Antibiotica

Organ System & Infections

Surgical Prophylaxis

Other Infectious Conditions

Drug Information

Disclaimer Feedback

1. Post-op fever with hemodynamic stability

Definition & Etiology

Temperature higher than 39^0 C (or higher than 102.2 F) on any postoperative day, or higher than 38^0 C (or higher than 100.4 F) on two consecutive postoperative days.

Timing has a significant impact on the cause. As the period of time following surgery increases, fever is more likely to be a result of infection. Non-infectious reasons include deep vein thrombosis, pulmonary emboli, myocardial infarction, drug- or transfusion-related complications, and endocrine conditions including adrenal insufficiency or thyroid storm.

Diagnostic Approach

Diagnosis:

- General evaluation & bedside tests
- Complete blood count
- Culture (blood, urine, wound or sputum)
- Imaging (X-ray, CT)

Special Considerations / Remarks

N/A

Preferred and Alternative Treatment

Condition	Likely causative Organisms	Empiric antibiotics	Alternative antibiotics	Comments
Post-op fever with hemodynamic stability	Usually not due to infection	None		Look for hematoma, DVT, transfusion related fever

References:

1. Abdelmaseeh TA, Azmat CE, Oliver TI. Postoperative Fever. [Updated 2022 Dec 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482299/

2. Surgical site infection

Definition & Etiology

Infection observed within 30 days of the surgery, or one year in patients with an implant. It is usually observed at the site of incision or deep tissue of the surgical site.
Microbial contamination of the surgical wound can occur from endogenous or exogenous sources.
S. aureus, coagulase-negative staphylococci, Enterococcus, and Escherichia coli are the most common endogenous causative organisms. Whereas, staphylococci and streptococci are the most common exogenous organisms causing the SSI.

Diagnostic Approach

Symptoms and Signs:

- Erythema
- Localized pain
- Persistent fever
- Purulent discharge from the surgical site
- Wound dehiscence
- Delayed wound healing

Diagnosis:

- Blood counts
- Culture (Pus, Blood)
- Imaging (ultrasound or CT/MRI) if deep-seated infection suspected

Differential Diagnosis:

- Cellulitis
- Necrotizing fasciitis

Special Considerations / Remarks

NA

Preferred and Alternative Treatment

Surgical site infection	*S. aureus*, Entero-bacteriaceae, Pseudomonas spp.			Treat based on culture and sensitivities

References:

1. Zabaglo M, Sharman T. Postoperative Wound Infection. [Updated 2022 Sep 19]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK560533/

3. Ventilator-associated pneumonia (VAP) & Hospital-acquired pneumonia (HAP)

Definition & Etiology

VAP - Occurrence of pneumonia in a patient who has been on mechanical ventilation for more than 48 hours.
HAP – Occurrence of pneumonia in a patient (not incubated at the time of admission) after 48 hours or more of hospital admission.

Organisms commonly associated with VAP and HAP include:

- Aerobic gram-negative bacilli such as Escherichia coli, Klebsiella pneumoniae, Acinetobacter spp. Enterobacter spp. And Pseudomonas aeruginosa.
- Gram-positive cocci such as Streptococcus spp. And staphylococcus aureus, which includes methicillin-resistant S. aureus.

Diagnostic Approach

Symptoms and Signs:

VAP

- Fever
- Purulent tracheal discharge
- Respiratory distress

HAP

- Fever
- Malaise or chills
- Cough
- Dyspnea
- Chest pain.

Diagnosis:

- Clinical evaluation
- Culture (Blood and sputum)
- Imaging (Chest X-ray, CT)

Differential Diagnosis:

- Aspiration pneumonia

Special Considerations / Remarks

- Piperacillin-tazobactam
- Cefoperazone-sulbactam
- Imipenem
- Meropenem
- Amikacin
- Gentamicin
- Tobramycin
- Ciprofloxacin
- Levofloxacin
- Vancomycin
- Linezolid
- Colistin

Preferred and Alternative Treatment

Adult

VAP/HAP	Entero-bacteriaceae, Pseudomonas spp., Acinetobacter spp.	Piperacillin-tazobactam 4.5g IV q6h or Cefoperazone-sulbactam 3g IVq8h	Imipenem 1g IV q8h or meropenem1g IV q8h	Modify based on culture of lower respiratory tract secretions.

