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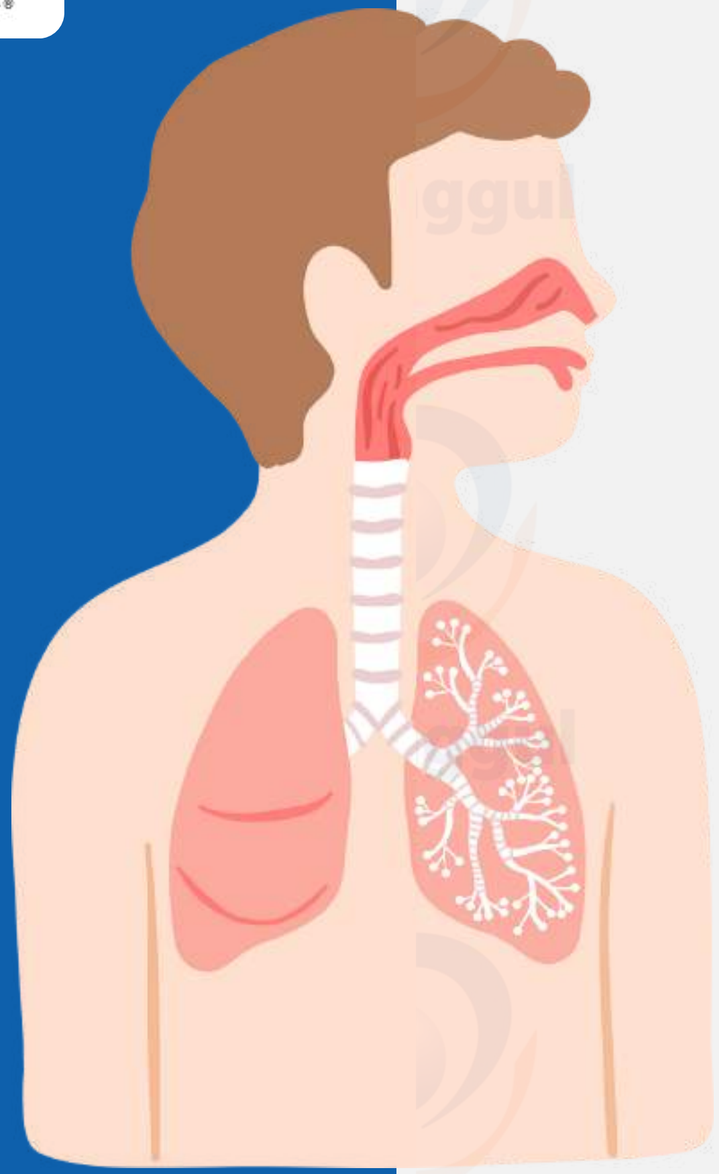

PSF402

Farmakoterapi Infeksi dan Kanker

Sesi Ke 1

Topik Sesuai RPS:
Pengantar Penyakit Infeksi

Dosen Pengampu:

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223080974

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Topik Sebelum UAS

Sesi 1
Prinsip Infeksi

Sesi 2
Prinsip Pemilihan Antibiotik

Sesi 3
Farmakoterapi Infeksi Saluran nafas atas

Sesi 4
Farmakoterapi saluran nafas bawah

Sesi 5
Farmakoterapi TBC

Sesi 6
Farmakoterapi saluran pencernaan

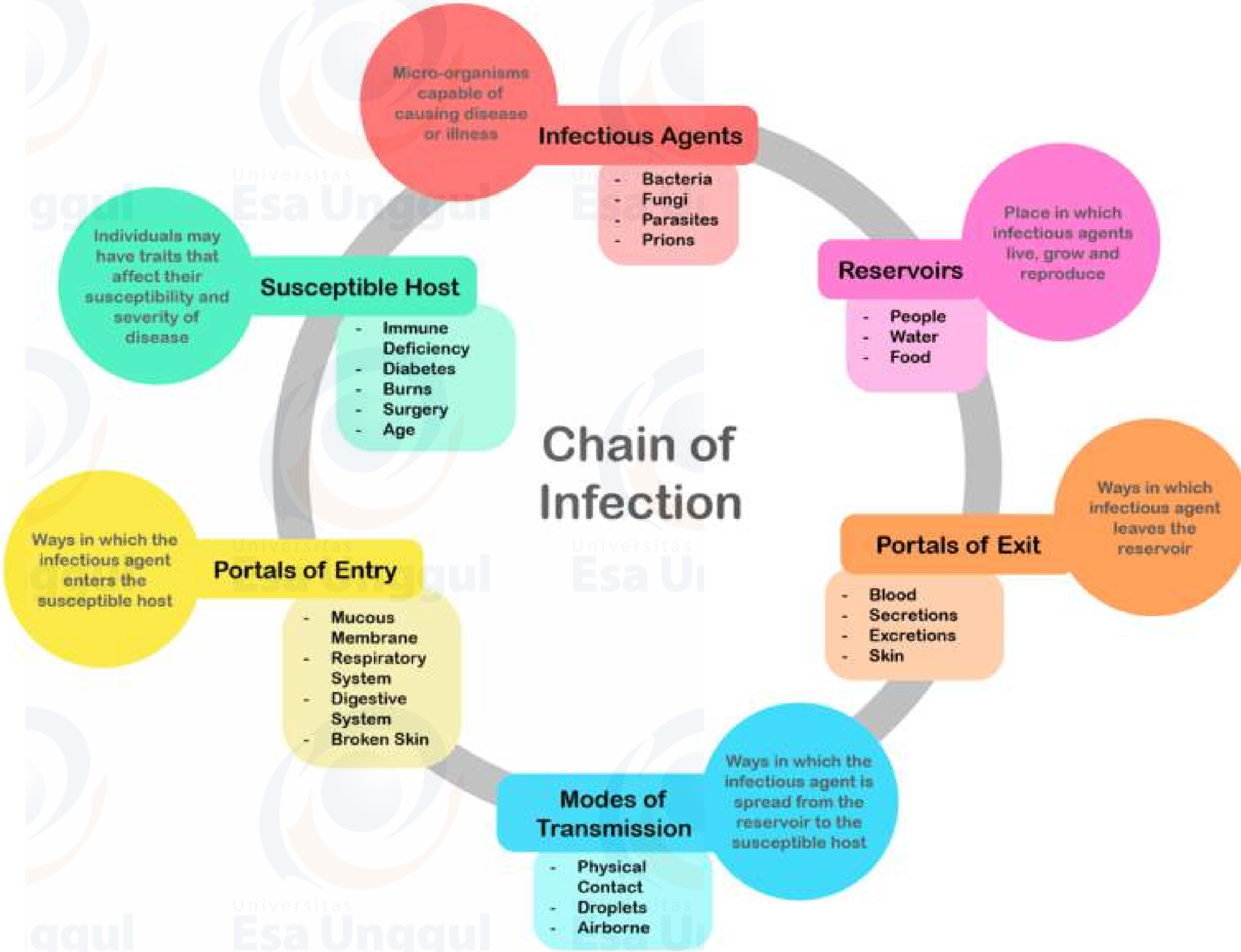
Sesi 7
Farmakoterapi sepsis

Ujian Tengah Semester

Mekanisme Terjadinya Infeksi

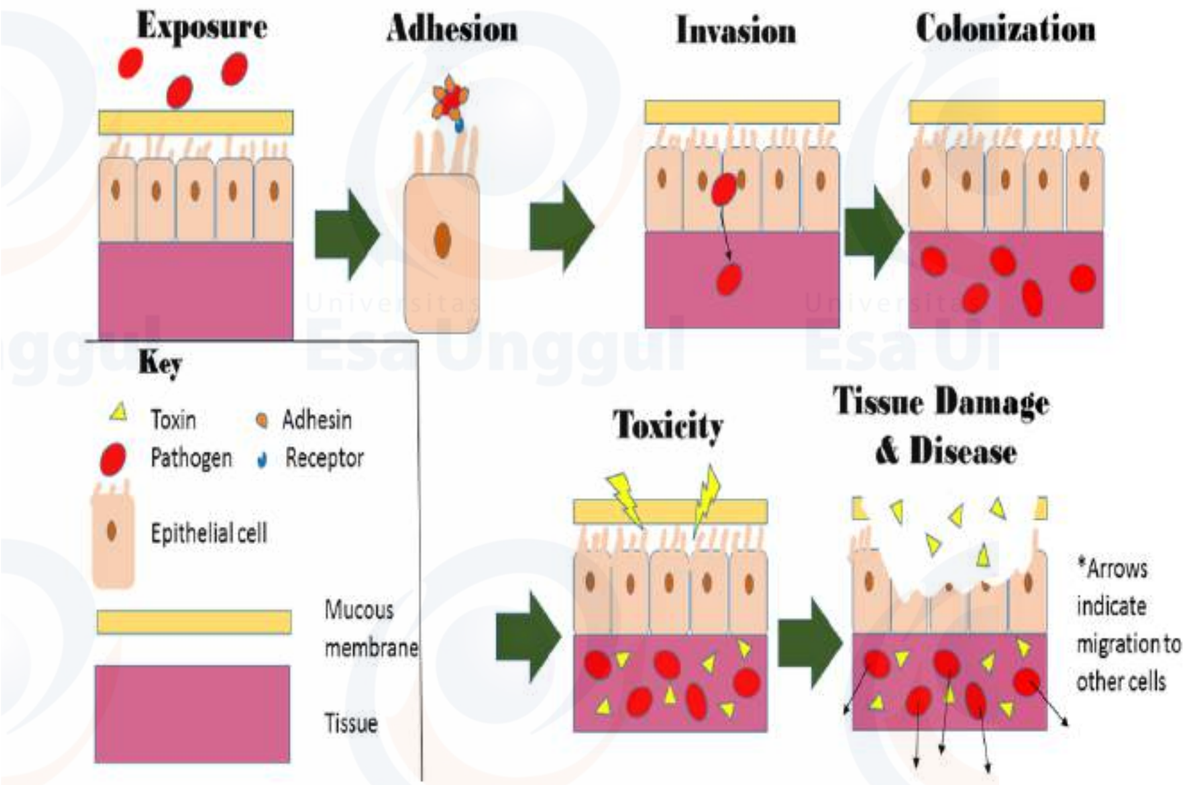
- Infeksi adalah proses invasif oleh mikroorganisme dan berproliferasi didalam tubuh yang menyebabkan sakit (potter &Perry 2005),
- Sedangkan menurut Smeltzer & Brenda (2002) infeksi adalah beberapa penyakit yang disebabkan oleh pertumbuhan organisme patogenik dalam tubuh.

Mekanisme Terjadinya Infeksi

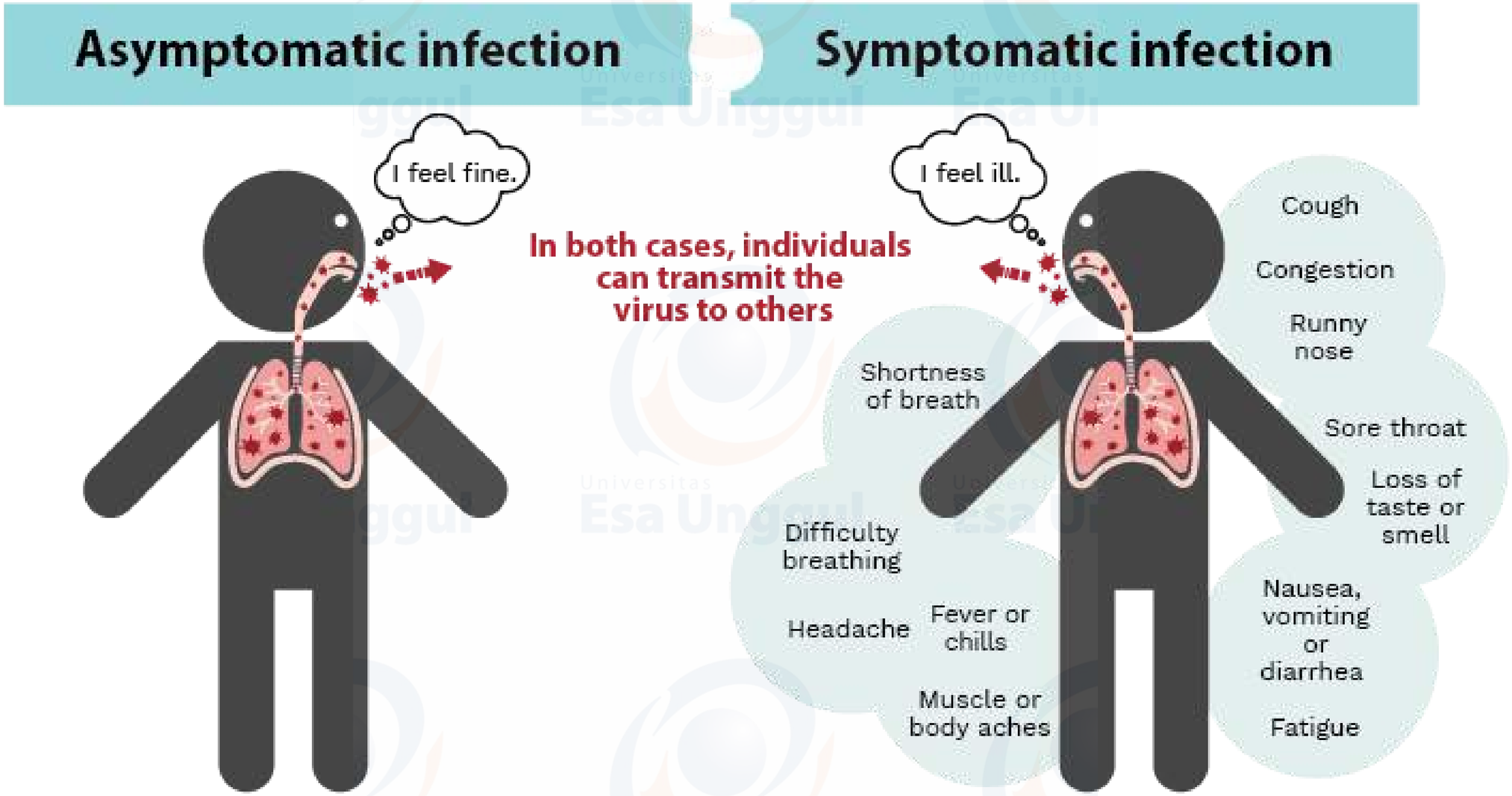


Step of Infection

- Adhesi (menempel)
- Penetrasi (masuk ke tubuh)-
- Invasi (menyebar ke seluruh tubuh)
- Kolonisasi (berbiak)-

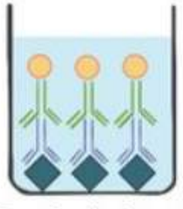
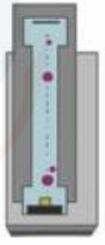


Clinical Assessment of Infection



Symptomatic - subjective: based on the disease

Objective

 Microscopy	• Rapid primary screening [97-98 , 104] • Low cost [97-98, 104]	• Dependent on phenotypic characterisation [97-98, 104]	 PCR	• Rapid results [97-98] • Highly sensitive and specific [97-98] • Able to process low quantity samples [97-98]	• High cost per test [97-98] • Specialised equipment and staff [97-98] • Lack of standardised PCR assays for fungi [97-99]
 Culture	• Gold standard [97-98] • Able to provide anti-fungal susceptibility testing [97-98] • Identifies viable organism [97-98] • Low cost [97-98]	• Dependent on phenotypic characterisation [97-98] • Delayed time to diagnosis [97-98] • Lacks sensitivity [97-98] • Risk of contamination [97-98]	 Sequencing	• Able to provide exact identity of fungi [97-99] • Commercial sequencing is increasingly economical [97-99]	• Specialised equipment and staff [97-99] • Complex bio-informatics analysis [97-99] • Lack of complete fungal reference database leading to poor species level resolution [97-99]
 Serological test	• Rapid results [98, 105-107] • Low cost [98, 105-107] • Not temperature sensitive [98, 105-107]	• Sensitivity and specificity varies by sample type (serum versus BAL), host factors and prior use of antibiotics and/or anti-fungals [97, 100, 110-112, 107] • Not available for all fungal species [98, 105-107]	 Mass spectrometry	• Highly sensitive and specific [99, 116] • Lower cost per test than other molecular methods [116]	• High initial cost of equipment [104, 116] • Specialised equipment and staff [104, 116] • Incomplete spectra database leading to poor species level resolution for certain organism [116]

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Rise your hand!

any question?

