

**Station 1 RESPIRATORY**

Pick correct dispensing label

WHATSTOPGO

Counsel patients on drug, lifestyle advice, and key counselling points

Demonstrate use of inhaler

**Station 2 ANTIMICROBIAL**

Given antimicrobial, dose/regimen, and condition

Drug knowledge

Indications for that drug

Dose of drug

Clinical knowledge for drug and also condition (other medications that can be used)

Year Three (Semester 2)			
Category One (Know these medicines)			
<u>Antibiotics</u>	<u>Antiviral</u>	<u>Antifungal</u>	<u>Respiratory medicines</u>
Amoxicillin/Clavulanate	Famciclovir	Fluconazole	Budesonide
Amoxicillin	Valaciclovir	Miconazole	Eformoterol
Flucloxacillin	Aciclovir	Amphotericin	Eformoterol/Budesonide
Phenoxymethylpenicillin			Fluticasone
Cephalexin			Prednisolone
Clarithromycin			Salbutamol
Metronidazole			Salmeterol
Ciprofloxacin			Salmeterol/Fluticasone
Doxycycline			Terbutaline
Trimethoprim/ Sulfamethoxazole			Tiotropium
Trimethoprim			

**Respiratory Medications**

**Asthma**

Why treat: Sx control & relief, prevent exacerbation, acute asthma & death. Improve & maintain lung function & QOL

1. SABAs – (relievers) first line for acute relief of Sx; given on as needed basis, prevent or treat exercise induced bronchoconstriction  
Increased use of daily SABAs is indicative of worsening asthma control i.e. >3/week (refer)
2. ICS (low to mod-high) – main preventative treatment: improves lung function & QOL, reduce airway inflammation and bronchial hyper-reactivity
3. ICS+LABA

\*\*Never use LABA on its own in asthmatic patients—can increase mortality rate

Exacerbations

- 4x4x4 with short acting
- Oral corticosteroid (short course)

**COPD**

Why treat: Sx relief, improve exercise tolerance & QOL, prevent or treat exacerbations & complications

1. SABA +/- SAMA – initial Tx: as needed basis to relieve Sx & improve exercise tolerance
2. LAMA or LABA – Tx for those who remain symptomatic even if short-acting & also treat exacerbations. Decrease Sx, frequency of exacerbation, hospitalisation & improve overall exercise tolerance & QOL
3. + LAMA or LABA
4. + ICS – reduce frequency of exacerbations & improves QOL in severe disease (if FEV<50%). Used in severe breathlessness and >2 exacerbations per year

\*\*STOP SAMA if use a LAMA or vice versa, never use together

Exacerbations

- Short acting: increase dose and/or frequency

	Always rinse mouth after using inhaler, gargle then spit out to wash out any excess residue at back of throat
<b>Eformoterol (Formoterol)</b>  Oxis Turbuhaler Floradile	<u>Asthma (+ICS)</u> DPI, 1-2 capsules (12-24mcg) inhaled BD DPI, 6-12 mcg inhaled BD Child >6yo: DPI, 6-12 mcg inhaled BD <u>COPD</u> DPI, 1 capsule (12mcg) inhaled BD
<b>Salmeterol</b>  Serevent Accuhaler	<u>Asthma (+ICS)</u> Adult & child >6yo: DPI 1 inhalation (50mcg) BD (up to 2 inhalations [100mcg] BD in more severe) <u>COPD</u> DPI 50mcg BD
<b>ICS/LABAs</b>	Maintenance Tx in asthma patients with combination of fixed inhaled corticosteroid or oral Always use in asthma, never use LABAs alone (increase risk of severe asthma exacerbations and asthma-related deaths) Individuals >6yo
<b>Budesonide/Eformoterol</b>  Symbicort (Rapihaler-MDI Turbuhaler-DPI) Flutiform	<u>Asthma</u> <i>Non-SMART Therapy</i> Adult: MDI/DPI 100/6-400/12 mcg BD Child >6yo: MDI/DPI 100/6-200/12 mcg BD <i>SMART Therapy (high doses not suitable)</i> DPI, 100/6 or 200/6 mcg Maintenance: 2 inhalations in 1 or 2 doses (max. 2 inhalations BD) Sx relief: 1 inhalation prn; repeat after a few minutes if needed up to max. 6 inhalations at any one time or 12 inhalations daily (includes maintenance doses) MDI, 50/3 or 100/3 mcg Maintenance: 4 inhalations daily in 1 or 2 doses (max 4 inhalations BD) Sx relief: 2 inhalations prn; repeat after a few minutes if required to max. 12 inhalations at any one time or 24 inhalations daily (includes maintenance doses) <u>COPD</u> Symbicort 200/6 MDI/DPI 2 inhalations BD Symbicort 400/12 DPI 1 inhalation BD
<b>Fluticasone propionate/Salmeterol</b> 25mcg Salmeterol: Seretide 50mcg Salmeterol: Seretide Accuhaler	<u>Asthma</u> <i>Adult</i> MDI 2 inhalations BD (25mcg Salmeterol + 50, 125 or 250mcg fluticasone propionate) DPI 1 inhalation BD (50mcg Salmeterol + 100, 250 or 500 mcg fluticasone propionate) <i>Child &gt;6yo</i> MDI (25mcg Salmeterol/50mcg fluticasone) 2 inhalations BD DPI (50mcg Salmeterol/ 100mcg fluticasone propionate) 1 inhalation BD <u>COPD</u> MDI 2 inhalations BD (25mcg Salmeterol + 125 or 250mcg fluticasone propionate) DPI 1 inhalation BD (50mcg Salmeterol + 250 or 500 mcg fluticasone propionate)