Pediatric

Potential Pathogens	Combination antibiotic therapy
Pseudomonas aeruginosa **Or** Klebsiella pneumonae (ESBL) **Or** Acinetobacter species	Beta Lactam + beta lactamase inhibitor (Piperacillin – Tazobactam) **Plus** **Either** Aminoglycoside (Amikacin, Gentamicin, or Tobramycin) **Or** Antipseudomonal fluroquinolone (Cipro/ Levofloxacin)
Methicillin – resistant *Staphylococcus aureus* (MRSA)	Vancomycin or Linezolid

Second line Therapy

Meropenem – 60 mg/kg/day I/V every 8 hourly

And

Vancomycin - 40 mg/kg/day I/V every 6 - 8 hourly

Third line Therapy

Colistin base IV., 2.5 – 5 mg/kg/day I/V every 6 – 12 hourly (1mg= 30000 IU)

And

Vancomycin - 40 mg/kg/day I/V every 6 - 8 hourly

References:

1. Kohbodi GNA, Rajasurya V, Noor A. Ventilator-associated Pneumonia. [Updated 2022 Sep 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK507711/
2. Shebl E, Gulick PG. Nosocomial Pneumonia. [Updated 2022 Jul 18]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK535441/

4. Central line-associated bloodstream infection (CLABSI)

Definition & Etiology

A laboratory-confirmed bloodstream infection that appears within 48 hours of the installation of a central line and is unrelated to an infection at another site.
Organisms commonly associated include:
Gram-positive - coagulase-negative staphylococci, enterococci, and staphylococcus aureus)
Gram negative - Klebsiella, Enterobacter, Pseudomonas, E.coli, Acinetobacter and Candida species

Diagnostic Approach

Symptoms and Signs:

- Fever and chills
- Pain, swelling, or discharge from the exit site
- Redness surrounding or along the subcutaneous track

Diagnosis:

- Complete blood count
- Blood culture

Differential Diagnosis:

- Phlebitis
- Pocket infections

Special Considerations / Remarks

- Vancomycin
- Teicoplanin
- Piperacillin-tazobactam
- Cefoperazone-sulbactam
- Daptomycin
- Meropenem
- Carbapenem
- Linezolid
- Echinocandin
- Fluconazole

Preferred and Alternative Treatment

Adult

CLABSI	*S. aureus*, Entero-bacteriaceae, Pseudomonas spp., Acinetobacter spp. Candida spp.	Vancomycin loading of 25-30 mg /kg in patients of septic shock followed by 15mg/kg IV 12 hourly (maximum 1gm 12 hourly)/teicoplanin 12mg/kg IV 12 hourly x 3 doses followed by 6 -12 mg once daily IV depending upon severity + Piperacillin-tazobactam 4.5g IV q6h or Cefoperazone-sulbactam 3g IVq8h For 2 weeks duration	Daptomycin 6 mg/kg IV od +Meropenem 1g IVq8h	Draw 2-3 blood culture sets with at least one from peripheral sites before starting antibiotics and modify based on culture. Removal of catheter must be contemplated.

Pediatric

1. Empirical coverage if suspecting gram-negative bacilli

Choice should be based on local antimicrobial susceptibility and the severity of disease.

- Fourth-generation cephalosporin
- Carbapenem
- Beta-lactam/beta-lactamase combination with or without an aminoglycoside

2. Empirical antimicrobial therapy if suspecting MRSA

- For health care settings with an elevated prevalence of MRSA- Vancomycin is recommended
- For institutions in which the most of MRSA isolates have vancomycin minimum inhibitory concentration (MIC) values 12 mg/mL- Daptomycin, should be used.
- Linezolid should not be used for empirical therapy

3. Empirical combination antibiotic coverage for MDR gram-negative bacilli, such as *Pseudomonas aeruginosa*, should be used when CRBSI is suspected in

- Neutropenic patients
- Severely ill patients with sepsis
- Patients known to be colonized with such pathogens, until the culture and susceptibility data are available and de-escalation of the antibiotic regimen can be done.

4. **Empirical therapy for suspected CRBSI involving femoral catheters**

- In critically ill patients' antibiotics should cover for gram-positive pathogens, gram-negative bacilli and Candida species.

5. Empirical therapy if catheter-related candidemia is suspected

- Echinocandin
- Fluconazole can be used in patients without azole exposure in the previous 3 months in health care settings where the risk of *Candida krusei or Candida glabrata*infection is very low.

*It should be suspected in septic patients with any of the following risk factors: total parenteral nutrition, prolonged use of broad-spectrum antibiotics, hematologic malignancy, receipt of bone marrow or solid-organ transplant, femoral catheterization, or colonization due to Candida species at multiple sites.

6. **Antibiotic lock therapy should be used for catheter salvage**

However, if antibiotic lock therapy cannot be used, systemic antibiotics should be administered through the colonized catheter.

