical situations that can arise, it is difficult to encompass them all, however, these tools will help clinicians to interpret the majority of results with a greater level of ease.

Alongside interpretation of the results, we have provided further information, which will help in understanding what the next steps are in terms of management and monitoring.





Covid19

Guidelines

The advent of Covid19 has single-handedly managed to change the narrative around antibiotic prescribing in hospitals. Before the deployment of the vaccine, patients were extremely sick with a high mortality rate. It was difficult for clinicians to watch their patients becoming more unwell. What this did was to drive significant escalation of therapy, even though, antibiotics have no effect on viruses.

We wanted to introduce specific local guidance around Covid19 antimicrobial prescribing, to try and reduce the burden of broad-spectrum antibiotic use through escalation, which resulted in this tool to help clinicians to prescribe the correct antibiotics, based on where the onset of the infection was and how severe it is, when considering a superimposed bacterial infection.

Links to Public Health England's videos to Donning and Doffing have also been provided within the app.

Contact

A touch of a button puts hospital colleagues in direct contact with the Microbiology advice line at Croydon Hospital

Information

All Croydon Hospital staff are eligible to use UpToDate for free. All of the guidelines are linked to relevant UpToDate material to provide you with extra information

Decision Tools

Functions have been added into each clinical guideline which will act as decision tools in helping the clinician to arrive at the correct regimen for the patient. All you need to do is to select the relevant options and the output will dynamically change to provide the relevant regimen.



Critical Care

Guidelines

Critical Care units have the sickest patients in a hospital. A significant number of them will have been admitted to one of the Critical Care units with an infective pathology. The immune system of these patients will often be compromised in some way, or they will have single or multi-organ failure, which will complicate their treatment

Our Critical Care antimicrobial guidelines have been co-developed by the Critical Care team to ensure that we provide the optimal treatment for patients, whilst ensuring that we maintain antimicrobial stewardship

- Community Acquired Pneumonia
- Hospital Acquired Pneumonia
- Ventilator Associated Pneumonia
- Abdominal Infection
- Biliary Tract Infection
- Urinary Tract Infection
- Encephalitis
- Meningitis
- Necrotising Fasciitis
- Long-Line Infection

20:35 3G

<

Ventilator Associated Pneumonia

1. Allergic to Penicillin? No Yes

Penicillin Anaphylaxis Rash

Regimen

Piperacillin-Tazobactam 4.5g TDS IV

If history or high suspicion of MRSA add Linezolid IV or PO 600mg BD

If recent Piperacillin-Tazobactam use consider Meropenem 1g TDS IV

Contact

A touch of a button puts Critical Care colleagues in direct contact with the Microbiology advice line at Croydon Hospital

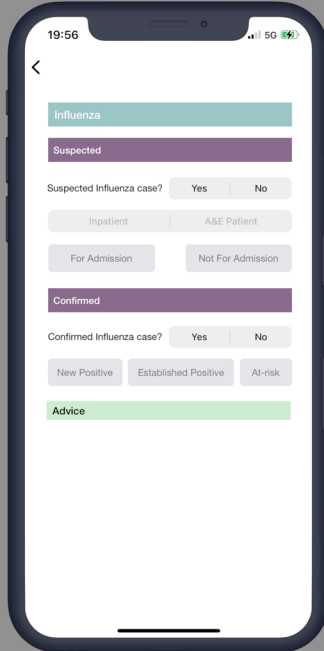
Information

All Croydon Hospital staff are eligible to use UpToDate for free. All of the guidelines are linked to relevant UpToDate material to provide you with extra information

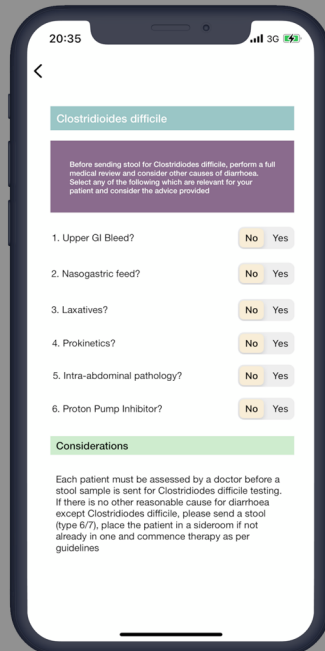
Decision Tools

Functions have been added into each clinical guideline which will act as decision tools in helping the clinician to arrive at the correct regimen for the patient