<b>Inhaled corticosteroids</b>	Asthma—main preventative treatment: improves lung function & QOL, reduce airway inflammation and bronchial hyper-reactivity Reduce airway inflammation and bronchial hyper-reactivity
Precaution	Pregnancy & breastfeeding—safe to use (budesonide & fluticasone propionate is preferred). No data for fluticasone furoate. COPD—may increase risk of pneumonia Smoking—in asthma patients respond less well to inhaled corticosteroids than non-smokers
Side effects	Dysphonia, oropharyngeal candidiasis, bruising, facial skin irritation, allergic reactions (SOB, rash, urticarial, angioedema) System side effects are rare: Adrenal suppression if high dose of corticosteroid and abruptly stop use, bone density loss Increase risk of glaucoma and cataracts Pneumonia—risk increased in COPD patients Skin thinning and bruising—higher risk at higher dose or elderly patients Impaired growth in children—may reduce growth initially, appear to have small impact on final adult height—poorly controlled asthma may also lead to impaired growth. Effect on other organs not defined well

	SE: headache, vomiting, diarrhoea, jaundice, hallucination, confusion, dizziness, rash Tablets only
<b>Valaciclovir</b>	Tx CMV following organ transplant Renal impairment cut-off at CrCl 50ml/min Use in renal impairment can increase risk of neurological ADEs Prefer aciclovir (can be used from 36 week of pregnancy) Safe in breastfeeding Liver disease or dysfunction—consider aciclovir?! SE: see aciclovir Tablets only

### Herpes Simplex – Cold sore

Mild ( <b>topical</b> )	Aciclovir	On first sign of tingle (prodromal phase) 5% aciclovir q4h (5 times daily) on affected area for 5 days
Primary severe (oral 7 days, IV available for aciclovir)	Aciclovir	400 mg 5 times daily for 7 days
	Famciclovir	500 mg q12h for 7 days
	Valaciclovir	1g q12h for 7 days
Recurrent severe (oral)	<b>Famciclovir</b>	<b>1500mg single dose</b>
	Valaciclovir	2g q12h for one day
	Aciclovir	400mg 5 times daily for 5 days
Lesion evident	Virasolve >12yoa	Idoxuridine with lidocaine Apply hourly first day, then q4h Caution in pregnancy, can prevent secondary infection
Referral	Painful mouth ulceration/poor oral intake Signs of bacterial infection Systemic Sx present (fever, sweats, chills, malaise) Lesions on other parts of the body >3 outbreaks per year <18yoa (topical is also ineffective) Lesion present for >7days Immunocompromised Near eyes or going into the nose	

### Shingles \*Tx for 7 days; treat as soon as Sx present, within 72h. Consider treatment if >72h for high risk pts.

Aciclovir	Oral 800mg 5 times daily
Valaciclovir	1g q8h
Famciclovir	250mg q8h If immunocompromised: 500mg q8h for 10 days