Duration of antimicrobial therapy:
A. Uncomplicated Short term central venous or arterial catheter related blood stream infection
a. Coagulase negative staph:
i) treat for 5-7 days, if the catheter is removed
ii) treat for 10-14 days, if the catheter is retained
b. Staph aureus :- treat for more than 14 days
c. Enterococcus :- treat for 7-14 days
d. Gram negative bacilli :- treat for 7-14 days
e. Candida sp. :- treat for 14 days after the first negative blood culture,
B. Complicated Short term central venous or arterial catheter related blood stream infection

- Four to Six weeks of antibiotic therapy should be administered to patients with persistent fungemia or bacteremia after catheter removal (i.e., occurring more than 72 hours after catheter removal), and to patients who are found to have infective endocarditis or suppurative thrombophlebitis, and to pediatric patients with osteomyelitis.

References:

1. Haddadin Y, Annamaraju P, Regunath H. Central Line Associated Blood Stream Infections. [Updated 2022 Nov 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430891/

5. Catheter-Associated Urinary Tract Infections (CAUTI)

Definition & Etiology

Occurrence of urinary tract infection in an individual who is having urinary bladder catheter or has been catheterized within the past 48 hours.
The most common organisms causing CAUTI are Escherichia coli, Enterobacteriaceae as well as Enterococci spp., coagulase negative Staphylococcus, Pseudomonas aeruginosa and Candida spp.

Diagnostic Approach

Symptoms and Signs:

- Fever
- Urinary urgency
- Suprapubic discomfort

Diagnosis:

- Urinalysis and urine culture
- Blood culture (if bacteremia is suspected)

Differential Diagnosis:

- Pyelonephritis
- Vaginitis

Special Considerations / Remarks

- Piperacillin-tazobactam
- Cefoperazone-sulbactam
- Imipenem
- Meropenem

Preferred and Alternative Treatment

CAUTI	Entero-bacteriaceae, Enterococci Candida spp.	Piperacillin-tazobactam 4.5g IV q6h or Cefoperazone-sulbactam 3g IVq8h	Imipenem 1g IV q8h or Meropenem 1g IV q8h	Do blood and urine cultures before starting antibiotics and modify based on culture. Removal of catheter must be contemplated.

References:

1. Nicolle LE. Catheter associated urinary tract infections. Antimicrob Resist Infect Control. 2014 Jul 25;3:23. doi: 10.1186/2047-2994-3-23. PMID: 25075308; PMCID: PMC4114799.
2. Werneburg GT. Catheter-Associated Urinary Tract Infections: Current Challenges and Future Prospects. Res Rep Urol. 2022 Apr 4;14:109-133. doi: 10.2147/RRU.S273663. PMID: 35402319; PMCID: PMC8992741.

6. Febrile Neutropenia

Definition & Etiology

Neutropenic fever is characterized by a single oral temperature equal to or exceeding 101 F (38.3 C), or a temperature equal to or exceeding 100.4 F (38 C) for at least one hour, in individuals with an absolute neutrophilic count (ANC) below 1500 cells/microliter.
While bacterial infections are the most common, it is also possible for neutropenic fever to have a viral or fungal cause.
Gram-positive bacteria are common amongst bacterial infections and drug-resistant organisms also have been identified as potential infectious agents.

Gram-positive bacteria	
Staphylococcus	Enterococcus species
Streptococcus	
Drug-resistant pathogens	
Pseudomonas aeruginosa	Acinetobacter species
Stenotrophomonas maltophilia	Klebsiella species
Escherichia coli	

Other causes of neutropenia include congenital neutropenia, certain medications and nutritional deficiency

Diagnostic Approach

It is important to gather a comprehensive medical history of the patient, including details about their current illness, past chemotherapy treatments, medication usage, previous infections (particularly those caused by antibiotic-resistant organisms), and any known allergies.

Symptoms and Signs:

- Neutropenic patients may not have usual signs of infection.
- Redness, tenderness and fever may be the only signs.

Diagnosis:

- Complete blood count
- Blood, urinalysis and throat cultures
- Chest X-ray (if respiratory conditions suspected)

Differential Diagnosis:

- Viral infections
- Thrombophlebitis
- Medication allergies and toxicities

Special Considerations / Remarks

- Ceftazidime
- Cefoperazone-Sulbactam
- Piperacillin-tazobactam
- Meropenem
- Imipenem
- Doripenem
- Amikacin
- Colistin
- Echinocandin
- Amphotericin B
- Vancomycin
- Cefixime
- Amoxicillin-Clavulanic acid

Preferred and Alternative Treatment

Adult

Patient-Haemodynamically stable

- Start IV Ceftazidime
- No need to add glycopeptide in the initial regimen (except in specific situations, given below)

Patient-Haemodynamically unstable

- Start BL-BLI agent (Cefoperazone-Sulbactam/piperacillin-tazobactam)
  Or
- Carbapenem (meropenem/imipenem/doripenem)

Reassess after 48 hours:

If blood cultures are negative, haemodynamically stable but still febrile

- Re-culture blood
- Add amikacin for 3 days
- Add colistin (instead of amikacin), If blood cultures are negative, haemodynamically unstable but still febrile
- Inj. Colistin (+/-Carbapenem) + glycopeptide + Echinocandin/L-Ampho B

Blood culture growing Gram negative bacilli

- Patient afebrile - continue the empirical antibiotic till antibiotic sensitivity is available.
- Rationalise as per susceptibility profiles

Conditions to add glycopeptides

- Haemodynamic instability, or other evidence of severe sepsis, septic shock or pneumonia
- Colonisation with MRSA or penicillin-resistant S. pneumonia

Pediatric

1st Line	2nd Line	3rd Line
Ceftazidime (150 mg/kg/day in 3div doses)+ Amikacin (15-20mg/kg/day in 2 or 3 div doses)	Piperacillin + Tazobactam (200-300 mg/kg/day IV in 3-4 div doses)+ Vancomycin (40 mg/kg/day IV in 4 divided doses)	Meropenem (60 mg/kg/day in 3 div doses) + Amphotericin B (1 mg/kg/day IV for 2 weeks) or liposomal Amphotericin B 1-5 mg kg/day, usually 3 mg/kg/day

Patients without an identified etiology who become afebrile within first 3-5 days of therapy and are clinically well with ANC of > 200 cells/cm can be shifted to oral antibiotics.

- Cefixime

  Or
- Amoxicillin-Clavulanic acid

Therapy should be continued for minimum 7 days.

However, if fever persists or ANC remains <200 parenteral therapy should be continued with 2nd line antibiotics

In clinically stable patients without an identified etiology but with persistent neutropenia, therapy can be stopped after 2 weeks.

References:

1. Punnapuzha S, Edemobi PK, Elmoheen A. Febrile Neutropenia. [Updated 2023 Mar 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK541102/

7. Pertussis (Whooping cough)

Definition & Etiology

Highly contagious disease primarily affecting children and adolescents. It is caused by the gram-negative bacteria Bordetella pertussis and Bordetella parapertussis. In rare cases, immunocompromised individuals may also acquire Bordetella bronchiseptica, which usually affects animals and is commonly referred to as "kennel cough."
Following an incubation period of 1 to 3 weeks, pertussis infection usually develops in three distinct stages: the catarrhal phase, the paroxysmal phase, and the convalescent phase.

Diagnostic Approach

Symptoms and Signs:

Catarrhal phase

- Fever
- Fatigue
- Rhinorrhea
- Conjunctival injection

Paroxysmal phase

- Severity and frequency of the cough increases
- Followed by forceful inspiration resulting in the distinctive "whoop" sound
- Cyanosis, diaphoresis, or apnea may be seen

Convalescent phase

- Residual cough (For weeks to months), triggered by exposure to irritant or another upper respiratory infection.

Diagnosis:

- Nasopharyngeal cultures
- Direct fluorescent antibody testing
- Polymerase chain reaction testing
- Serologic testing

Differential Diagnosis:

- Viral upper respiratory infection
- Bronchiolitis
- Pneumonia
- Tuberculosis.

Special Considerations / Remarks

- Erythromycin
- Azithromycin
- Clarithromycin

Preferred and Alternative Treatment Pediatric

- Erythromycin for 14 days
- Azithromycin for 5 days
- Clarithromycin for 7 days

Infants less than 6 months

- Azithromycin in a dose of 10 mg/kg once a day for 5 days

References:

1. Lauria AM, Zabbo CP. Pertussis. [Updated 2022 Oct 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK519008/

8. Tetanus

Definition & Etiology

Tetanus is a condition characterized by acute intoxication caused by a neurotoxin produced by the bacterium Clostridium tetani. The condition is most frequently observed in individuals who have not received vaccination or in elderly individuals with declining immunity.
The incubation period ranges from 2 to 50 days (average, 5 to 10 days).
There are four forms of tetanus based on clinical findings: generalized, neonatal, localized, and cerebral tetanus.

Diagnostic Approach

Symptoms and Signs:

- Jaw stiffness
- Difficulty swallowing
- Restlessness and Irritability
- Stiff neck, arms, or legs
- Arching of the back (opisthotonos)
- Headache
- Sore throat
- Tonic spasms
- Difficulty opening their jaw (trismus)
- Elevated eyebrows (risus sardonicus)

Diagnosis:

- Physical evaluation

Differential Diagnosis:

- Localized infections
- Stiff person syndrome
- Serotonin syndrome
- Hysteria
- Stimulant drugs
- Black widow spider envenomation
- Neoplasms
- Malignant hyperthermia

Special Considerations / Remarks

- Crystalline Penicillin
- Metronidazole

Preferred and Alternative Treatment Pediatric

- Inj. Crystalline Penicillin (2 lac IU /kg/ d /12 hourly)

  Or
- Inj. Metronidazole

References:

1. Bae C, Bourget D. Tetanus. [Updated 2023 May 31]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459217/

9. Acute rheumatic fever

Definition & Etiology

Rheumatic fever is an acute inflammatory condition that arises as a non-purulent complication of a pharyngeal infection caused by group A streptococcus. It can manifest in various combinations of symptoms such as arthritis, carditis, subcutaneous nodules, erythema marginatum, and chorea.