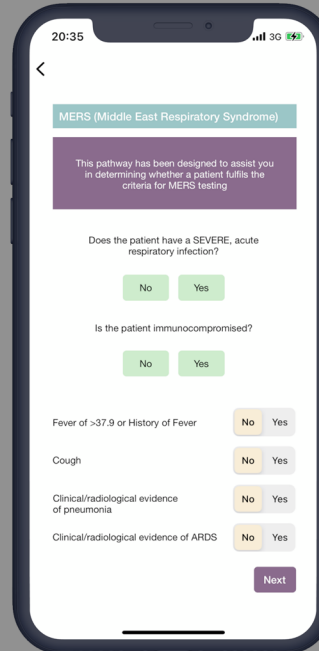
Infection Control



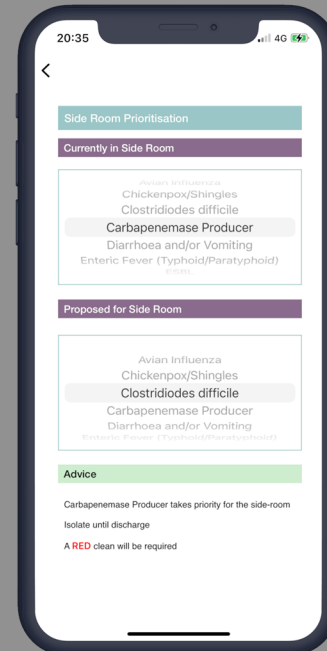
The Influenza tool takes clinicians through a pathway to determine what management plan needs to be implemented, depending on whether they are being admitted and whether they fall into a risk category



Patients often have diarrhoea, but it is not always infective in origin and can be caused for a variety of reasons. This is a tool developed for considerations that clinicians should take when sending a stool for *Clostridioides difficile*



Middle East Respiratory Syndrome is a differential which is raised by clinicians for patients who have travelled to various countries and return with a respiratory illness. This tool helps clinicians to navigate the PHE guidance about whether the patient is at risk and whether they require testing



In the situation that two patients on a ward both need a sideroom, the question around priority is raised. This tool helps to establish which conditions take priority for a sideroom, and when moving patients in and out of siderooms, which type of clean will be required

🏠 OPAT & Ambulatory

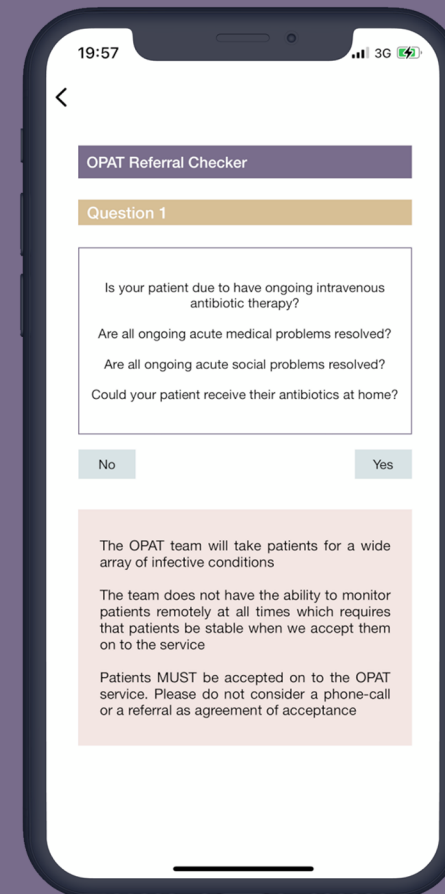
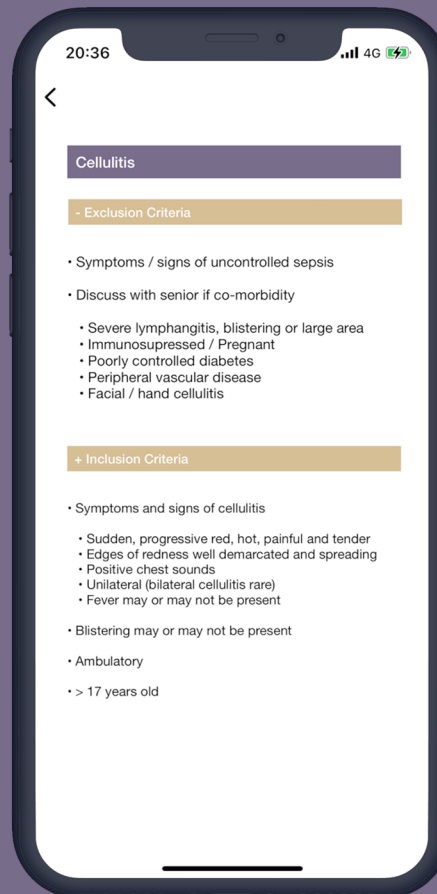
OPAT