### Antifungal

<b>Azoles</b>	Fungistatic—impairs synthesis of ergosterol in fungal cell membrane → cell breakdown, leakage and death via lytic activity of host
Precautions	Breastfeeding—excreted in breastmilk, but miconazole and fluconazole is safe to use
<b>Fluconazole</b>	Less broad spectrum against Aspergillus spp. Broad spectrum antifungal—yeasts: candida spp. (except krusei), and cryptococcus. Also effective in all dermatophytes, 2 molds (bipolaris spp. & Penicillium spp.) Pregnancy: high doses increases risks. Dose of 150mg single dose no effect on congenital abnormalities, but recent study suggests increased risk of miscarriage Renal impairment—dose reduction required; usual dose for first 2 days then ½ or ¼ dose depending on severity Capsule, oral liquid, injection Same doses for oral and IV administration Readily absorbed in gut, no effect if alterations in gastric pH Give IV under controlled rate of over 60 min or more (no less to avoid cardiac arrhythmias) i.e. 200mg/hour 150mg doses typically seen 400-800mg doses used for more serious infections (systemic candidiasis/Cryptococci)

<b>Liposomal</b>	AmBisome 3-5mg/kg daily IV Mild infusion toxicity, lowest risk of nephrotoxicity Infuse IV over 30-60min at concentration 0.2-2mg/mL in glucose 5%. Infuse over 2h for doses >5mg/kg
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### Invasive Candida

- Fluconazole IV (then can transition to oral therapy)
- Caspofungin IV (no oral formation for step down, fluconazole preferred)
- 10-14 days minimum for bloodstream infection
- If complicated disease, longer duration required

### Cryptococcus (Systemic fungal)

Meningitis	C. neoformans: Immunosuppressed C. gatti: immunocompetent
Induction	Desoxycholate: 0.7-1mg/kg daily OR Liposomal: 3-5mg/kg daily OR Lipid complex: 3-5mg/kg daily + Flucytosine - C. neoformans dose duration for min. 2 weeks - C. gatti dose duration longer, 4-6 weeks required
Consolidation (eTG)	Fluconazole 800mg oral STAT, then 400-800mg OD for 8-10 weeks - Duration dependent on immunosuppression (I.e. transplant requires longer), and response

### Tinea

Corporis (body skin)	Dermatophytes: Trichophyton spp. DDx: discoid eczema (microscope scrapings to differentiate) Topical treatment: miconazole or clotrimazole BD, continue treatment for additional 1-2 weeks after skin has cleared Can also use terbinafine (OD)—shorter duration of use, more rapid effects Refer: large area, on scalp or face (systemic). If itchy, refer (bacterial)
Tinea versicolor (pityriasis)	Yeast skin infection: pityrosporum ovale Hyper/hypopigmentation, in young adults due to sweat Topical OTC treatments: econazole (peveryl) [wet body, leave overnight, wash next day, for 3 consecutive nights] ketoconazole 2% or <u>miconazole 2% shampoo</u> ** (OD for 10 minutes, then wash off for 10 days) Selenium sulfide 2.5% suspension Treatment failure: systemic azole – fluconazole 400mg single dose
Tinea pedis (athlete's foot)	Dermatophytes: Trichophyton spp. Treatment: miconazole BD must be used for additional 2 weeks after Sx resolve +/- topical steroid for inflammation (until resolved) Other Tx: econazole, bifonazole, clotrimazole, terbinafine 1%
Tinea capitis	Scalp ringworm (dermatophytes) DDx: pityriasis capitis (dandruff—doesn't cause hair loss) Systemic treatment: fluconazole 150mg once weekly 2-6 weeks (usually 4 weeks) Can also use terbinafine or itraconazole
Tinea unguium (Onychomycosis)	1 <sup>st</sup> line: terbinafine—10% better cure rate than alternatives, also duration of treatment shorter Alternative: fluconazole 150-300mg one weekly for 12-24 weeks (fingernail) or 24-52 weeks (toe nail) Intraconazole If distal infection (at top), use topical amorolfine