PSF402

Antibiotik yang Rasional

Sesi Ke 2

Topik Sesuai RPS:
Prinsip pemilihan antibiotik yang rasional

Dosen Pengampu:

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Prinsip Pemilihan Antibiotik

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Farmakoterapi saluran nafas bawah

Sesi 5

Farmakoterapi TBC

Sesi 6

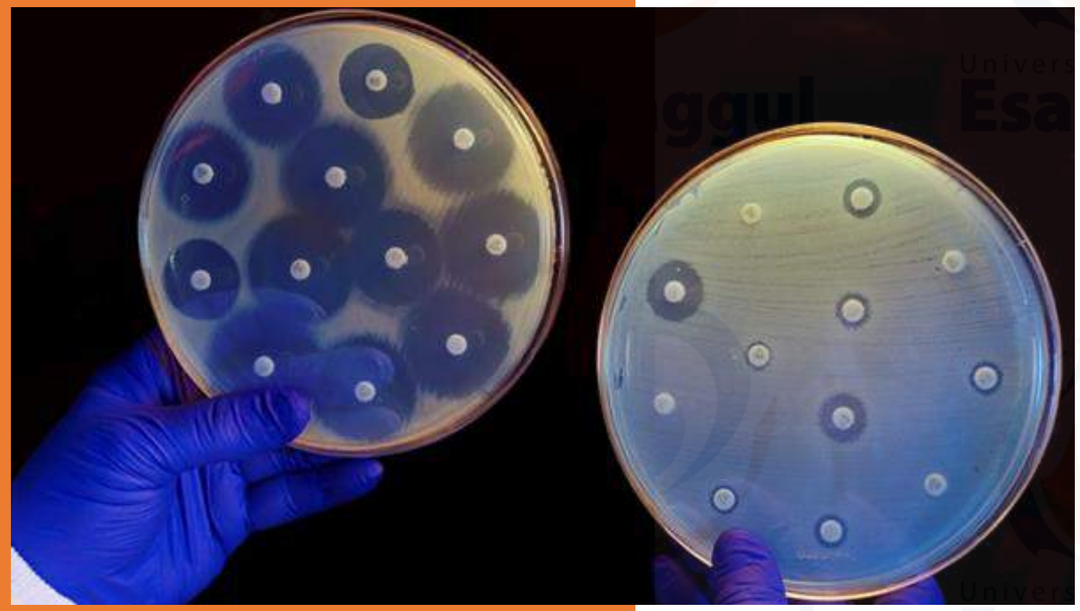
Farmakoterapi saluran pencernaan

Sesi 7

Farmakoterapi sepsis

Ujian Tengah Semester

What is Resistency

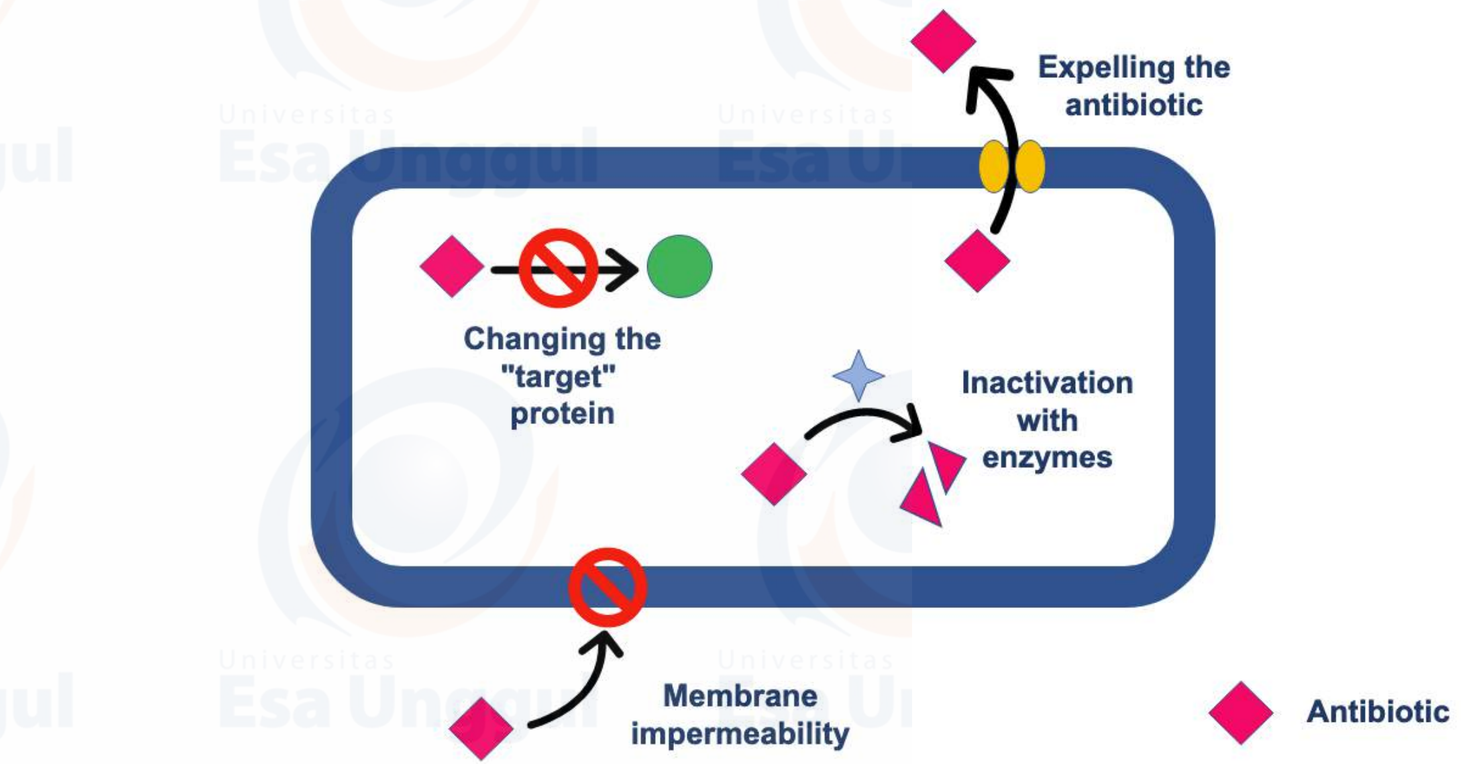


HASIL PEMBIAKAN ATROS : *Enterococcus faecium*

HASIL UJI SENSITIVITAS

	Jenis Obat	Keterangan
1	Ampicillin	R
2	Ampicillin	R
3	Amoxillin Clavulanic Acid	R
4	Ampicilin Sulbactam	R
5	Amikacin	R
6	Azithromycin	R
7	Clindamycin	R
8	Ceftriaxon	R
9	Ceftazidine	R
10	Cefotaxime	R
11	Chloramphenicol	R
12	Ciprofloxacin	R
13	Erytromycin	R
14	Fosfomicin	R
15	Gentamycin	R
16	Levofloxacin	R
17	Moxifloxacin	R
18	Piperacillin/ Tazobactam	R
19	Sulfamethoxazole/trimethoprim	R
20	Tetracycline	R
21	Oxacilin	R
22	Ofloxacin	R
23	Vancomycin	R
24	Imipenem	R
25	Meropenem	R

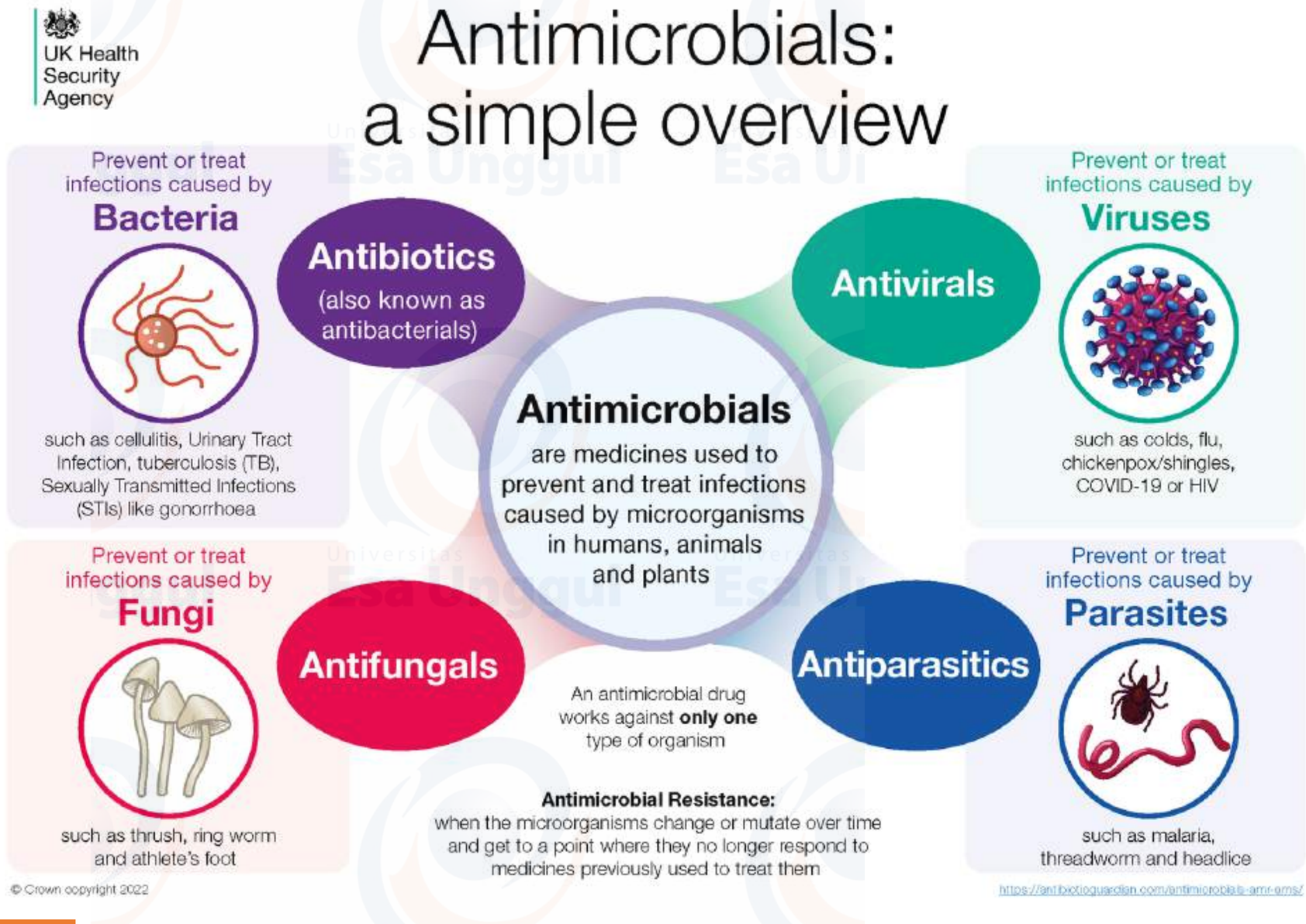
What is Resistency



- Selection Pressure
- Using plasmid, from resistance to non resistance

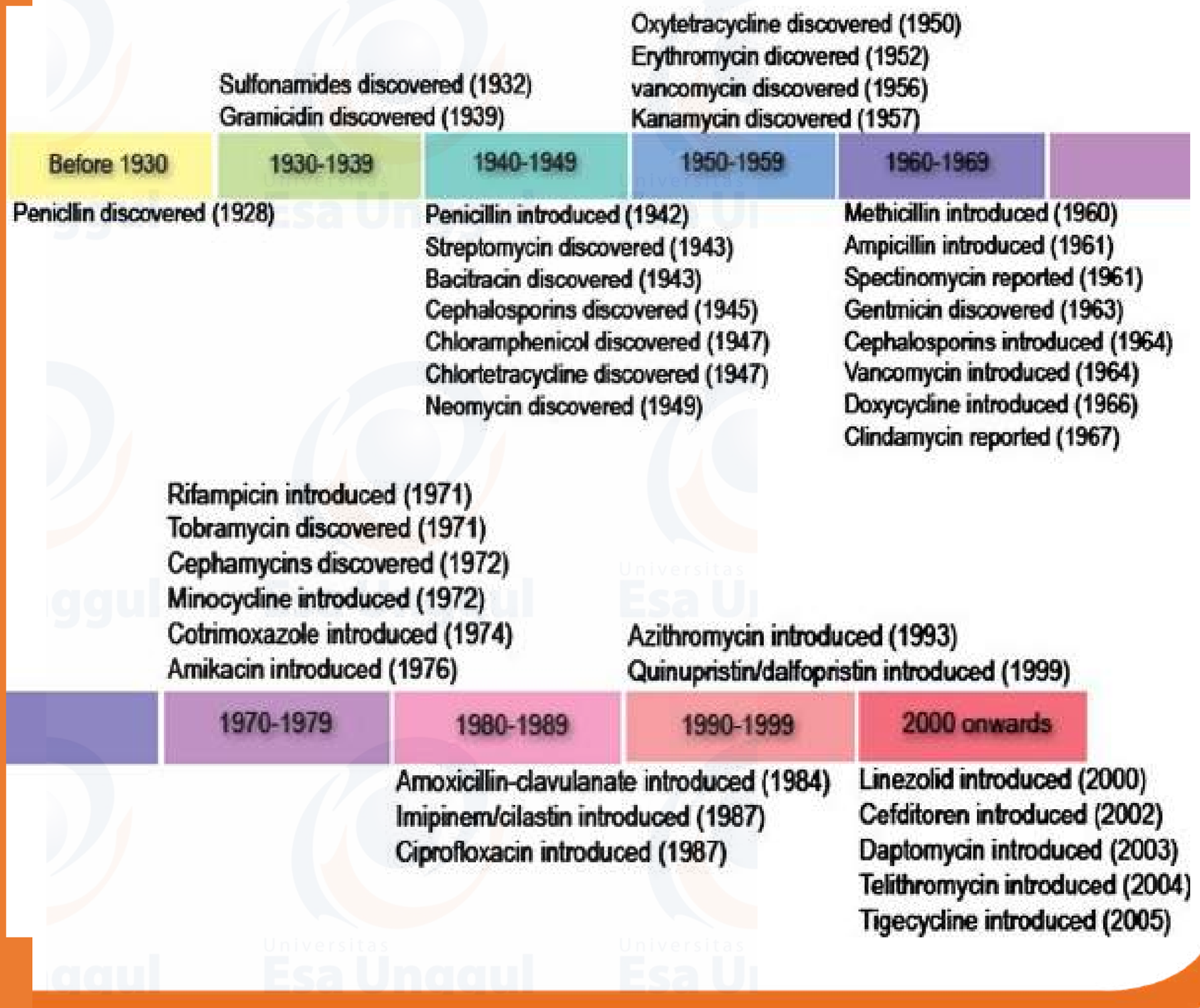
What should we Do?