The Outpatient Parenteral Antimicrobial Therapy (OPAT) service has been designed to facilitate earlier discharge of patient care from hospital to their place of residence.

The OPAT Pathway and referral system is often not well understood by clinicians, and so in this part of the app, not only is the pathway described, but a referral checker has also been implemented, which takes clinicians who wish to refer to the service through a series of questions to test the patient's suitability for antibiotic therapy at home

Ambulatory

Not all patients are suitable for the OPAT service, which could be for a number of reasons. They may however be suitable for either the medical or the surgical ambulatory service. In this part of the app, we have provided information around three common medical conditions which may well be suited to the Ambulatory service, along with their inclusion and exclusion criteria

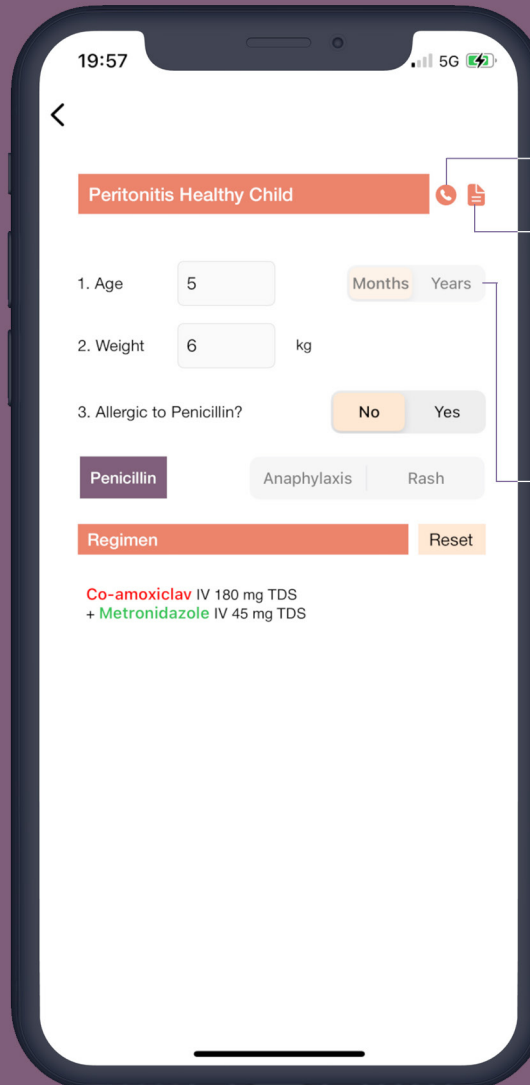


Paediatrics

Guidelines

Paediatric inpatient admissions are important because the majority of paediatric patients that present to secondary care and are admitted are quite unwell. It is vital to have empirical antimicrobial guidance which is available to Paediatric colleagues so that they can optimise the management of children admitted with infections, of which there will be a significant number. This section provides guidance on a range of clinical conditions and systems

- Bone Infections
- Cardiovascular Infections
- CNS Infections
- ENT Infections
- Gastrointestinal Infections
- Eye Infections
- Respiratory Infections
- Skin and Soft Tissue Infections
- Urinary Tract Infections
- Sepsis & Febrile Neutropenia



The smartphone screen displays the 'Peritonitis Healthy Child' guideline. At the top, the status bar shows 19:57, 5G, and battery level. The app header includes a back arrow and a title bar. The main form contains fields for Age (5), Weight (6 kg), and Allergic to Penicillin? (No). Below these are buttons for Penicillin, Anaphylaxis, and Rash. A 'Regimen' section shows the recommended treatment: Co-amoxiclav IV 180 mg TDS + Metronidazole IV 45 mg TDS. A 'Reset' button is located at the bottom right of the regimen section.