### Antibacterial

#### Beta-Lactams

Penicillins	<ul style="list-style-type: none"> <li>- Bactericidal; interferes with bacterial cell wall PG synthesis (bind PBP → causing cell death)</li> <li>- Renal impairment: IV or prolong Tx can result in electrolyte disturbance and neurotoxicity. Risk of neutropenia</li> <li>- Pregnancy—safe <ul style="list-style-type: none"> <li>o Avoid amoxicillin/ clavulanate in pregnant women with premature rupture of membranes</li> </ul> </li> </ul>
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SE: taste disturbance, GI (NVD), ototoxicity (dose related), abdominal pain & cramps, candida infections, rash, headache, <i>C. difficile</i> associated disease, thrombocytopenia, SJS	
Spectrum of activity	<ul style="list-style-type: none"> <li>- Gram negative activity: <i>Campylobacter jejuni</i> &amp; <i>coli</i>, <i>H. influenza</i>, <i>Moraxella catarrhalis</i>, some activity against <i>Neisseria</i> spp.</li> <li>- Gram positive activity: <i>Staphylococcus</i> (incl. MRSA—no data), <i>streptococcus</i></li> <li>- Anaerobic activity</li> <li>- Covers <i>Mycoplasma pneumonia</i>, <i>Mycobacterium avium</i> &amp; some activity to tuberculosis, <i>legionella</i> spp., <i>chlamydia</i>, <i>chlamydia</i> spp.</li> </ul>
Dose	<ul style="list-style-type: none"> <li>- Renal impairment dose reduction if CrCl&lt;30mL/min—use lowest dose (250mg)</li> <li>- Pregnancy—must contact pregnancy drug information centers for advice for specific patient (<i>azithromycin</i>, <i>erythromycin</i> &amp; <i>roxithromycin</i> preferred &amp; safe to use)</li> <li>- Breastfeeding—safe to use, may cause loose bowel action in infant</li> <li>- Adult oral dose: 250-500mg BD (Max. 1g BD may be used for non-TB mycobacterial infection)</li> </ul>
Indication	<ul style="list-style-type: none"> <li>- Prevent &amp; Tx <i>Mycobacterium avium</i> complex (MAC) &amp; other non-TB mycobacterial infections, with other agents</li> <li>- Eradication of <i>H. pylori</i> with other agents</li> <li>- Lower respiratory tract infections</li> <li>- Prevent &amp; Tx pertussis</li> </ul>
Clinical	<ul style="list-style-type: none"> <li>- CI: Tx with <i>colchicine</i>, <i>ergometrine</i>, <i>simvastatin</i>, oral <i>midazolam</i>, <i>ticagrelor</i></li> <li>- Risks of arrhythmias (prolong QT interval)</li> <li>- Inactive against <i>P. aeruginosa</i>, but can reduce biofilm production in mucoid strains and inhibit some virulent factors—can contribute to effects in CF</li> <li>- MAC <ul style="list-style-type: none"> <li>o Prevention: 500mg BD</li> <li>o Tx+HIV- 500mg (&lt;50kg 250mg) BD</li> <li>o Tx+HIV+ 500mg BD (dose not to be exceeded, increased dose associated with mortality)</li> </ul> </li> <li>- <i>H. pylori</i> eradication <ul style="list-style-type: none"> <li>o 500mg BD for 7 days (combination Tx with <i>amoxicillin</i> 1g BD)</li> </ul> </li> </ul>

<b>Metronidazole</b> (Nitroimidazoles)	
Prodrug metabolised to active metabolites which interfere with DNA synthesis	
SE: NVD, abdominal pain, metallic taste, CNS effects (dizziness, headache), hypersensitivity (flushing, fever, rash, itch), SJS, seizures, dark urine*	
Spectrum of activity	<ul style="list-style-type: none"> <li>- Narrow spectrum</li> <li>- Covers only anaerobes: <i>bacteroides</i>, <i>clostridium difficile</i></li> <li>- Activity to protozoa</li> <li>- Inactive against aerobic gram positive or gram negative coverage (although may show some activity for <i>Yersinia</i> spp.) and facultative anaerobic bacteria</li> </ul>
Dose	<ul style="list-style-type: none"> <li>- Oral, rectal suppositories, liquid, injection</li> <li>- Shorter t ½ c.f. to <i>tinidazole</i> thus multiple doses given daily (OD dosing for giardiasis possible)</li> <li>- Dosing q8-12h—little evidence to support q12h but very commonly used in Aus</li> <li>- Bioavailability oral (70-90%: almost completely absorbed and very little remains in GI) &amp; rectal (60-80%) are good <ul style="list-style-type: none"> <li>o Absorption from oral liquid LOWER than oral tablets</li> <li>o Convert IV to oral asap</li> </ul> </li> <li>- Take oral tablets with food to reduce stomach upset</li> <li>- Oral liquid best absorbed if taken 1h before food</li> <li>- Medication can make patient dizzy or confused, avoid driving</li> <li>- Avoid alcohol during Tx and for 24h after finishing course to prevent NV, flushing headache and palpitations</li> <li>- Renal impairment—dose reduction usually not necessary, metabolites can accumulate in severely impaired (risk of ADEs)</li> <li>- Severe hepatic impairment—dose reduction of 1/3 or ½</li> <li>- Pregnancy: safe to use, take in divided doses if possible</li> <li>- Breastfeeding: safe to use. May cause bitterness in milk. Use divided doses</li> <li>- Adult oral: 200-400mg q8-12h. Max 4g daily</li> </ul>
Indication	<ul style="list-style-type: none"> <li>- Anaerobic bacterial infections</li> <li>- Protozoal infections—giardiasis, trichomoniasis</li> <li>- Bacterial vaginosis</li> <li>- <i>C. difficile</i>-associated disease</li> </ul>