What is Antibiotics?



ANTIBIOTICS

Timeline and History



classification of antibiotics

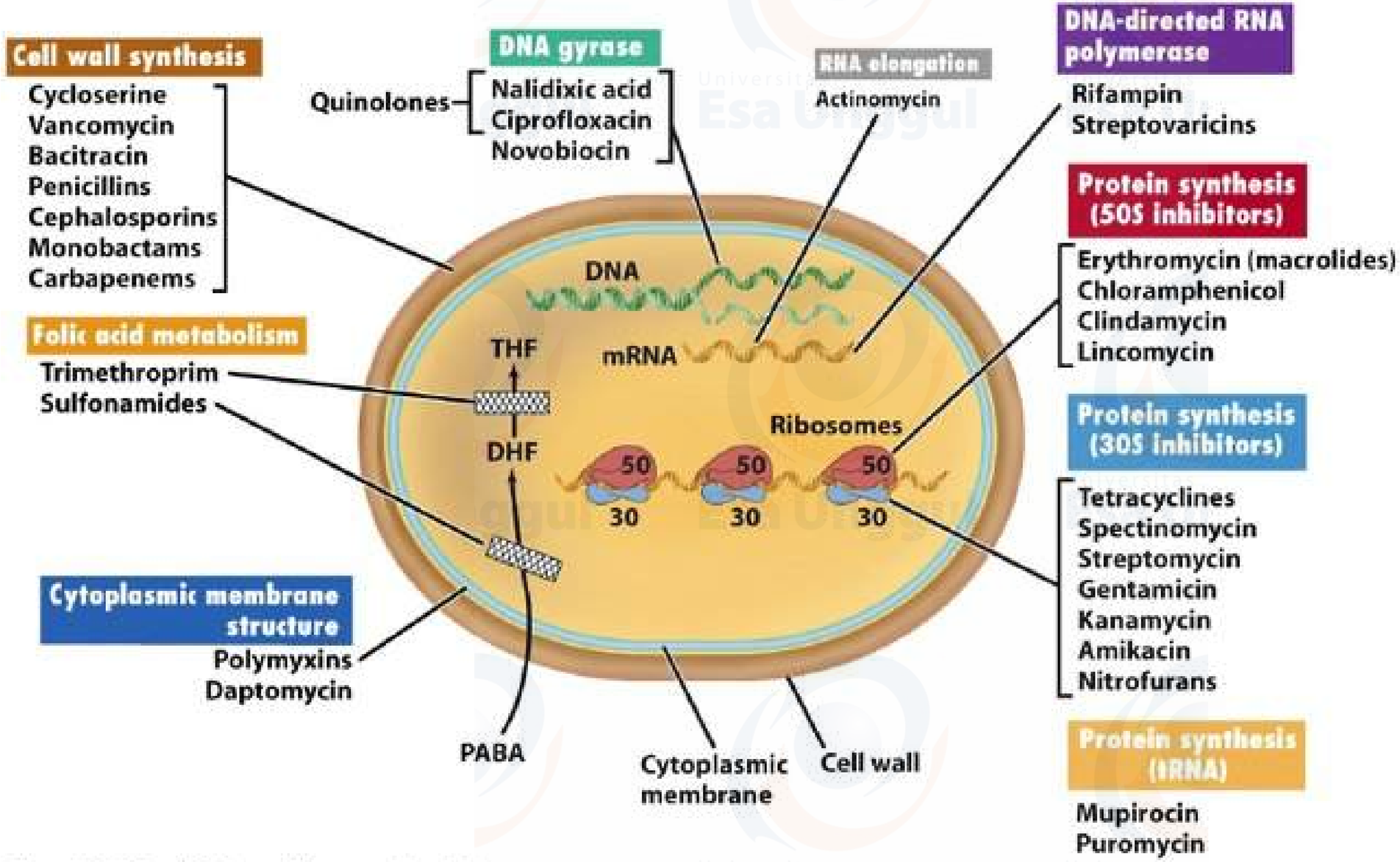


Figure 20-14 Brock Biology of Microorganisms 11/e

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Different classes of antibiotics

B-Lactams

Inhibit bacteria cell wall biosynthesis

Examples
Amoxicillin
Flucloxacillin
Cefalexin

Aminoglycosides

Inhibit the synthesis of proteins by bacteria

Examples
Streptomycin
Neomycin
Kanamycin
Paromomycin

Glycopeptides

Inhibit bacteria cell wall biosynthesis

Examples
Vancomycin
Teicoplanin

Ansamycins

Inhibit the synthesis of RNA by bacteria

Examples
Geldanamycin
Rifamycin
Naphthomycin

Quinolones

Interfere with bacteria DNA replication and transcription

Examples
Ciprofloxacin
Levofloxacin
Trovafloxacin

Streptogramins

Inhibit the synthesis of proteins by bacteria

Examples
Pristinamycin IIA
Pristinamycin IA

Lipopeptides

Disrupt multiple cell membrane functions

Examples
Daptomycin
Surfactin

Sulfonamides

Prevent bacteria growth and multiplication

Examples
Prontosil
Sulfanilamide
Sulfadiazine
Sulfisoxazole

Chloramphenicol

Inhibits synthesis of proteins

No longer a first line drug in any developed country

Tetracyclines

Inhibits synthesis of proteins by bacteria

Examples
Tetracycline
Doxycycline
Lymecycline
Oxytetracycline

Macrolides

Inhibits protein synthesis by bacteria

Examples
Erythromycin
Clarithromycin
Azithromycin

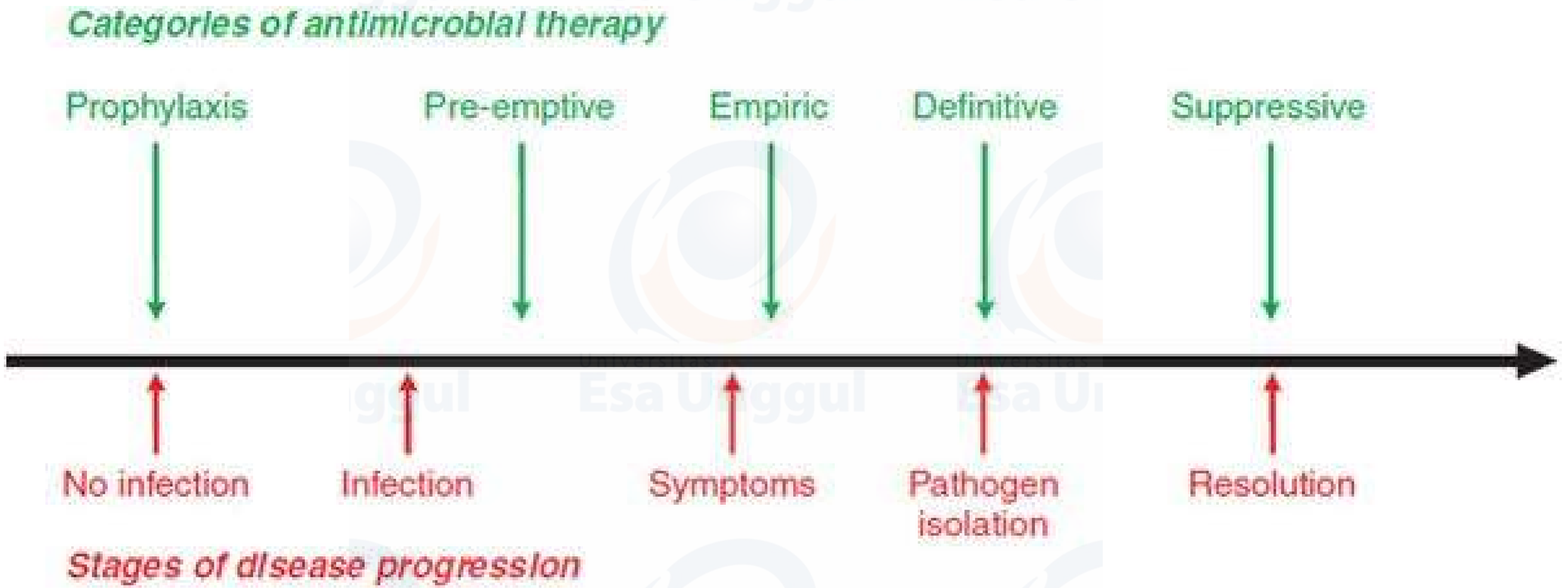
Oxazolidinones

Inhibits synthesis of proteins by bacteria

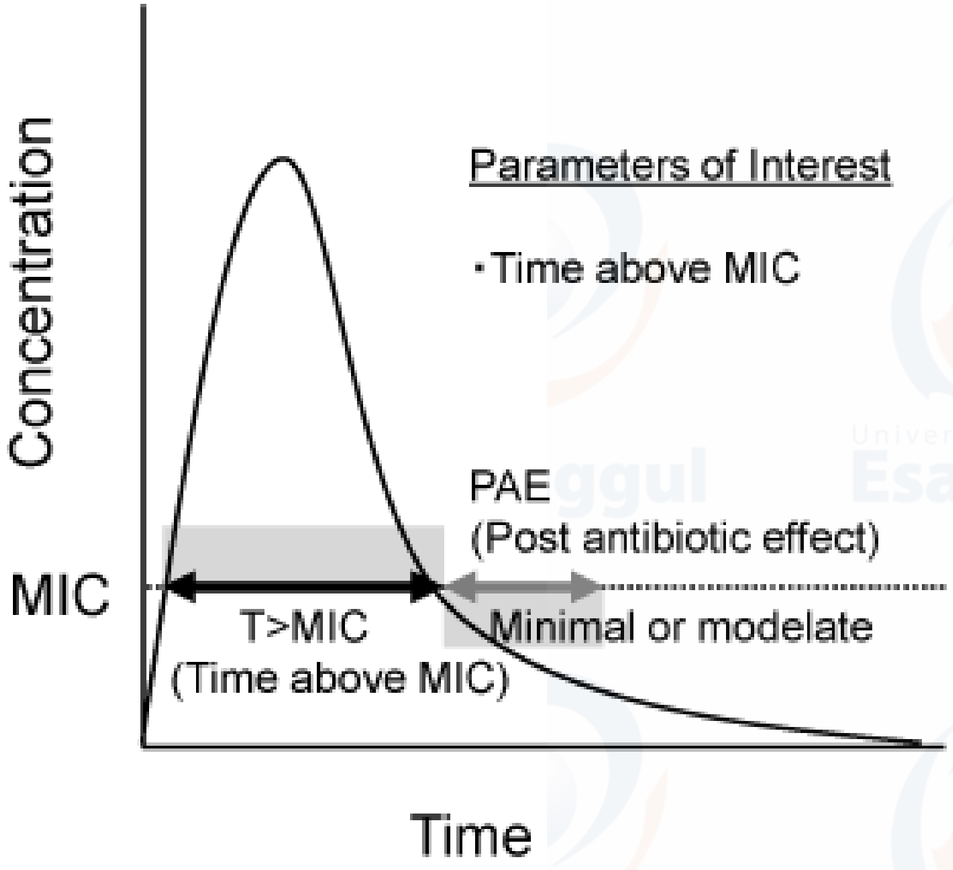
Examples
Linezolid
Posizolid
Tedizolid
Cycloserine