Contact

A touch of a button will put Paediatric colleagues in direct contact with the Microbiology advice line at Croydon Hospital

Information

All Croydon Hospital staff are eligible to use UpToDate for free. All of the Paediatric guidelines are linked to relevant UpToDate material to provide you with extra information

Calculation Support

Paediatric dosing is often based on personal parameters of the patient, such as age, weight and height. The calculations for dosing have been included in the guidance to make it easier for Paediatric colleagues to dose their patients accurately, minimising human error



Primary Care

Guidelines

Primary care clinicians are under significant pressure to see a high volume of patients within a short space of time.

Patients with infections make up a significant part of their total consultations. Having easy access to the guidance on an app with in-built decision tools really helps colleagues to make decisions quickly in a time-sensitive environment.

- Dental Infections
- Eye Infections
- Gastrointestinal Infections
- Genital Tract Infections
- Lower Respiratory Tract Infections
- Meningitis
- Skin and Soft Tissue Infections
- Upper Respiratory Tract Infections
- Urinary Tract Infections

19:58 3G

<

Cellulitis / Erysipelas

Class I: Patient afebrile and healthy - flucloxacillin alone.
Class II: Patient febrile and ill, or comorbidity, admit for IV treatment, or use OPAT. Class III: Systemically ill - admit. Adding clindamycin does not improve outcomes

1. Allergic to Penicillin? No Yes

Cellulitis Facial MRSA in last 24/12

Regimen

Adult: **Flucloxacillin** 1g QDS
Children: Please refer to BNFC

Duration: 7 days; if slow response continue for another 7 days

Contact

A touch of a button puts Primary care colleagues in direct contact with the Microbiology advice line at Croydon Hospital

Information

All guidelines are referenced back to the original Primary care guidance, which has further information for clinicians should they need to use it.

Decision Tools

Functions have been added into each clinical guideline which will act as decision tools in helping the clinician to arrive at the correct regimen for the patient

Targetted Guidance

Comprehensive guidance is provided to enable Primary care colleagues to make the correct choices. Durations of therapy are provided as well as colour coded antibiotics for Penicillin allergy

Dosing & Monitoring

Calculators

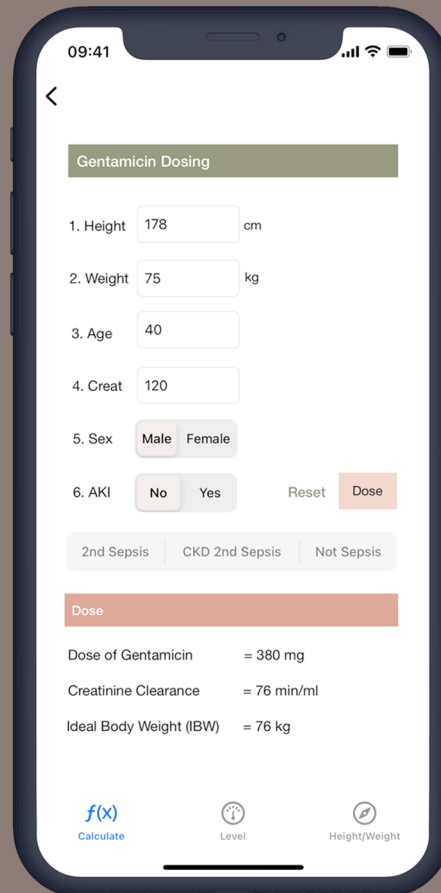
The app has four in-built antibiotic dosing calculators for

- Amikacin
- Gentamicin
- Teicoplanin
- Vancomycin

A height and weight converter is built into each calculator and is also available separately

Each calculator adheres to the local Trust guidelines, and provides feedback and guidance at relevant points