Diagnostic Approach

Symptoms and Signs:

- Fever (≥ 38.5° C)
- Migratory polyarthritis
- Carditis
- Heart murmurs
- Heart failure
- Subcutaneous nodules
- Erythema marginatum
- Sydenham chorea

Diagnosis:

- Modified Jones criteria (Initial diagnosis)
- Testing for GAS (culture, rapid strep test, or antistreptolysin O and anti-DNase B titers)
- ECG
- Echocardiography with Doppler
- Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) level

Differential Diagnosis:

- Rheumatoid arthritis
- Juvenile idiopathic arthritis or septic arthritis
- Systemic lupus erythematosus
- Serum sickness or Lyme disease
- Infective endocarditis
- Henoch-Schonlein purpura
- Sarcoidosis
- Leukemia

Special Considerations / Remarks

- Benzathine Penicillin G
- Azithromycin
- Amoxicillin
- Cephalexin
- Erythromycin
- Penicillin-V
- Sulfadiazine

Preferred and Alternative Treatment

Pediatric

Antibiotic	Dose	Route	Frequency	Duration
Primary prophylaxis for rheumatic fever (Treatment of group A streptococcal tonsillo-pharyngitis) The primary goal of treating an ARF attack is to eradicate streptococcal organisms and bacterial antigens from the pharyngeal region. The antibiotic therapy is very effective if started within 9 days after onset of symptoms to prevent rheumatic fever specially carditis.				
Benzathine Penicillin G* [After sensitivity testing] According to weight of the child	weight ≥ 27 kg :- 1.2 million units weight < 27 kg :- 0.6 million units	Deep intramuscular injection	Only once Single dose	Single dose
Alternative antibiotics				
Azithromycin	12.5 mg/kg/day divided	Oral	OD	5 days
Amoxicillin	25–50mg/kg/day divided Adult dose 750-1500 mg/day	Oral	TDS	10 days
Cephalexin	15-20 mg/kg/dose	Oral	BD	10 days
Erythromycin	250 mg #OR 40 mg/kg/day divided	Oral	QID	10 days
Penicillin-V	250 mg Adult dose 500mg	Oral	QID	10 days
Secondary prophylaxis for rheumatic fever It involves continuous administration of antibiotics in patients with a previous attack of RF and/or rheumatic heart disease. It is mandatory for all patients who have had an attack of RF, whether or not they have residual rheumatic valvular heart disease.				
Benzathine Penicillin G	Same as above	same	same	Every 3-4 weeks
Penicillin V	Same	same	BD	See below
Sulfadiazine (patients allergic to penicillin)	weight >27 kg:- 0.5 g weight ≥27 kg:- 1 g	oral	OD	See below
Erythromycin (patients allergic to penicillin & sufadiazine)	Same	same	BD	See below

Note:
*Contraindicated in penicillin allergy
maximum dose-500mg; contraindicated in liver disorders; can be given in patients with penicillin allergy; do not use if high rates of group A streptococcal macrolide resistance prevalent.

Duration for secondary prophylaxis:
It depends on the presence of carditis during the acute episode.

- NO carditis: continue for 5 years after last attack or 18 years of age [whichever is longer]
- Carditis present (healed carditis or mild mitral regurgitation): continue for 10 years after last attack or 25 years of age [whichever is longer]
- Carditis present (established heart disease or following valve surgery or ballon mitral valvotomy): continue lifelong
- Expert consultation should be sought if want to discontinue after 40 years of age instead of life-long prophylaxis as recurrence beyond this age is minimal.

10. Neonatal sepsis

Definition & Etiology

An infection that affects the bloodstream of newborn infants who are less than 28 days old. Neonatal sepsis can be categorized into two groups depending on when it occurs after birth: early-onset sepsis (EOS) and late-onset sepsis (LOS). EOS refers to sepsis that occurs in neonates within 72 hours of life (sometimes up to seven days), while LOS is defined as sepsis occurring at or after 72 hours of life.
The most frequent bacterial culprits responsible for EOS are:

Group B streptococcus (GBS),	coagulase-negative Staphylococcus
Escherichia coli and Listeria monocytogenes	Haemophilus influenza

The predominant cause of late-onset sepsis (LOS) is attributed to coagulase-negative staphylococcal species, particularly Staphylococcus epidermis. Nevertheless, various other bacterial and viral pathogens have been linked to cases of LOS.