Commonly act as bactericidal agents, causing bacterial cell death

Commonly act as bacteriostatic agents, restrict growth & multiplication

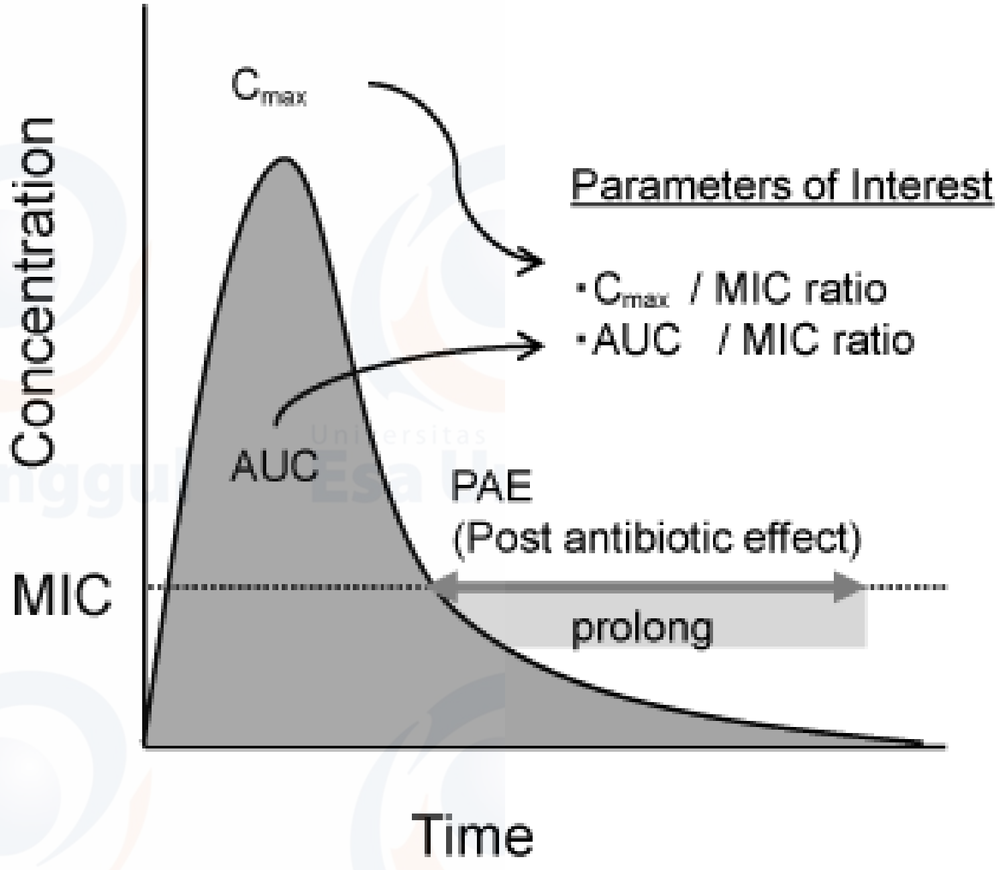


Time-dependent antibiotics

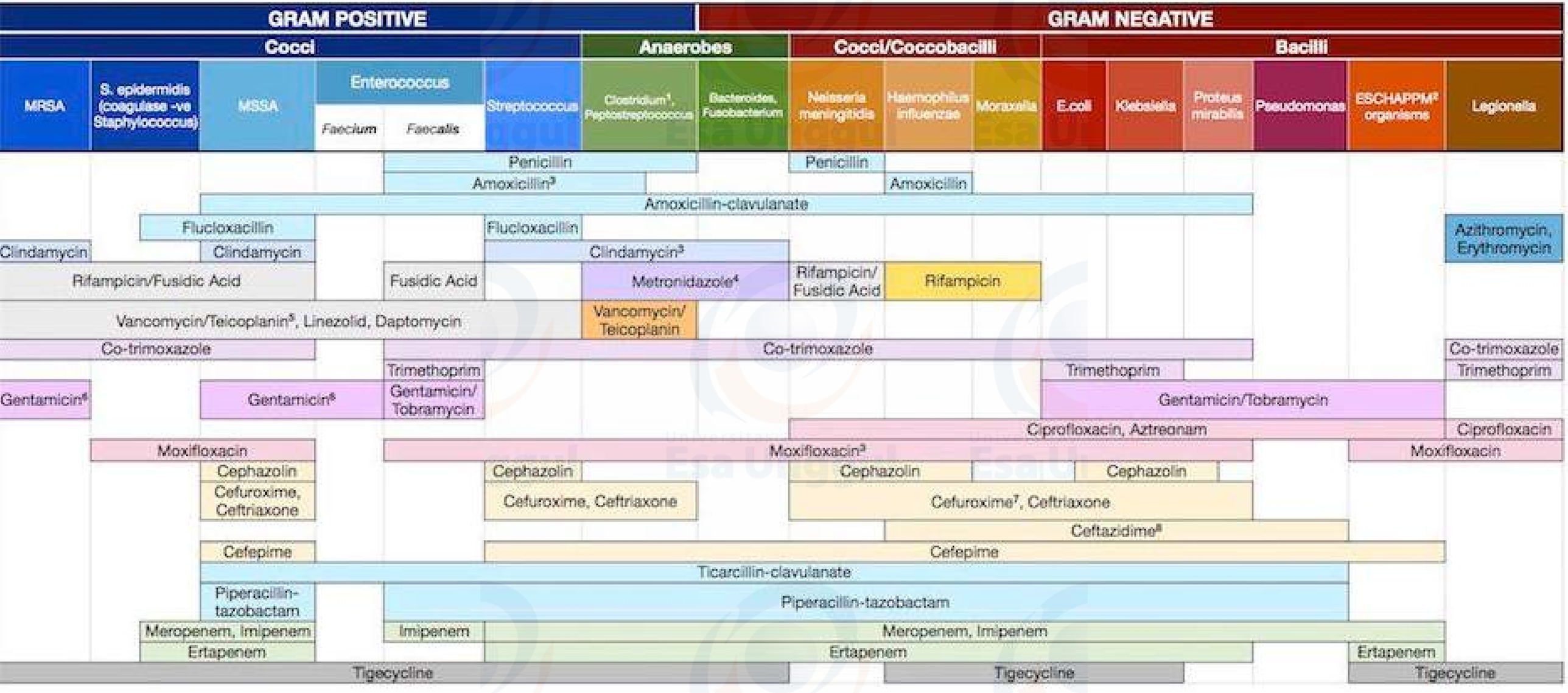


penisilin, sefalosporin, dan makrolida

Concentration-dependent antibiotics



Aminoglikosid, Fluorokuinolon


GRAM POSITIVE
GRAM NEGATIVE
Cocci
Anaerobes
Cocci/Coccobacilli
Bacilli
MRSA
S. epidermidis (coagulase -ve Staphylococcus)
MSSA
Enterococcus
Faecium
Faecalis
Streptococcus
Clostridium[1], Peptostreptococcus
Bacteroides, Fusobacterium
Neisseria meningitidis
Haemophilus influenzae
Moraxella
E.coli
Klebsiella
Proteus mirabilis
Pseudomonas
ESCHAPPM[2] organisms
Legionella
Penicillin
Penicillin
Amoxicillin[3]
Amoxicillin
Amoxicillin-clavulanate
Flucloxacillin
Flucloxacillin
Azithromycin, Erythromycin
Clindamycin
Clindamycin
Clindamycin[3]
Rifampicin/Fusidic Acid
Fusidic Acid
Metronidazole[4]
Rifampicin/ Fusidic Acid
Rifampicin
Vancomycin/Teicoplanin[5], Linezolid, Daptomycin
Vancomycin/ Teicoplanin
Co-trimoxazole
Co-trimoxazole
Co-trimoxazole
Trimethoprim
Trimethoprim
Trimethoprim
Gentamicin[6]
Gentamicin[6]
Gentamicin/ Tobramycin
Gentamicin/Tobramycin
Ciprofloxacin, Aztreonam
Ciprofloxacin
Moxifloxacin
Moxifloxacin[3]
Moxifloxacin
Cephazolin
Cephazolin
Cephazolin
Cephazolin
Cefuroxime, Ceftriaxone
Cefuroxime, Ceftriaxone
Cefuroxime[7], Ceftriaxone
Ceftazidime[8]
Cefepime
Cefepime
Ticarcillin-clavulanate
Piperacillin-tazobactam
Piperacillin-tazobactam
Meropenem, Imipenem
Imipenem
Meropenem, Imipenem
Ertapenem
Ertapenem
Ertapenem
Tigecycline
Tigecycline
Tigecycline

TASK

Sebutkan contoh aplikasi dari masing-masing penggunaan terapi antibiotik, dan kasusnya.

- name of agent
- aims of therapy
- indication/ disease

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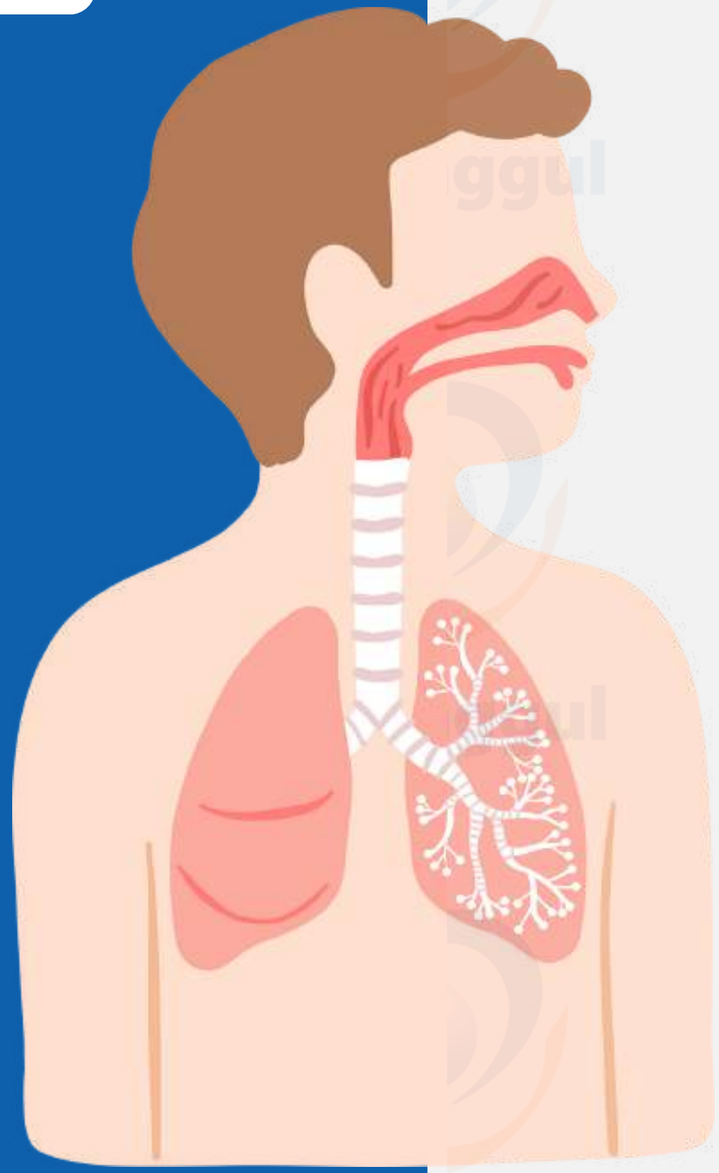
Rise your hand!

any question?



PSF402

Infeksi Saluran Pernafasan Atas (ISPA)

Sesi Ke 3

Topik Sesuai RPS:
Prinsip pemilihan antibiotik untuk ISPA

Dosen Pengampu:

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Sesi 5

Farmakoterapi TBC

Sesi 6

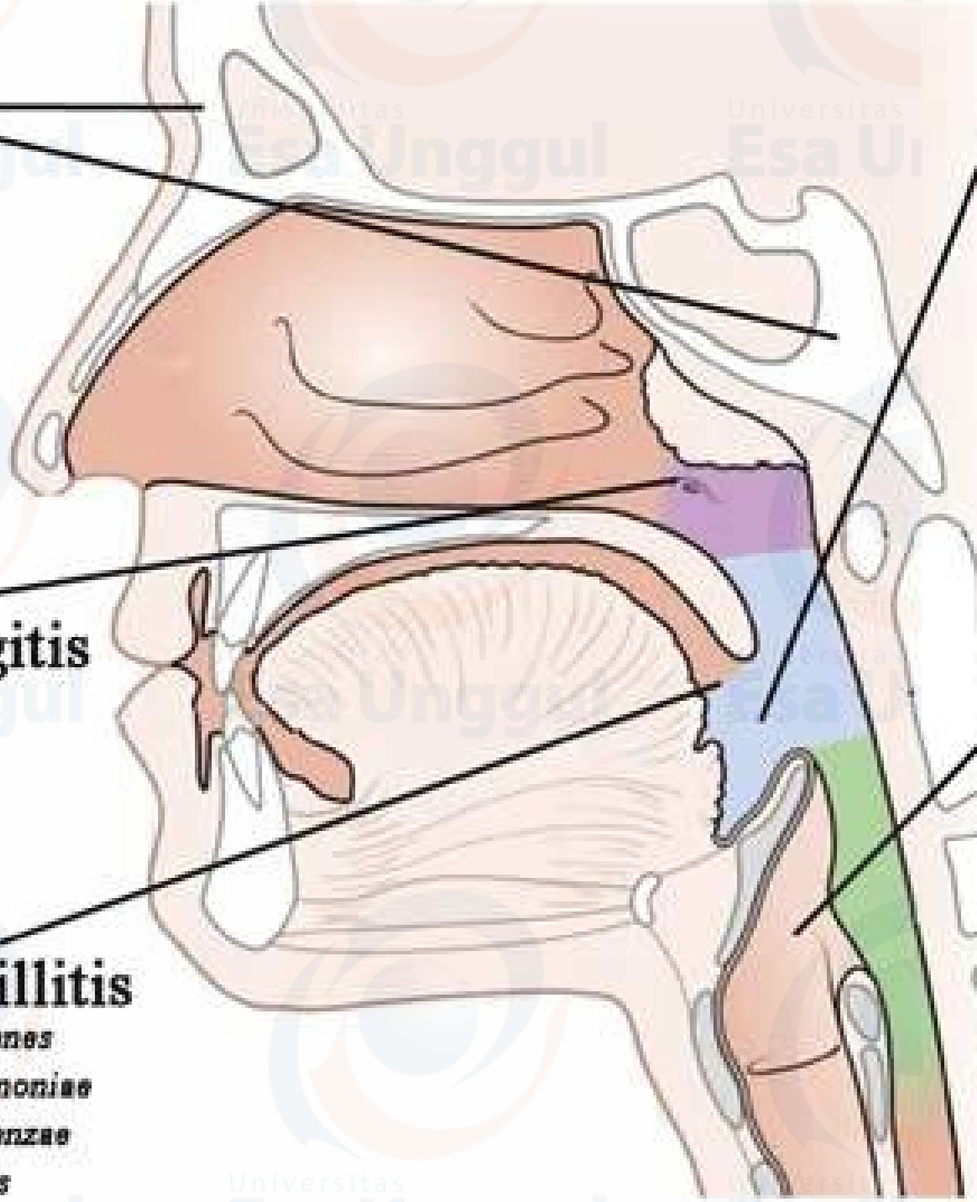
Farmakoterapi saluran pencernaan

Sesi 7

Farmakoterapi sepsis

Ujian Tengah Semester

Upper respiratory tract



Sinusitis

S. pneumoniae
H. influenzae
M. catarrhalis

Pharyngitis

S. pyogenes
Rhinovirus
Coronavirus
Adenovirus
Influenza virus
Parainfluenza virus
Human metapneumovirus
Respiratory syncytial virus
Coxsackie virus
Human bocavirus

Nasopharyngitis

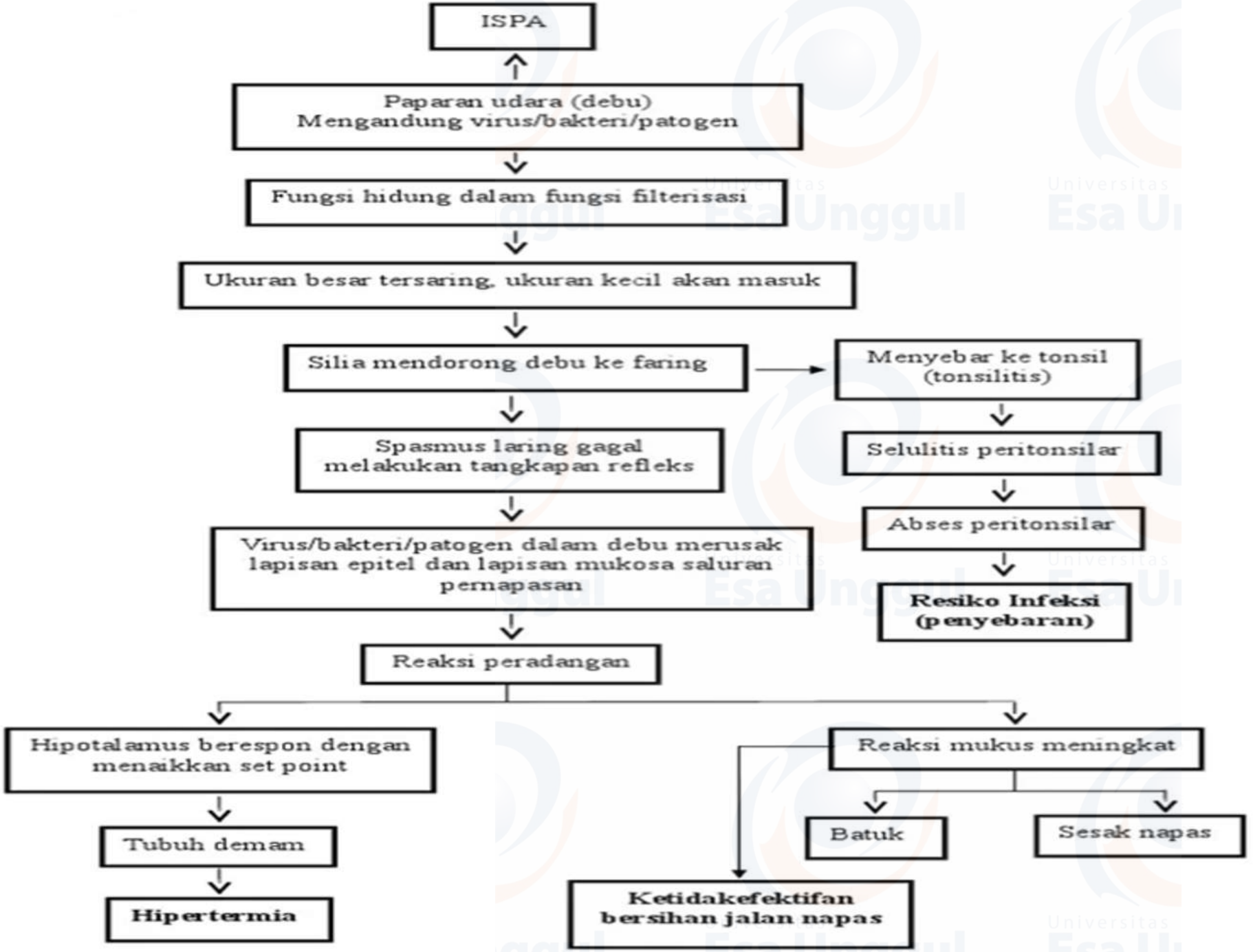
Rhinovirus
Coronavirus
Adenovirus
Influenza virus
Parainfluenza virus