Where appropriate, guidance is provided around loading and maintenance dosing



09:41

<

Gentamicin Dosing

1. Height cm

2. Weight kg

3. Age

4. Creat

5. Sex ☒ Male ☐ Female

6. AKI ☒ No ☐ Yes




2nd Sepsis CKD 2nd Sepsis Not Sepsis

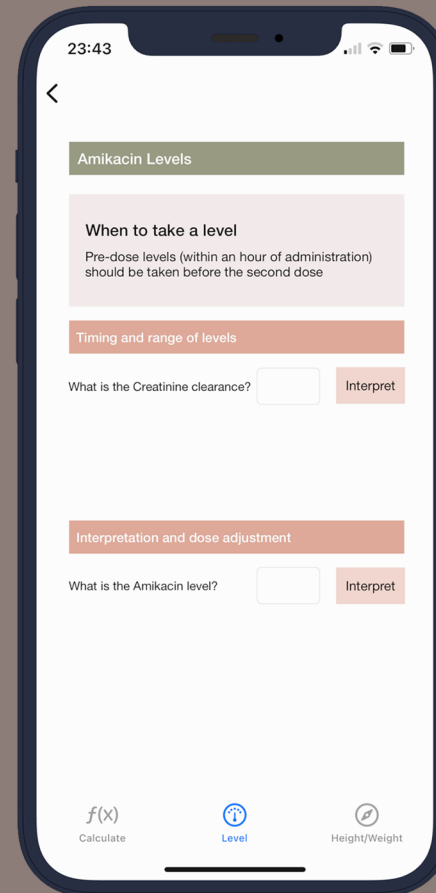
Dose

Dose of Gentamicin = 380 mg

Creatinine Clearance = 76 min/ml

Ideal Body Weight (IBW) = 76 kg

 Calculate  Level  Height/Weight



23:43

<

Amikacin Levels

When to take a level




Pre-dose levels (within an hour of administration) should be taken before the second dose

Timing and range of levels

What is the Creatinine clearance?

Interpretation and dose adjustment

What is the Amikacin level?

 Calculate  Level  Height/Weight

Level

Each of the four antibiotic calculators has an in-built level calculator which provides an interpretation of the result

An additional tool is included which provides references for other antibiotics which involve therapeutic dose monitoring

Benefits

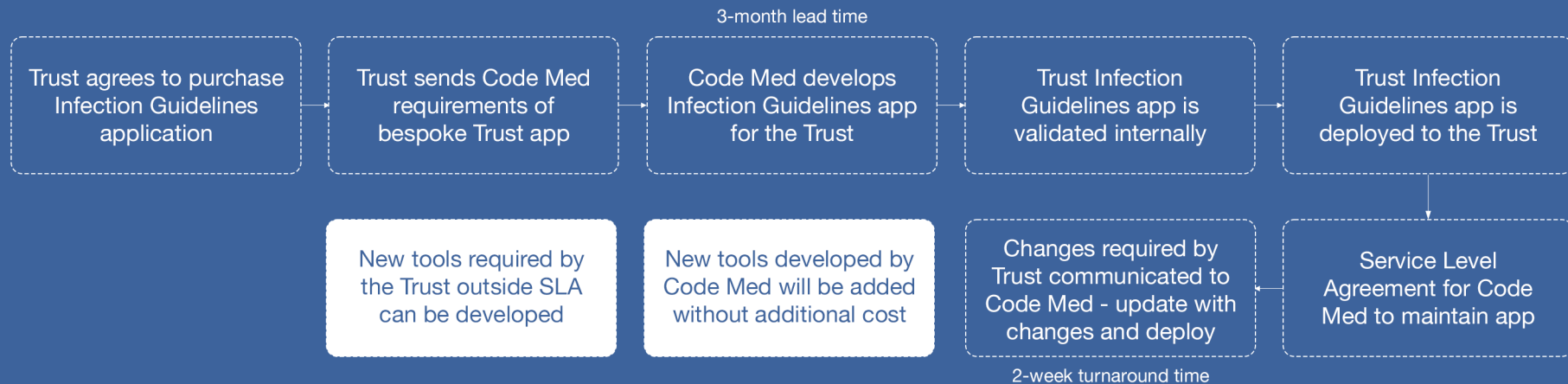
These calculators provide an accurate dose calculation and can also be set to minimise drug wastage by rounding to be consistent with vial volumes

Using these calculators reduces the time taken by clinicians to calculate the dose whilst ensuring a high level of accuracy

Interested?

So now that you have had the grand tour, you might be thinking how you can get this app in the hands of your frontline staff?

We do not have a generic app as others may do, which takes your information and presents it in a standard format. We bespoke craft our apps for each organisation so that we can provide the look and feel that you want and which reflects your corporate identity. You may already be using alternative solutions, which may be working well for you, however, we want you to imagine the possibilities of the technology you could introduce to your organisation, and how that could make even greater improvements in the future.



Take a moment to reach out to us with no commitment whatsoever. Let us take the time to explore the possibilities. We look forward to hearing from you.



Code Med Team
info@codemed.co.uk
07789260113