Diagnostic Approach

Symptoms and Signs:

- Irritability,
- Lethargy
- Poor feeding
- Respiratory distress
- Fever
- Hypothermia
- Hypotension

Diagnosis:

- Blood culture
- Complete blood count (CBC) with differential and C-reactive protein
- Lumbar puncture with cerebrospinal fluid (CSF) analysis and culture
- PCR testing
- Inflammatory markers (e.g., procalcitonin, haptoglobin, and cytokines) to support the diagnosis.
- Chest X-ray (to find pulmonary findings in a neonate with respiratory symptoms)

Differential Diagnosis:

- Prematurity and associated complications
- Meconium aspiration
- Neonatal encephalopathy
- Infection due to virus, fungal or parasite
- Congenital heart disease
- Metabolic disease

Special Considerations / Remarks

- Ampicillin
- Gentamicin
- Cefotaxime
- Amikacin
- Piperacillin- Tazobactam
- Vancomycin

Preferred and Alternative Treatment

Antibiotic	Each dose	Frequency		Route	Duration(Days)
		< 7 days	> 7 days		
Inj. Ampicillin And	50 mg/kg/dose	12 hrly	8hrly	IV	7-10
Inj. Gentamicin	5-7.5 mg/kg/dose	24 hrly	24hrly	IV	7-10

Condition	Antibiotic
Severe sepsis (Sclerema/ Shock / suspicion of meningitis)	Inj. Cefotaxime 200 mg/kg/day IV in 4 div doses) + Amikacin (15mg/kg/d)
Sepsis is suspected to be health care associated Or No response in 48-72 hours of initial therapy Or Documented resistance	Inj. Piperacillin- Tazobactam (200-300 mg/kg/day IV in 3-4 div doses) And Amikacin Vancomycin (Added to the regime if staphylococcus is suspected)

Note:

- If two sepsis screens (NNF protocols) done at 12 hours interval or a single sepsis screen is negative and infant remains asymptomatic at 48 -72 hours, the antibiotics may be discontinued.

References:

1. Singh M, Alsaleem M, Gray CP. Neonatal Sepsis. [Updated 2022 Sep 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK531478/

11.Malaria

Definition & Etiology

Infectious disease caused by parasites transmitted through the bite of Anopheles mosquitoes. It can result in severe and life-threatening illness, making it a significant global health concern.

The duration between the initial infection and the onset of symptoms varies depending on the malaria parasite species involved.

Parasite	Duration
P. falciparum	8 to 11 days
P. vivax	8 to 17 days
P. ovale	10 to 17 days
P. malariae	18 to 40 days
P. knowlesi	9 to 12 days

Malaria in pregnancy:

The clinical presentation of infection during pregnancy can range from no symptoms to severe manifestations, which largely depend on the level of immunity the woman had attained prior to conception. In women with partial immunity, only a small number of infections may lead to fever or other noticeable symptoms.

Malaria during pregnancy has a profound impact on the well-being of expectant mothers and has been linked to elevated infant mortality rates. This is primarily due to the occurrence of low birth weight resulting from either intrauterine growth restriction, preterm labor, or both factors combined.

Diagnostic Approach

Symptoms and Signs:

Normal Adult

- Fever and rigors—the malarial paroxysm
- Anemia
- Jaundice
- Splenomegaly
- Hepatomegaly

Complications in pregnant Women

Infections caused by the P. falciparum parasite are linked to various complications such as:

- Maternal anemia
- Hypoglycemia and pulmonary edema
- Miscarriage
- Low birth weight
- Stillbirths

Diagnosis:

- Light microscopy of blood (thin and thick smears)
- Rapid diagnostic testing
- Complete blood count and blood culture
- Urinalysis
- Comprehensive metabolic and coagulation panel
- Chest radiograph

Cerebral malaria

- Lactate level
- Arterial blood gas
- Lumbar puncture

Differential Diagnosis:

- Influenza
- Chikungunya
- Dengue
- Hepatitis virus (A or B)
- Rickettsia
- Leptospirosis
- Typhoid

Special Considerations / Remarks

- Doxycycline
- Clindamycin

Preferred and Alternative Treatment

Kindly refer National Malaria Control Program guidelines

https://ncvbdc.mohfw.gov.in/index.php

References:

1. Buck E, Finnigan NA. Malaria. [Updated 2023 Jan 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK551711/

12.Tuberculosis

Definition & Etiology

A persistent, gradually advancing infection caused by Mycobacterium tuberculosis that frequently exhibits an initial period of latent infection without noticeable symptoms.

M.tuberculosis is resistant to alcohol and acid. It belongs to a group of organisms known as the M. tuberculosis complex, which includes Mycobacterium africanum, Mycobacterium bovis, and Mycobacterium microti.