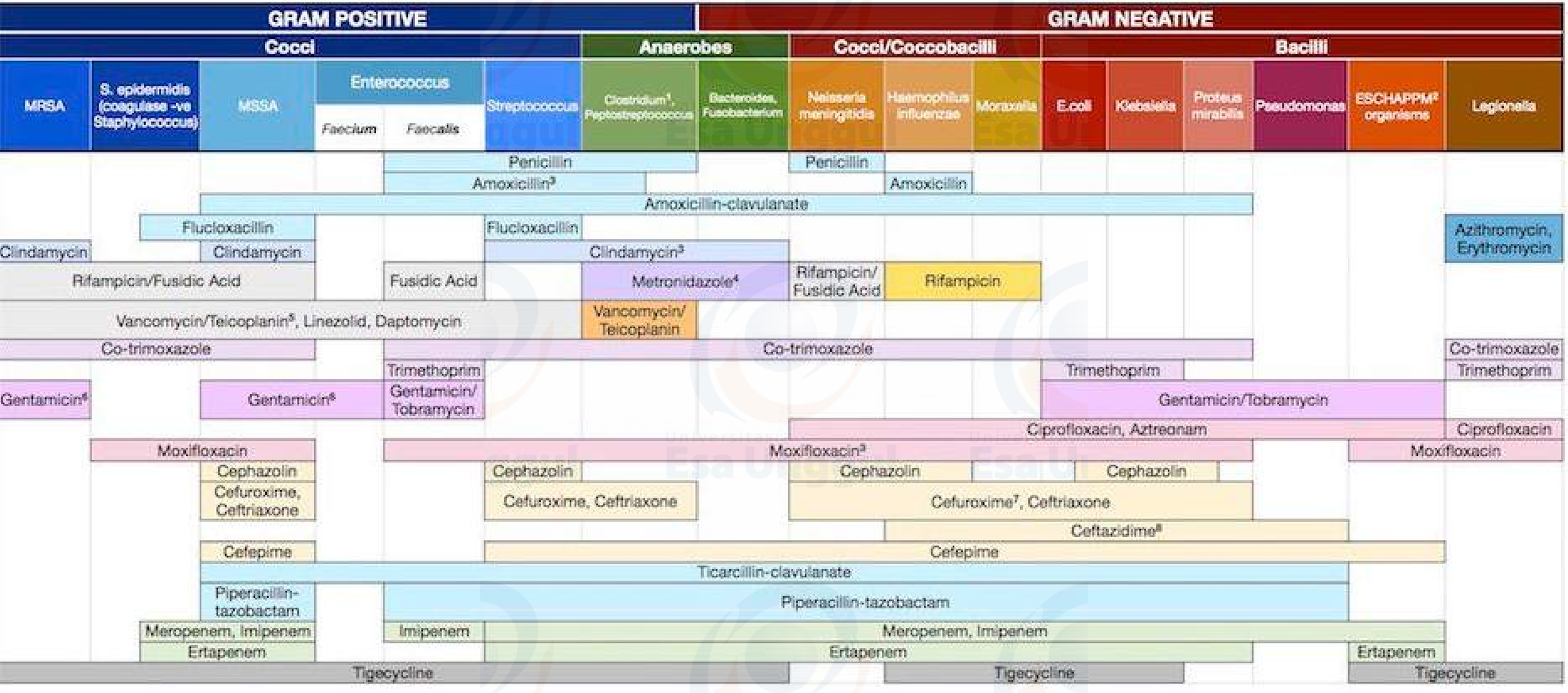
Laryngitis

Parainfluenza virus 1-2
H. influenzae
M. catarrhalis
S. aureus
Group A and G streptococci
C. pneumoniae
M. pneumoniae

Tonsillitis

S. pyogenes
S. pneumoniae
H. influenzae
S. aureus


ISPA
Paparan udara (debu)
Mengandung virus/bakteri/patogen
Fungsi hidung dalam fungsi filterisasi
Ukuran besar tersaring, ukuran kecil akan masuk
Silia mendorong debu ke faring
Menyebar ke tonsil (tonsilitis)
Selulitis peritonsilar
Abses peritonsilar
Resiko Infeksi (penyebaran)
Spasmus laring gagal melakukan tangkapan refleks
Virus/bakteri/patogen dalam debu merusak lapisan epitel dan lapisan mukosa saluran pernapasan
Reaksi peradangan
Hipotalamus berespon dengan menaikkan set point
Tubuh demam
Hipertermia
Reaksi mukus meningkat
Batuk
Sesak napas
Ketidakefektifan bersihan jalan napas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Moraxella
E.coli
Klebsiella
Proteus mirabilis
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Penicillin
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Amoxicillin-clavulanate
Flucloxacillin
Flucloxacillin
Azithromycin, Erythromycin
Clindamycin
Clindamycin
Clindamycin[3]
Rifampicin/Fusidic Acid
Fusidic Acid
Metronidazole[4]
Rifampicin/ Fusidic Acid
Rifampicin
Vancomycin/Teicoplanin[5], Linezolid, Daptomycin
Vancomycin/ Teicoplanin
Co-trimoxazole
Co-trimoxazole
Co-trimoxazole
Trimethoprim
Trimethoprim
Trimethoprim
Gentamicin[6]
Gentamicin[6]
Gentamicin/ Tobramycin
Gentamicin/Tobramycin
Ciprofloxacin, Aztreonam
Ciprofloxacin
Moxifloxacin
Moxifloxacin[3]
Moxifloxacin
Cephazolin
Cephazolin
Cephazolin
Cephazolin
Cefuroxime, Ceftriaxone
Cefuroxime, Ceftriaxone
Cefuroxime[7], Ceftriaxone
Ceftazidime[8]
Cefepime
Cefepime
Ticarcillin-clavulanate
Piperacillin-tazobactam
Piperacillin-tazobactam
Meropenem, Imipenem
Imipenem
Meropenem, Imipenem
Ertapenem
Ertapenem
Ertapenem
Tigecycline
Tigecycline
Tigecycline

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Different classes of antibiotics

B-Lactams

Inhibit bacteria cell wall biosynthesis

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Flucloxacillin
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Lymecycline
Oxytetracycline

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Clarithromycin
Azithromycin

Oxazolidinones

Inhibits synthesis of proteins by bacteria

Examples
Linezolid
Posizolid
Tedizolid
Cycloserine

Commonly act as bactericidal agents, causing bacterial cell death

Commonly act as bacteriostatic agents, restrict growth & multiplication

Table 1. Diagnostic Findings and Appropriate Treatments for Upper Respiratory Tract Infections

Condition	*Key diagnostic findings*	*Treatment*
Acute bronchitis and tracheitis	Cough, possible phlegm production	Symptomatic treatment; antibiotics are not recommended[3-6]
Acute otitis media	Acute onset of symptoms, presence of middle ear effusion, signs of middle ear inflammation	Amoxicillin, 80 to 90 mg per kg per day, in two divided doses (first-line treatment)[7-9]
Acute rhinosinusitis	Nasal obstruction, anterior or posterior purulent nasal discharge, facial pain, cough, decreased sense of smell	Watchful waiting in mild cases; amoxicillin for severe or complicated bacterial rhinosinusitis[10]
Common cold	Runny nose, cough, sore throat, sneezing, nasal congestion	Symptomatic treatment; antibiotics are not recommended[11]
Epiglottitis	Dysphagia, voice change, tachycardia (heart rate > 100 beats per minute), drooling, fever, subjective shortness of breath, tachypnea (respiratory rate > 24 breaths per minute), stridor, respiratory distress, leaning forward	Intravenous combination of a third-generation cephalosporin and an antistaphylococcal agent active against methicillin-resistant *Staphylococcus aureus*[12] or intravenous monotherapy with ceftriaxone (Rocephin), cefotaxime (Claforan), or ampicillin/sulbactam (Unasyn)[13-15]
Influenza	Abrupt onset of fever, headache, myalgia, malaise	Influenza vaccination for prevention; supportive care; initiation of antiviral therapy within 48 hours of symptom onset may decrease illness duration by one day[16,17]
Laryngitis	Loss or muffling of voice, sore throat, cough, fever, runny nose, headache	Symptomatic treatment; antibiotics are unnecessary[18]
Pharyngitis and tonsillitis	Sore throat, fever, absence of cough	Treatment based on modified Centor score (Table 2)

Information from references 3 through 18.

Tabel 4.1 Antibiotika pada terapi Faringitis oleh karena Streptococcus Grup A

Lini pertama :	Penicilin G (untuk pasien yang tidak dapat menyelesaikan terapi oral selama 10 hari)	1 x 1,2 juta U i.m.	1 dosis
	Penicilin VK	Anak: 2-3 x 250mg Dewasa 2-3 x 500mg	10 hari
	Amoksisilin (Klavulanat) 3 x 500mg selama 10 hari	Anak: 3 x 250mg Dewasa:3x 500mg	10 hari

Lini kedua :	Eritromisin (untuk pasien alergi Penicilin)	Anak: 4 x 250mg Dewasa:4x 500mg	10 hari
	Azitromisin atau Klaritromisin (lihat dosis pada Sinusitis)		5 hari
	Cefalosporin generasi satu atau dua	Bervariasi sesuai agen	10 hari
	Levofloksasin (hindari untuk anak maupun wanita hamil)		

Tabel 2.1. Antibiotika pada Terapi pokok Otitis Media[8,15,23,31]

Antibiotika	Dosis	Keterangan
Lini Pertama		
Amoksisilin	Anak: 20-40mg/kg/hari terbagi dalam 3 dosis Dewasa:40mg/kg/hari terbagi dalam 3 dosis Anak 80mg/kg/hari terbagi dlm 2 dosis	Untuk pasien risiko rendah yaitu: Usia>2th, tidak mendapat antibiotika selama 3 bulan terakhir Untuk pasien risiko tinggi
	Dewasa:80mg/kg/hari terbagi dlm 2 dosis	

Lini Kedua		
Amoksisilin-klavulanat	Anak:25-45mg/kg/hari terbagi dlm 2 dosis Dewasa:2x875mg	
Kotrimoksazol	Anak: 6-12mg TMP/30-60mg SMX/kg/hari terbagi dlm 2 dosis Dewasa: 2 x 1-2 tab	
Cefuroksim	Anak: 40mg/kg/hari terbagi dlm 2 dosis Dewasa:2 x 250-500 mg	
Ceftriaxone	Anak: 50mg/kg; max 1 g; i.m.	1 dosis untuk otitis media yang baru 3 hari terapi untuk otitis yang resisten
Cefprozil	Anak: 30mg/kg/hari terbagi dlm 2 dosis Dewasa: 2 x 250-500mg	
Cefixime	Anak:8mg/kg/hari terbagi dlm 1-2 dosis Dewasa: 2 x 200mg	

Tabel 3.1 Antibiotika yang dapat dipilih pada terapi sinusitis[2,47]

Agen Antibiotika	Dosis
SINUSITIS AKUT	
Lini pertama	
Amoksisilin/Amoksisilin-clav	Anak: 20-40mg/kg/hari terbagi dalam 3 dosis /25-45mg/kg/hari terbagi dlm 2 dosis Dewasa: 3 x 500mg/ 2 x 875 mg
Kotrimoxazol	Anak: 6-12mg TMP/30-60mg SMX/kg/hari terbagi dlm 2 dosis Dewasa: 2 x 2tab dewasa
Eritromisin	Anak: 30—50mg/kg/hari terbagi setiap 6 jam Dewasa: 4 x 250-500mg
Doksisiklin	Dewasa: 2 x 100mg

Lini kedua	
Amoksi-clavulanat	Anak: 25-45mg/kg/hari terbagi dlm 2 dosis Dewasa:2 x 875mg
Cefuroksim	2 x 500mg
Klaritromisin	Anak:15mg/kg/hari terbagi dlm 2 dosis Dewasa: 2 x 250mg
Azitromisin	1 x 500mg, kemudian 1x250mg selama 4 hari berikutnya.
Levofloxacin	Dewasa:1 x 250-500mg
SINUSITIS KRONIK	
Amoksi-clavulanat	Anak: 25-45mg/kg/hari terbagi dlm 2 dosis Dewasa:2 x 875mg
Azitromisin	Anak: 10mg/kg pada hari 1 diikuti 5mg/kg selama 4 hari berikutnya Dewasa: 1x500mg, kemudian 1x250mg selama 4 hari
Levofloxacin	Dewasa: 1 x 250-500mg

- Analgetik antipiretik
- Antihistamin
- Kortikosteroid
- Dekongestasn
- Bronkodilatro:
- ß-Adrenoceptor Agonist
- Metilxantine
- Mukolitik

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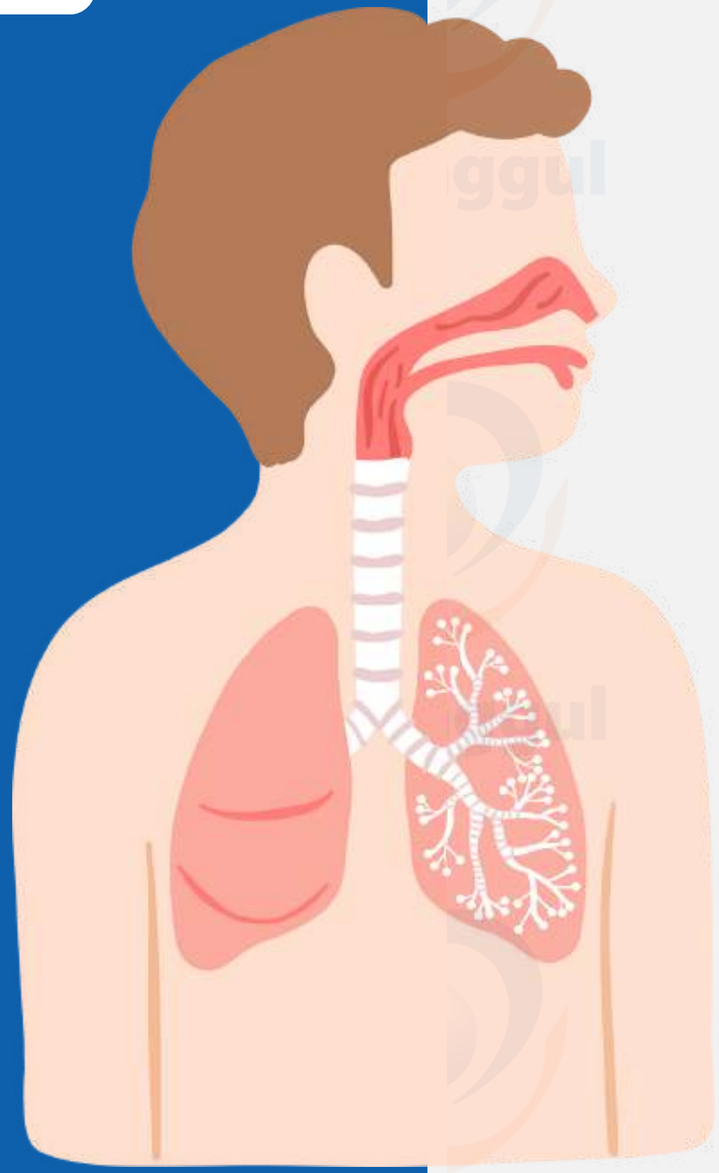
Rise your hand!

any question?