<ul style="list-style-type: none"> <li>- Pregnancy: trimethoprim CI in 1<sup>st</sup> trimester; sulphamethoxazole CI in late pregnancy</li> <li>- Breastfeeding: safe if neonate is healthy and full term; avoid if ill, stressed or preterm infant and in those with hyperbilirubinemia or G6PD deficiency</li> <li>- SE: hypersensitivity (fever, dyspnoea, cough, rash, eosinophilia; SJS, TENs, serum sickness-like syndrome, lupus-like syndrome, pneumonitis, hepatitis)—fever, NVD, rash, itch, sore mouth, hyperkalemia, thrombocytopenia, headache, drowsiness, photosensitivity, tremor, hyponatraemia, aseptic meningitis, C. difficile associated disease</li> <li>- Notify doctor: sore throat, fever, troublesome rash, cough, difficulty breathing, joint pain, dark urine, or pale stools</li> </ul>	
Spectrum of activity	<p>Mainly gram negative bacteria (except pseudomonas aeruginosa—resistant)</p> <p>Gram positive staphylococcus activity</p> <p>Activity against strep is unknown/not recommended</p> <p>No data for use with anaerobes</p> <p>Susceptibility to nocardia spp.</p>
Dose	<ul style="list-style-type: none"> <li>- Ratio of trimethoprim to sulfamethoxazole is 1:5 <ul style="list-style-type: none"> <li>o 160/800mg (1 double strength tablet)</li> <li>o 8/40 mg is 1mL of liquid</li> </ul> </li> <li>- Mild to moderate infections <ul style="list-style-type: none"> <li>o Adult: 80/400-160-800 mg q12h</li> </ul> </li> <li>- Severe infections – use IV</li> <li>- Renal impairment if CrCl &lt;50mL/min dose of 160/800 remains in the same (no reduction required) but frequency and duration of treatment must be changed accordingly</li> <li>- Take medication with food to reduce upset stomach. Drink lots of fluids (min. 2-3L daily) during prolonged or high dose Tx</li> <li>- Avoid sun exposure to avoid onset of rash—SLIP SLAP SLOP</li> </ul>
Indication	<ul style="list-style-type: none"> <li>- Treatment and primary and secondary prevention of PCP</li> <li>- Infections caused by L. monocytogenes (alternative to ampicillin or benzylpenicillin), Nocardia spp., Stenotrophomonas maltophilia</li> <li>- Melioidosis (with other agents)</li> <li>- Shigellosis</li> <li>- Primary prevention of cerebral toxoplasmosis in HIV patients</li> <li>- Prevention and treatment of pertussis (if a macrolide unsuitable)</li> <li>- Community-acquired MRSA infections, eg skin and soft tissue infections</li> </ul>
Clinical	<ul style="list-style-type: none"> <li>- Melioidosis <ul style="list-style-type: none"> <li>o With ceftazidime or meropenem for acute and alone maintenance</li> </ul> </li> <li>- PCP <ul style="list-style-type: none"> <li>o Adult oral: 5/25 mg/kg q6-8h until improvement, followed by oral at the same dose for total of 21 days</li> <li>o Primary or secondary prevention: oral 80/400-160/800mg/kg OD or 160/800mg OD on 3 days a week</li> </ul> <p style="margin-left: 40px;">+HIV &amp; significant hypoxia, begin corticosteroids at the same time to prevent early deterioration and accelerate recovery</p> </li> <li>- Shigellosis <ul style="list-style-type: none"> <li>o Adults Oral 160/800mg q12h for 5 days</li> </ul> </li> </ul>

#### Augmentin 500/125mg + CAP

- Broad spectrum
  - o Gram + : strep, staph,
  - o Anaerobes
- Covers more bacteria than amoxicillin alone
- Dose: normal dose 875/125mg per day, dose is low, could be given bd
- For cap in adult dose should be higher
- Lower dose given in renal impairment
- Spectrum: broad
  - o Gram + strep, staph
  - o Gram – h. influenza, Moraxella
  - o Good anaerobe cover
- Appropriateness: 1<sup>st</sup> line for class, augmentin may be unnecessary as its more broader spectrum
- Augmentin more broader than amoxicillin
  - o Clavulanic acid makes it susceptible to