The primary site of infection is typically the lungs. However, it can also affect various other organ systems including the respiratory system, gastrointestinal (GI) system, lymphoreticular system, skin, central nervous system, musculoskeletal system, reproductive system, and liver.

Diagnostic Approach

Symptoms and Signs:

Primary infection

- Asymptomatic
- If symptomatic then low-grade fever and fatigue can be observed

Active pulmonary tuberculosis

- Cough with little or no sputum initially but can become more productive as the disease progresses
- Dyspnea
- Weight loss
- General malaise or fatigue
- Night sweats
- Hemoptysis (in cavitary TB)

Diagnosis:

- Chest x-ray
- Acid-fast stain and culture
- Tuberculin skin test (TST) or interferon-gamma release assay (IGRA)
- Nucleic acid amplification test (NAAT)

Differential Diagnosis:

- Pneumonia
- Malignancy
- Non-tuberculous mycobacterium
- Fungal infection
- Histoplasmosis
- Sarcoidosis

Special Considerations / Remarks

- Ofloxacin
- Levofloxacin
- Ciprofloxacin
- Moxifloxacin
- Amikacin

Preferred and Alternative Treatment

Kindly refer to RNTCP guidelines

https://tbcindia.gov.in/index.php

References:

1. Adigun R, Singh R. Tuberculosis. [Updated 2023 May 14]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441916/

13. Syphillis

Definition & Etiology

Syphilis is a widespread infection caused by the bacterium Treponema pallidum, affecting the entire body. During pregnancy, this infection becomes a significant concern due to the potential transmission of the bacterium from the mother to the fetus through the placenta. Congenital infection, which occurs in the fetus, can lead to various unfavorable consequences, including perinatal mortality.

Diagnostic Approach

Symptoms and Signs:

- Chancre
- Systemic symptoms (e.g., fever, headache, malaise, sore throat, myalgias and weight loss)
- Adenopathy
- Alopecia
- Renal (transient albuminuria, acute nephritis with hypertension and renal failure)
- Ocular or Otic infection

Diagnosis:

- Serologic testing (FTA-ABS, MHA-TP, TPPA, RPR and VDRL)
- Cerebrospinal (CSF) examination (For neurologic symptoms patient)
- Imaging studies (depending on the organ involved)

Differential Diagnosis:

- Genital herpes
- Pityriasis rosea
- Erythema multiforme

Preferred and Alternative Treatment

Kindly refer to STD program guidelines

https://nhm.gov.in

References:

1. https://www.uptodate.com/
2. Tudor ME, Al Aboud AM, Leslie SW, et al. Syphilis. [Updated 2023 May 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan

14. Influenza

Definition & Etiology

A contagious viral infection affecting the respiratory system, encompassing both the upper and lower respiratory tracts. It is caused by four types of influenza viruses, namely A, B, C, and D. Among these, types A and B are responsible for human infections annually during the epidemic season.

Influenza A has various subtypes based on the combination of hemagglutinin (H) and neuraminidase (N) proteins expressed on the virus surface. These subtypes are classified into 18 hemagglutinin subtypes and 11 neuraminidase subtypes, denoted as H1-18 and N1-11, respectively. For instance, influenza A viruses can be designated by their H and N types, such as H1N1 and H3N2.

On the other hand, influenza B viruses are categorized into different lineages and strains. Recent influenza B viruses belong to either the influenza B Yamagata or influenza B Victoria lineage. Notably, influenza viruses possess receptors that determine their specificity to different species.

Diagnostic Approach

Symptoms and Signs:

- Cough and fever
- Sore throat
- Myalgia
- Headache
- Rhinorrhea
- Conjunctivitis
- Shortness of breath, tachycardia and hypotension (in severe cases)

Diagnosis:

- Clinical evaluation
- Rapid antigen or reverse transcriptase-polymerase chain (RT-PCR) tests
- Chest x-ray (in severe respiratory symptoms)

Differential Diagnosis:

- Acute Respiratory Distress Syndrome (ARDS)
- Adenovirus
- Dengue

Special Considerations / Remarks

- Oseltamivir
- Zanamvir

Preferred and Alternative Treatment

- No antibiotics to be given
- In pregnancy following approach recommended

Influenza In pregnancy (seasonal And H1N1) The best preventive strategy is administration of single dose of killed vaccine.	Oseltamivir 75 mg Oral BD for 5 days	Nebulization with Zanamvir respules (2) 5 mg each, BD for 5 days	1. Tendency for severe including premature labor &delivery. 2. Treatment should begin within 48 hrs of onset of symptoms. 3. Higher doses commonly used in non pregnant population (150 mg) are not recommended in pregnancy due to safety concerns. 4. Chemoprophylaxis can be used in significant exposures. 5. Live (nasal Vaccine) is contraindicated in pregnancy.	Direct fetal infection rare Preterm delivery and pregnancy loss.