PSF402

Infeksi Saluran Pernafasan Bawah (ISPB)

Sesi Ke 4

Topik Sesuai RPS:
Prinsip pemilihan antibiotik untuk ISPB

Dosen Pengampu:

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NID:

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Topik Sebelum UAS

Sesi 1

Prinsip Infeksi

Sesi 2

Prinsip Pemilihan Antibiotik

Sesi 3

Farmakoterapi Infeksi Saluran nafas atas

Sesi 4

Farmakoterapi saluran nafas bawah

Sesi 5

Farmakoterapi TBC

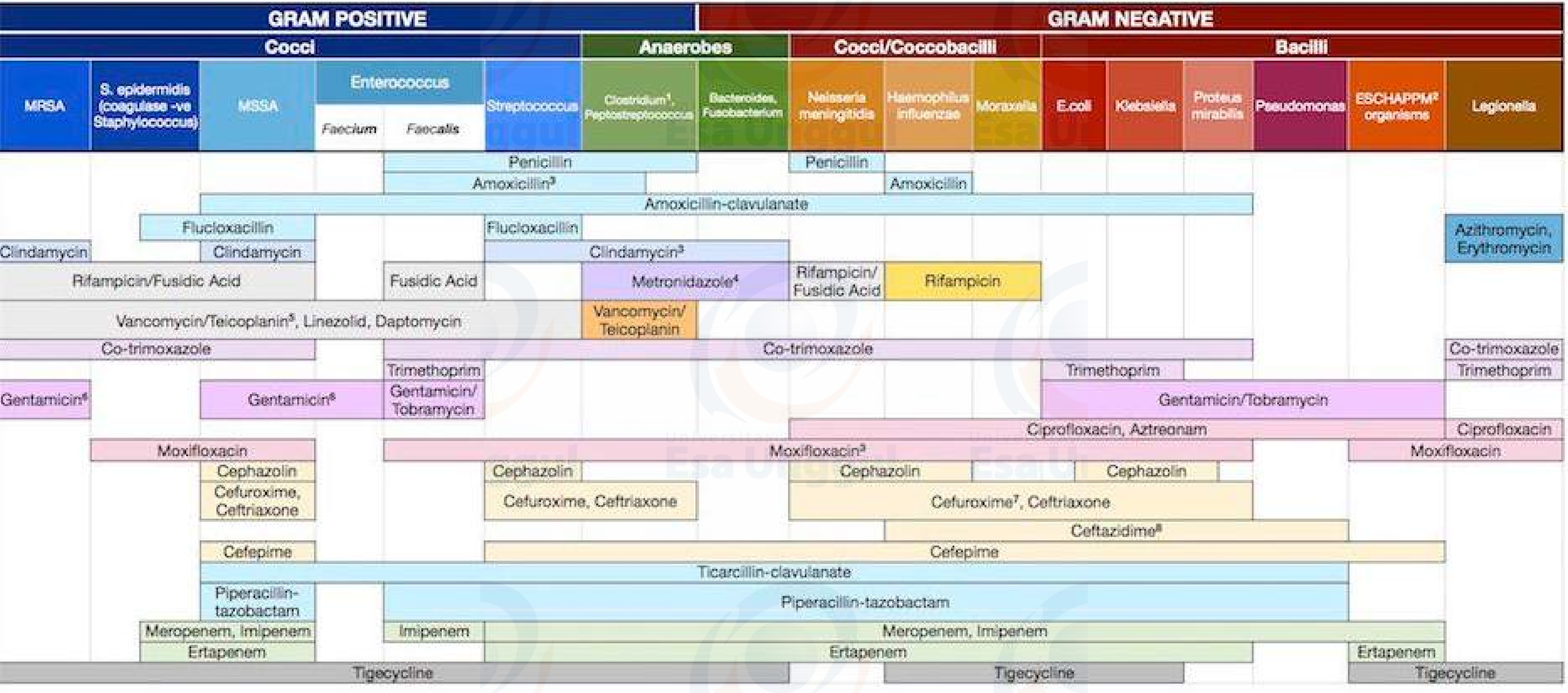
Sesi 6

Farmakoterapi saluran pencernaan

Sesi 7

Farmakoterapi sepsis

Ujian Tengah Semester


GRAM POSITIVE
GRAM NEGATIVE
Cocci
Anaerobes
Cocci/Coccobacilli
Bacilli
MRSA
S. epidermidis (coagulase -ve Staphylococcus)
MSSA
Enterococcus
Faecium
Faecalis
Streptococcus
Clostridium[1], Peptostreptococcus
Bacteroides, Fusobacterium
Neisseria meningitidis
Haemophilus influenzae
Moraxella
E.coli
Klebsiella
Proteus mirabilis
Pseudomonas
ESCHAPPM[2] organisms
Legionella
Penicillin
Penicillin
Amoxicillin[3]
Amoxicillin
Amoxicillin-clavulanate
Flucloxacillin
Flucloxacillin
Azithromycin, Erythromycin
Clindamycin
Clindamycin
Clindamycin[3]
Rifampicin/Fusidic Acid
Fusidic Acid
Metronidazole[4]
Rifampicin/ Fusidic Acid
Rifampicin
Vancomycin/Teicoplanin[5], Linezolid, Daptomycin
Vancomycin/ Teicoplanin
Co-trimoxazole
Co-trimoxazole
Co-trimoxazole
Trimethoprim
Trimethoprim
Trimethoprim
Gentamicin[6]
Gentamicin[6]
Gentamicin/ Tobramycin
Gentamicin/Tobramycin
Ciprofloxacin, Aztreonam
Ciprofloxacin
Moxifloxacin
Moxifloxacin[3]
Moxifloxacin
Cephazolin
Cephazolin
Cephazolin
Cephazolin
Cefuroxime, Ceftriaxone
Cefuroxime, Ceftriaxone
Cefuroxime[7], Ceftriaxone
Ceftazidime[8]
Cefepime
Cefepime
Ticarcillin-clavulanate
Piperacillin-tazobactam
Piperacillin-tazobactam
Meropenem, Imipenem
Imipenem
Meropenem, Imipenem
Ertapenem
Ertapenem
Ertapenem
Tigecycline
Tigecycline
Tigecycline

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Different classes of antibiotics

B-Lactams

Inhibit bacteria cell wall biosynthesis

Examples
Amoxicillin
Flucloxacillin
Cefalexin

Aminoglycosides

Inhibit the synthesis of proteins by bacteria

Examples
Streptomycin
Neomycin
Kanamycin
Paromomycin

Glycopeptides

Inhibit bacteria cell wall biosynthesis

Examples
Vancomycin
Teicoplanin

Ansamycins

Inhibit the synthesis of RNA by bacteria

Examples
Geldanamycin
Rifamycin
Naphthomycin

Quinolones

Interfere with bacteria DNA replication and transcription

Examples
Ciprofloxacin
Levofloxacin
Trovafloxacin

Streptogramins

Inhibit the synthesis of proteins by bacteria

Examples
Pristinamycin IIA
Pristinamycin IA

Lipopeptides

Disrupt multiple cell membrane functions

Examples
Daptomycin
Surfactin

Sulfonamides

Prevent bacteria growth and multiplication

Examples
Prontosil
Sulfanilamide
Sulfadiazine
Sulfisoxazole

Chloramphenicol

Inhibits synthesis of proteins

No longer a first line drug in any developed country

Tetracyclines

Inhibits synthesis of proteins by bacteria

Examples
Tetracycline
Doxycycline
Lymecycline
Oxytetracycline

Macrolides

Inhibits protein synthesis by bacteria

Examples
Erythromycin
Clarithromycin
Azithromycin

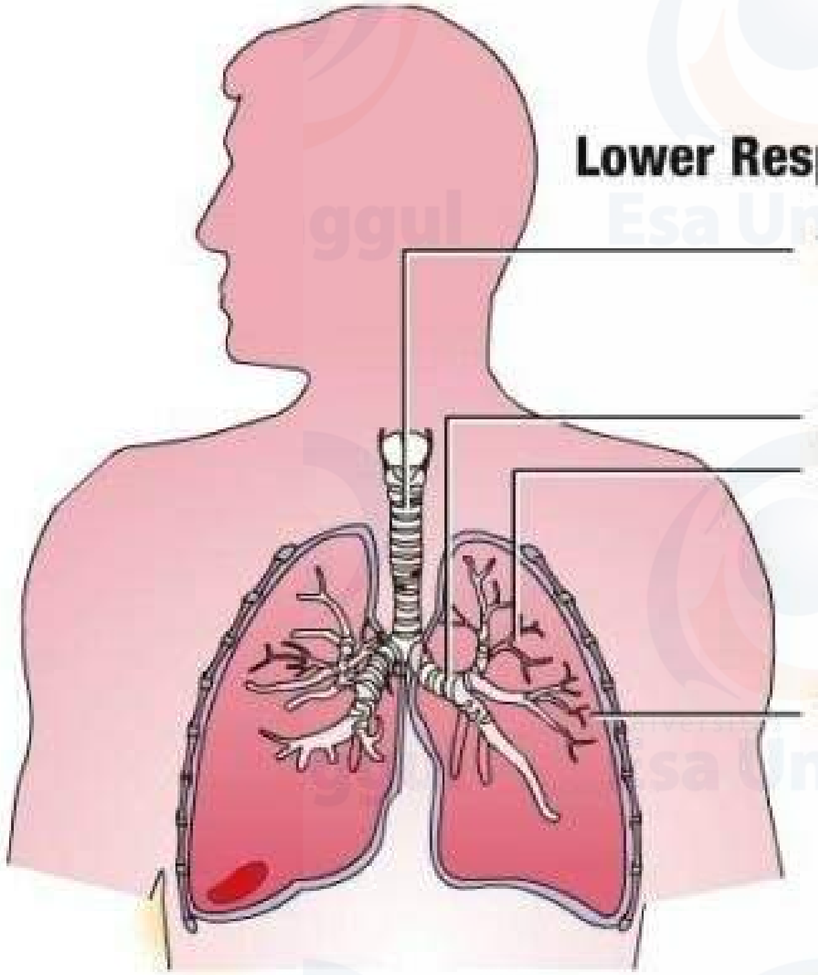
Oxazolidinones

Inhibits synthesis of proteins by bacteria

Examples
Linezolid
Posizolid
Tedizolid
Cycloserine

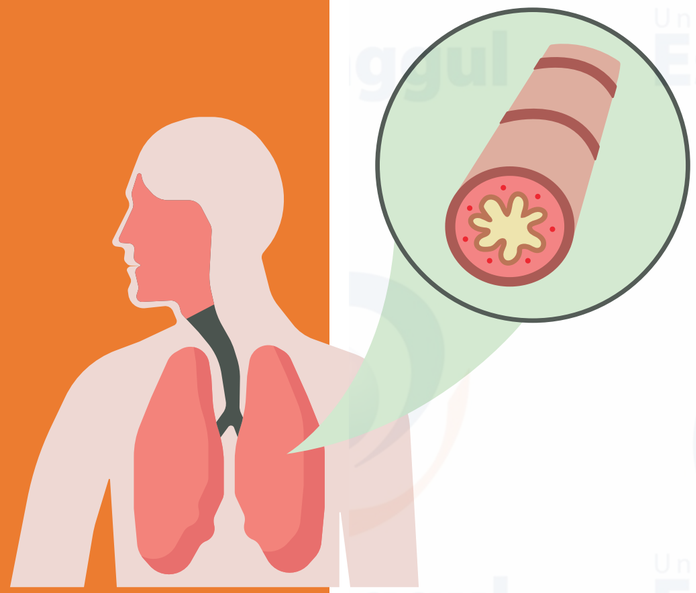
Commonly act as bactericidal agents, causing bacterial cell death

Commonly act as bacteriostatic agents, restrict growth & multiplication



Lower Respiratory Tract Infections

		Examples
Trachea:	**Tracheitis**	*S. aureus*
Bronchus: Bronchioles:	**Bronchitis**	*M. pneumoniae* *M. catarrhalis* *S. pneumoniae* *H. influenzae*
Lung:	**Pneumonia**	*S. pneumoniae* *H. influenzae* *K. pneumoniae* *M. pneumoniae* *P. aeruginosa* *S. aureus*
Lung:	Abscesses	Anaerobic bacteria: • *Bacteroides* • *Fusobacterium*



Bronchitis
- Acute
  - Bronchitis
  - Bronchiolitis
- Chronic

Acute Bronchitis

- **Acute bronchitis occurs most commonly during the winter months, following a pattern similar to those of other acute respiratory tract infections.**
- **Respiratory viruses are by far the most common infectious agents associated with acute bronchitis.**

Clinical Manifestation and warning:

its a self-limiting disease, but
recurrent acute respiratory infections may be associated with increased airway hyperreactivity and pos- sibly the pathogenesis of asthma or chronic obstructive pulmonary disease (COPD).

Clinical Presentation:

- Cough is the hallmark of acute bronchitis and occurs early (up to 3 weeks)
- Nasal or nasopharyngeal complaints - mucopurulent sputum
- Children gagging and vomiting to expectorate the mucus
- Fever, rarely exceeds 39°C (adenovirus, influenza virus, and M. pneumoniae)

Causes of Acute Bronchitis

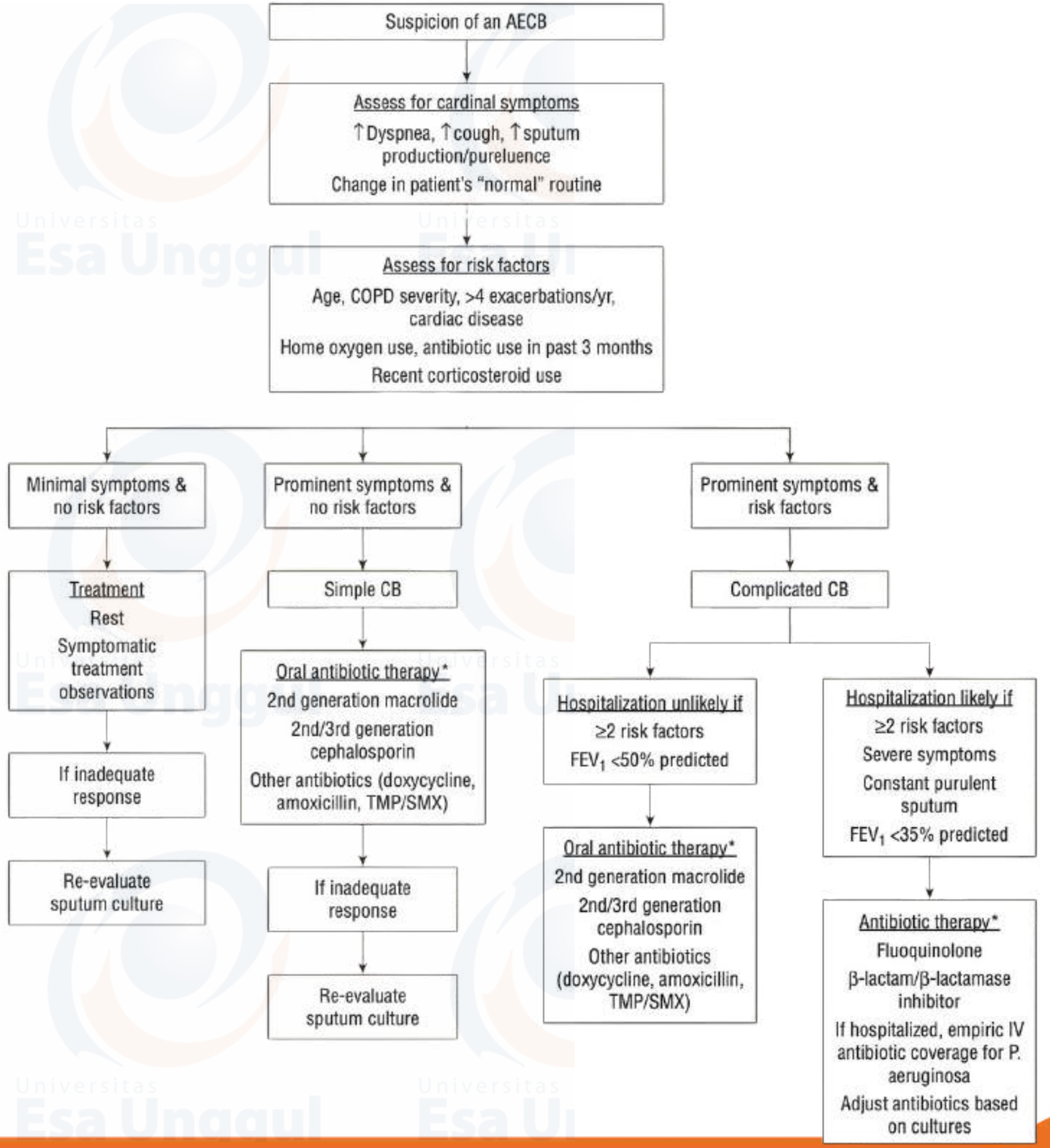
Pathogen	Comments
Virus	
Influenza	Quick onset with fever, chills, headache, and cough. Myalgias are common and may be accompanied by myopathy.
Parainfluenza	Epidemics in autumn. Outbreaks may occur in nursing homes. Croup in child at home suggests presence of the organism.
Respiratory syncytial virus	About 45% of family members exposed to infant with bronchiolitis become infected. Outbreaks prominent in winter or spring. Twenty percent of adults have ear pain.
Coronavirus	Can cause severe respiratory symptoms in elderly. Epidemics present in military recruits.
Adenovirus	Similar presentation as influenza; abrupt onset of fever.
Rhinovirus	Fever is uncommon and infection generally mild.
Atypical Bacteria	
Bordetella pertussis	Incubation period of 1–3 weeks. Whooping occurs in a minority of patients, and fever is uncommon. Marked leukocytosis with lymphocytic predominance can occur.
Mycoplasma pneumoniae	Incubation period is 2–3 weeks. Outbreak cases in military and students have been reported.
Chlamydophila pneumoniae	Incubation period is 3 weeks. Onset of symptoms, which include hoarseness before cough, is gradual. Outbreaks reported in nursing homes, college students, and military personnel.

General Treatment for acute bronchitis

- **NON PHARMACOLOGY:**
  - Bed rest for comfort
  - Patients should be encouraged to drink fluids to prevent dehydration and possibly to decrease the viscosity of respiratory secretions.
  - Mist therapy (use of a vaporizer) may promote the thinning and loosening of respiratory secretions.
- **PHARMACOLOGY:**
  - analgesic- antipyretics frequently
  - Oral or inhaled corticosteroid for patients with persistent (>14 to 20 days), troublesome cough.
  - Antihistamines, sympathomimetics, and antitussives
  - Routine use of antibiotics for treatment of acute bronchitis **should be discouraged**
  - Fever or respiratory symptoms for more than 4 to 6 days or for predisposed patients (e.g., elderly, immunocompromised), **the possibility of a concurrent bacterial infection should be suspected.**
  - ***M/S. pneumoniae:*** *azithromycin, fluoroquinolones*
  - **Influenza A, viral:** amantadine or rimantadine, zanamivir and oseltamivir (neuroamidase inhibitor)

Chronic Bronchitis

- **Chronic bronchitis, a component of the COPD is a clinical diagnosis for a nonspecific disease that primarily affects adults.**
- Chronic cough productive of sputum lasting more than **3 consecutive months of the year for 2 consecutive years** without an underlying etiology of bronchiectasis or tuberculosis.
- **RISK FACTOR**
  - Cigarette smoking
  - Exposure to occupational dusts, fumes, and environmental pollution
  - and host factors [e.g., genetic factors and bacterial (and possibly viral) infections



Chronic Bronchitis

TABLE 116-1 Clinical Presentation of Chronic Bronchitis

Signs and symptoms
Excessive sputum expectoration
Cyanosis (advanced disease)
Obesity

Physical examination
Chest auscultation usually reveals inspiratory and expiratory rales, rhonchi, and mild wheezing with an expiratory phase that is frequently prolonged; hyperresonance on percussion with obliteration of the area of cardiac dullness
Normal vesicular breathing sounds are diminished
Clubbing of digits (advanced disease)

Chest radiograph
Increase in anteroposterior diameter of the thoracic cage (observed as a barrel chest)
Depressed diaphragm with limited mobility

Laboratory tests
Erythrocytosis (advanced disease)

Pulmonary function tests
Decreased vital capacity
Prolonged expiratory flow

TABLE 116-2 Common Bacterial Pathogens Isolated from Sputum of Patients with Acute Exacerbation of Chronic Bronchitis

Pathogen	Percent of Cultures
H. influenzae[a,b]	45
M. catarrhalis[a]	30
S. pneumoniae[c]	20
E.coli, Enterobacter species, *Klebsiella* species, *P. aeruginosa*	5

[a]Often β-lactamase positive.
[b]Vast majority are nontypeable strains.
[c]As many as 25% of strains may have intermediate or high resistance to penicillin.

General Treatment for Chronic Bronchitis

- **NON PHARMACOLOGY:**
  - Reduce the patient's exposure to known bronchial irritants (e.g., smoking, workplace pollution)
  - Humidification of inspired air may promote the hydration (liquefaction) of tenacious secretions, allowing for removal that is more productive
  - Mist therapy (use of a vaporizer) may promote the thinning and loosening of respiratory secretions.
- **PHARMACOLOGY:**
  - Mucolytics may have the greatest benefit for patients with moderate or severe COPD who are not receiving inhaled corticosteroids
  - Aerosolized bronchodilators may be of benefit by increasing mucociliary and cough clearance: twice-daily inhaled salmeterol/fluticasone propionate 50:250 or 50:500 mcg for 24 to 52 weeks improves FEV1
  - Use of systemic corticosteroid therapy (oral or IV) for patients with an acute exacerbation significantly reduces treatment failures and the need for additional medical treatment
  - Systemic and/ nasal bronchodilator: theophylline, ipratoprium bromide

TABLE 116-3 Oral Antibiotics Commonly Used for the Treatment of Acute Respiratory Exacerbations in Chronic Bronchitis

Antibiotic	Usual Adult Dose (mg)	Dose Schedule (Doses/Day)
Preferred drugs		
Ampicillin	250–500	4
Amoxicillin	500–875	3–2
Amoxicillin/clavulanate	500–875	3–2
Ciprofloxacin	500–750	2
Levofloxacin	500–750	1
Moxifloxacin	400	1
Doxycycline	100	2
Minocycline	100	2
Tetracycline HCl	500	4
Trimethoprim/sulfamethoxazole[a]	1 DS	2
Supplemental drugs		
Azithromycin	250–500	1
Erythromycin	500	4
Clarithromycin	250–500	2
Cephalexin	500	4

[a]DS, double-strength tablet (160-mg trimethoprim/800-mg sulfamethoxazole).

Bronchiolitis

- Bronchiolitis is an acute viral infection of the lower respiratory tract that affects approximately **50% of children during the first year of life and 100% by age 3 years.**
- Respiratory syncytial virus (RSV) is the most common cause of bronchiolitis, accounting for up to 75% of all cases.
- Parainfluenza, adenovirus, and influenza : prevented by flu shot vaccine

TABLE 116-4 Clinical Presentation of Bronchiolitis

Signs and symptoms
Prodrome with irritability, restlessness, and mild fever
Cough and coryza
Vomiting, diarrhea, noisy breathing, and increased respiratory rate as symptoms progress
Labored breathing with retractions of the chest wall, nasal flaring, and grunting
Physical examination
Tachycardia and respiratory rate of 40–80 per minute in hospitalized infants
Wheezing and inspiratory rales
Mild conjunctivitis in one third of patients
Otitis media in 5–10% of patients
Laboratory tests
Peripheral white blood cell count normal or slightly elevated
Abnormal arterial blood gases (hypoxemia and, rarely, hypercarbia)

General Treatment for Bronchiolitis

- **NON PHARMACOLOGY:**
  - In the well infant, bronchiolitis usually is a self-limiting illness, and reassurance, and adequate fluid intake usually are all that are necessary while waiting for resolution of the underlying viral infection.
- **PHARMACOLOGY:**
  - Antipyretics
  - Aerosolized β2-adrenergic when occur the bronchospasm
  - Bronchodilator therapy
  - Routine use of systemically administered corticosteroids is **discouraged**
  - Systemic and/ nasal bronchodilator: theophylline, ipratoprium bromide

CLINICAL CONTROVERSY

Because bacteria are not primary pathogens in the etiology of bronchiolitis, antibiotics should not be administered routinely. Despite this, many clinicians frequently administer antibiotics while awaiting culture results because the clinical and radiographic findings in bronchiolitis often are suggestive of possible bacterial pneumonia.

TABLE 116-3 Oral Antibiotics Commonly Used for the Treatment of Acute Respiratory Exacerbations in Chronic Bronchitis

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Preferred drugs		
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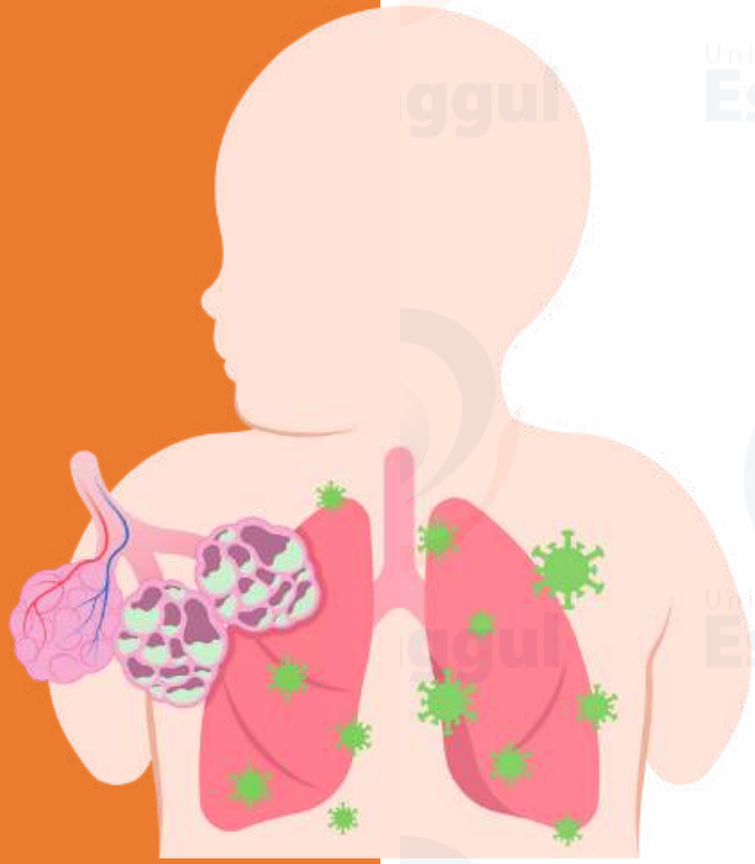
Amoxicillin	500–875	3–2
Amoxicillin/clavulanate	500–875	3–2
Ciprofloxacin	500–750	2
Levofloxacin	500–750	1
Moxifloxacin	400	1
Doxycycline	100	2
Minocycline	100	2
Tetracycline HCl	500	4
Trimethoprim/sulfamethoxazole[a]	1 DS	2
Supplemental drugs		
Azithromycin	250–500	1
Erythromycin	500	4
Clarithromycin	250–500	2
Cephalexin	500	4

[a]DS, double-strength tablet (160-mg trimethoprim/800-mg sulfamethoxazole).

Pneumonia



- Community-Acquired Pneumonia
- Healthcare-Associated Pneumonia
- Hospital-Acquired Pneumonia
- Ventilator-Associated Pneumonia
- Atypical Pneumonia
- Viral Pneumonia

- Pneumonia is the most common infectious cause of death - **prevent by vaccine**
- The most prominent pathogen causing community-acquired pneumonia (CAP) in otherwise healthy adults is **S. pneumoniae** and accounts for up to 75% of all acute cases
- **M. pneumoniae, Legionella species, C. pneumoniae, H. influenzae**, and a variety of viruses including **influenza**
- Resistant agent (HCAP/ HAP): ***P. aeruginosa, Acinetobacter species,*** **and methicillin-resistant *S. aureus* (MRSA)**

TABLE 116-5 Clinical Presentation of Pneumonia

Signs and symptoms
Abrupt onset of fever, chills, dyspnea, and productive cough
Rust-colored sputum or hemoptysis
Pleuritic chest pain

Physical examination
Tachypnea and tachycardia
Dullness to percussion
Increased tactile fremitus, whisper pectoriloquy, and egophony
Chest wall retractions and grunting respirations
Diminished breath sounds over affected area
Inspiratory crackles during lung expansion

Chest radiograph
Dense lobar or segmental infiltrate

Laboratory tests
Leukocytosis with predominance of polymorphonuclear cells
Low oxygen saturation on arterial blood gas or pulse oximetry

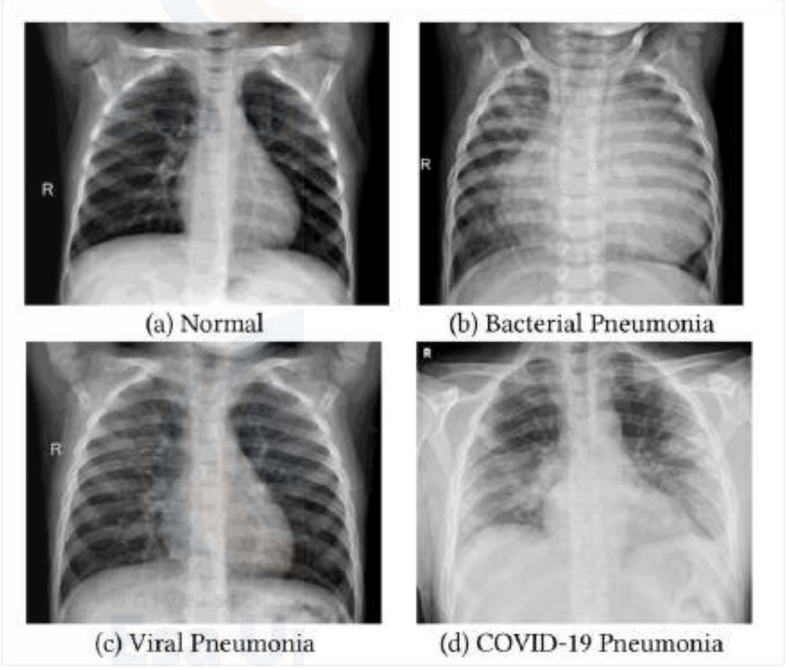

(a) Normal
(b) Bacterial Pneumonia
(c) Viral Pneumonia
(d) COVID-19 Pneumonia

TABLE 116-6 Pneumonia Classifications and Risk Factors

Type of Pneumonia	Definition	Risk Factors
Community acquired (CAP)	Pneumonia developing in patients with no contact to a medical facility	• Age >65 years • Diabetes Mellitus • Asplenia • Chronic cardiovascular, pulmonary, renal and/or liver disease • Smoking and/or alcohol abuse
Healthcare associated (HCAP)	Pneumonia developing in patients not in medical facility but two or more risk factors for MDR pathogens	• Recent hospitalization ≥2 days within past 90 days • Nursing home or long-term care facility resident • Recent (past 30 days) antibiotic use, chemotherapy, wound care or infusion therapy either at a healthcare facility or home • Hemodialysis patients • Contact with a family member with infection caused by MDR pathogen
Hospital-acquired (HAP)	Pneumonia developing >48 hours after hospital admission	• Witnessed aspiration • COPD, ARDS, or coma • Administration of antacids or H2-antagonists • Supine position • Enteral nutrition, nasogastric tube • Reintubation, tracheostomy, or patient transport • Prior antibiotic exposure • Head trauma, ICP monitoring • Age >60 years • See healthcare associated for MDR risk factors
Ventilator associated (VAP)	Pneumonia developing >48 hours after intubation and mechanical ventilation	• Same as hospital acquired