References:

1. Boktor SW, Hafner JW. Influenza. [Updated 2023 Jan 23]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459363/

15. Varicella

Definition & Etiology

A communicable illness caused by the varicella-zoster virus (VZV). The mode of transmission is through inhalation of infected aerosolized droplets. The primary infection begins in the mucosal lining of the upper respiratory tract. Subsequently, after a period of 2-6 days, the virus enters the bloodstream, leading to another episode of viremia around 10-12 days later.

Diagnostic Approach

Symptoms and Signs:

- Myalgia and headache followed by a rash,
- Oral sores
- Low-grade fever
- Nausea and decreased appetite

Diagnosis:

- Physical evaluation

If diagnosis doubtful then:

- Polymerase chain reaction (PCR) test
- Immunofluorescent test
- Serologic tests
- Viral culture

Differential Diagnosis:

- Insect bites
- Impetigo
- Drug eruptions

Special Considerations / Remarks

- Aciclovir

Preferred and Alternative Treatment

- No antibiotics to be given
- In pregnancy following approach recommended

Varicella	>20 wks of gestation, presenting within 24 hours of the onset of the rash, Aciclovir 800mg Oral 5 times a day IV acyclovir recommended for the treatment of severe complications, > 24 hrs from the onset of rash, antivirals are not found to be useful.	VZIG should be offered to susceptible women < 10 days of the exposure. VZIG has no role in treatment once the rash appears. The dose of VZIG is 125 units / 10kg not exceeding 625 units, IM.	Chickenpox during pregnancy does not justify termination without prior prenatal diagnosis as only. A minority of fetuses infected develop fetal varicella syndrome.

References:

1. Ayoade F, Kumar S. Varicella-Zoster Virus (Chickenpox) [Updated 2022 Oct 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448191/

Treatment of Muti-Drug Resistant Bacterial Pathogens

1. Methicillin-Resistant S. aureus (MRSA)

- **Resistant** - All penicillins, cephalosporins and macrolides
- **DOC** - Glycopeptides (e.g., Vancomycin and Teicoplanin)
  Linezolid (for skin and soft tissue infections caused by MRSA)
- **Caution** - Fluoroquinolones, aminogycogides, chloramphenicol and doxycycline are not to be used as monotherapy or as first line of treatment.

2. Vancomycin Resistant Enterococcus (VRE)

- **DOC** - Linezolid
  Nitrofurantoin was found effective for uncomplicated UTIs
- **Caution –** High doses of penicillin or ampicillin is required for isolates susceptible to these agents.
  For doxycycline and chloramphenicol-susceptible isolates, the drugs should not be used as monotherapy.
  Gentamicin or streptomycin are recommended to be used in combination with ampicillin for the treatment of enterococcal endocarditis caused by organisms susceptible to either agent.

3. Extended Spectrum Beta-Lactamases (ESBL) Producing Enterobacteriaceae.

- **Resistant -** All penicillin's, cephalosporins (including cefepime and cefpirome) and Aztreonam
- **DOC** - Carbapenems (Ertapenem, Meropenem and Imipenem)
  Piperacillin–Tazobactam and Cefoperazone- Sulbactam can be considered in mild infections and when susceptible in-vitro.

4. Carbapenem-Resistant Enterobacteriaceae (CRE)

- **Resistant -** β-lactam antibiotics, aminoglycosides, and β-lactam–β-lactam inhibitor Combinations
- **DOC** - Colistin
- **Caution** - Polymyxins, tigecycline & Fosfomycin can be considered but treatment regimen vary with the patient and infection site.

Treatment of Burns Patients

Causative Organism	Empiric antibiotics	Alternative antibiotics
Strep pyogenes Enterobacter sp., S. aureus, S. epidermidis, Pseudomonas Fungi (rare)	**Burn wound sepsis** • Piperacillin-tazobactam or • Cefoperazone-sulbactam or With or without: • Vancomycin //Teicoplanin (if there is suspicion for MRSA) **Antifungal Therapy** When extensive burns and patient not responding to antibiotics • If hemodynamically stable: fluconazole • If hemodynamically unstable: Echinocandin **Burn wound cellulitis** • Cefazolin or • Clindamycin or • Vancomycin if there is suspicion for MRSA With and without (for burns involving the lower extremity or feet or burns in patients with diabetes) Piperacillin-tazobactam or Cefoperazone-sulbactam	Carbapenem +/- Vancomycin/ Teicoplanin
Comments: • Antibiotic choices are dependent on the antibiogram of the individual institution. • Surgical debridement as necessary. • Amphotericin B is toxic to all burn patient as renal system compromised, hence Caspofungin may be used.		