TABLE 116-7 Pulmonary Complications of Human Immunodeficiency Virus Infection

- Infections
  - Viruses
    - Cytomegalovirus
    - Herpes simplex virus
    - Varicella-zoster virus
    - Respiratory syncytial virus and other common respiratory pathogens (parainfluenza virus, adenovirus)
    - Measles virus
  - Bacteria
    - Pyogenic organisms (especially *S. pneumoniae, H. influenzae*; in late disease, *S. aureus* and gram-negative organisms)
    - *M. tuberculosis*
    - *M. avium* complex and other nontuberculous mycobacteria
  - Fungi
    - *Histoplasma capsulatum*
    - *Coccidioides immitis*
    - *Cryptococcus neoformans*
    - *Candida* species
    - *Aspergillus* species
  - Parasites
    - *Pneumocystis carinii*
    - *Toxoplasma gondii*
    - Cryptosporidia
    - *Strongyloides stercoralis*
- Malignancies
  - Kaposi's sarcoma
  - Non-Hodgkin's lymphoma
  - Smooth muscle tumors
- Lymphocytic interstitial pneumonitis
- Nonspecific interstitial pneumonitis
- Drug-induced pneumonitis

General Treatment for Pneumonia

- Eradication of the offending organism through selection of the **appropriate antibiotic** and complete clinical cure are the goals of therapy for bacterial pneumonia.
- Evaluate the adequacy of **respiratory function** and to determine the presence of signs of systemic illness, specifically dehydration or sepsis with resulting circulatory collapse- **oxygen/ resucitation/ ventilator**
- Humidified oxygen for hypoxemia, administration of **bronchodilators** (albuterol) when bronchospasm is present

TABLE 116-8 Evidence-Based Empiric Antimicrobial Therapy for Pneumonia in Adults[a]

Clinical Setting	Usual Pathogens	Empiric Therapy
Outpatient/community acquired		
• Previously healthy	*S. pneumoniae, M. pneumoniae, H influenza, C. pneumoniae, M. catarrhalis*	Macrolide/azalide[b], or tetracycline[c]
• Comorbidities (diabetes, heart/lung/liver/ renal disease, alcoholism		Fluoroqinolone[d] or β-lactam + macrolide[b]
• Elderly	S. pneumoniae, Gram-negative bacilli	Piperacillin/tazobactam or cephalosporin[e] or carbapenem[f]
Inpatient/community acquired		
• Non-ICU	*S. pneumoniae, H. influenza, M. pneumoniae, C. pneumoniae, Legionella* sp.	Fluoroquinolone[d] or β-lactam + macrolide[b]
• ICU	*S. pneumoniae, S.aureus, Legionella* sp, gram-negative bacilli, *H. influenza*	β-lactam + macrolide[b] or fluoroquinolone[d]; piperacillin/taxobactam or meropenem or cefepime + fluoroquinolone[d], or β-lactam + AMG + azithromycin or β-lactam + AMG + respiratory fluoroquinolone[d]
	If MRSA suspected	Above + vancomycin or linezolid
Hospital acquired, ventilator associated, or healthcare associated		
• No risk factors for MDR pathogens	*S. pneumoniae, H. influenzae*, MSSA enteric Gram-negative bacilli	Ceftriaxone or fluoroquinolone[d] or ampicillin/sulbactam or ertapenem or doripenem
• Risk factors for MDR pathogen	*P. aeruginosa, K. pneumoniae* (ESBL), Acinetobacter sp.,	Antipseudomonal cephalosporin[e] or antipseudomonal carbapenem or β-lactam/β-lactamase + antipseudomonal fluoroquinolone[d] or AMG[g]
	If MRSA or Legionella sp. suspected	Above + vancomycin or linezolid
• Aspiration	Mouth anaerobes, *S. aereus*, enteric Gram-negative bacilli	Penicillin or clindamycin or piperacillin/tazobactum + AMG[g]
Atypical pneumonia[h]		
• *Legionella pneumophilia*		Fluoroquinolone[d] or doxycycline
• *Mycoplasma pneumonia*		Fluoroquinolone[d] or doxycycline
• *Chlamydophila pneumonia*		Fluoroquinolone[d] or doxycycline
• SARS		Fluoroquinolone[d] or macrolides[b]
• Avian Influenza		Oseltamivir
• H1N1 Influenza		Oseltamivir

MRSA, methicillin resistance staphylococcus aureus; AMG, aminoglycoside; SARS, severe acute respiratory syndrome; ESBL, extended-spectrum β-lactamases.

TABLE 116-9 Empirical Antimicrobial Therapy for Pneumonia in Pediatric Patients[a]

Age	Usual Pathogen(s)	Empirical Therapy
1 month	Group B streptococcus, *H. influenzae* (nontypeable), *E. coli, S. aureus, Listeria*, CMV, RSV, adenovirus	Ampicillin/sulbactam, cephalosporin,[b] carbapenem[c] Ribavirin for RSV[g]
1–3 months	*C. pneumoniae*, possibly *Ureaplasma*, CMV, *Pneumocystis carinii* (afebrile pneumonia syndrome)	Macrolide/azalide,[d] trimethoprim-sulfamethoxazole
	RSV	Ribavirin
	S. pneumoniae, *S. aureus*	Semisynthetic penicillin[e] or cephalosporin[f]
3 months to 6 years	*S. pneumoniae*, *H. influenzae*, RSV, adenovirus, parainfluenza	Amoxicillin or cephalosporin[f] Ampicillin/sulbactam, amoxicillin–clavulanate Ribavirin for RSV
>6 years	*S. pneumoniae*, *M. pneumoniae*, adenovirus	Macrolide/azalide[d] cephalosporin,[f] amoxicillin–clavulanate

TABLE 116-10 Antibiotic Doses for Treatment of Bacterial Pneumonia

		Daily antibiotic dose[a]	
Antibiotic Class	Antibiotic	*Pediatric (mg/kg/day)*	*Adult (Total Dose/Day)*
Macrolide	Clarithromycin	15	0.5–1 g
	Erythromycin	30–50	1–2 g
Azalide	Azithromycin	10 mg/kg × 1 day, then 5 mg/kg/day 4 days	500 mg day 1, then 250 mg/day × 4 days
Tetracycline[b]	Doxycycline	2–5	100–200 mg
	Tetracycline HCl	25–50	1–2 g
Penicillin	Ampicillin	100–200	2–6 g
	Amoxicillin ± clavulanate[c]	40–90	0.75–1 g
	Piperacillin/tazobactam	200–300	12–18 g
	Ampicillin/sulbactam	100–200	4–8 g
Extended-spectrum cephalosporins	Ceftriaxone	50–75	1–2 g
	Ceftazidime	150	4–6 g
	Cefepime	100–150	2–6 g
Fluoroquinolones[d]	Moxifloxacin		400 mg
	Gemifloxacin	–	320 mg
	Levofloxacin	10–15	0.75 g
	Ciprofloxacin	20–30	1.2 g
Aminoglycosides	Gentamicin	7.5–10	7.5 mg/kg
	Tobramycin	7.5–10	7.5 mg/kg
Carbapenems	Imipenem	60–100 g	2–4 g
	Meropenem	30–60	1–3 g
Other	Vancomycin	45–60	2–3 g
	Linezolid	20–30	1.2 g

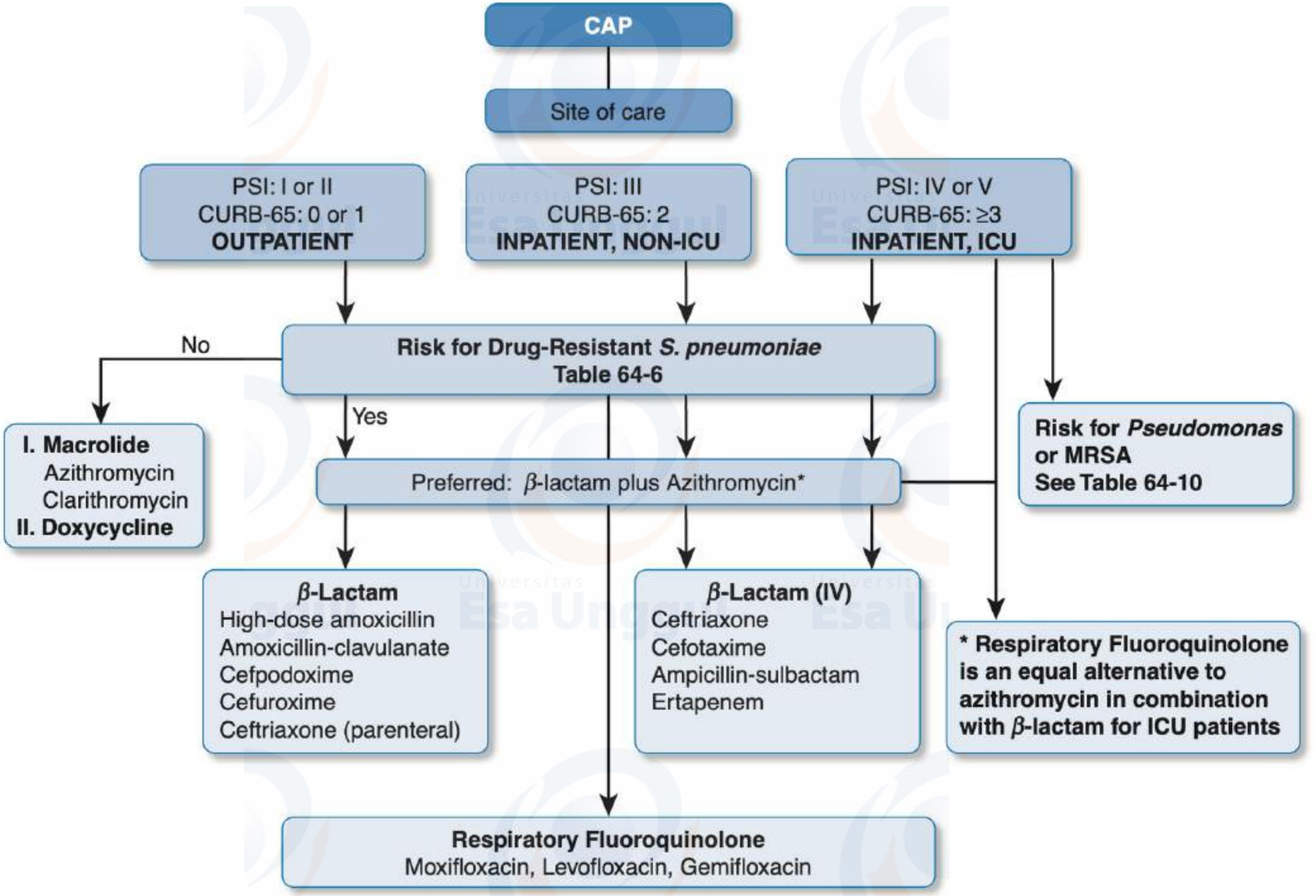


FIGURE 64-1 Approach to empiric antibiotic therapy in patients with community-acquired pneumonia. CAP, community-acquired pneumonia; CURB-65, confusion, uremia, respiratory rate, blood pressure, and age of at least 65 years; IV, intravenous; MRSA, methicillin-resistant *Staphylococcus aureus;* PSI, pneumonia severity index.

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Lets TRY

CASE 1

R. is a 30-year-old woman presenting with a chief complaint of cough. **Her symptoms have persisted for 6 days, and she now produces yellow sputum with each cough.** She has had no recent illnesses; however, her 2-year-old daughter in daycare has experienced recent colds. She denies nausea, vomiting, or emesis or fever and chills. A review of systems reveals fatigue and difficulty sleeping because of cough.

Vital signs review indicates a temperature of 37.1 ◦ C, heart rate of 70 beats/minute, blood pressure of 130/70 mm Hg, and respiratory rate of 18 breaths/minute with accompanying oxygen saturations of 98% on room air. Her physical examination is positive for coarse breath sounds that clear with coughing, but is otherwise normal. What signs and symptoms in A.R. are consistent?

S: Cough 6d, yellow sputum,fatigue and difficulty sleeping because of cough, daughter recently got common cold,
O: T 37.1 ◦ C, HR 70 bpm, BP 130/70 mmHg, RR 18 bpm SO2 98%
A: dx: acute bronchitis - AB (cough 10d) no illness, no hemoptysis, objective data and physical examination were normal.
P: treatment plan:

- The typical duration of symptoms in AB is 5 to 14 days
- self limiting disease - no antimicrobial needed
- Inhaled β-agonists (albuterol) for shortness of breath
- Acetaminophen to alleviate myalgias or fever
- antihistamines (chlorpheniramine) , antitussives (dextromethorphan), or mucolytics (guaifenesin) for cough.
- check blood test/ culture: azithromycine could be given after lab result gained (bacteria sign: leucocyte).

CASE 2

QUESTION 1: M.R. is a 33-year-old man presenting to the ED with fevers, chills, and chest pain. His symptoms have persisted for 3 days, and he has a productive cough with rusty-colored sputum and dyspnea with exertion. He has had no recent illnesses and no known sick contacts, but he was recently released from a 2-year period of incarceration. He has tried ibuprofen to alleviate his fever and chest pain. Past medical history is positive for asthma, for which he is prescribed fluticasone and albuterol, and depression, for which he takes sertraline. Vital signs reveal a temperature of 40.1°C, heart rate of 128 beats/minute, blood pressure of 130/76 mm Hg, and respiratory rate of 32 breaths/minute with accompanying oxygen saturations of 85% on 5 L of oxygen by nasal cannula. The remainder of the physical examination is notable for orientation to person but not place or time and for diffuse crackles bilaterally, which are most apparent on the right side. Laboratory results include the following:

WBC count, 15,500 cells/μL
Hematocrit, 29.3%
Sodium, 133 mmol/L
Potassium, 3.8 mmol/L
BUN, 23 mg/dL
SCr, 0.8 mg/dL
Glucose 148, mg/dL
pH 7.42
Po_2, 61 mm Hg
Pco_2, 46 mm Hg
HCO_3, 28 mEq/L

A test for human immunodeficiency virus is negative. Chest radiograph reveals a right lower lobe infiltrate. What signs, symptoms, and tests are consistent with CAP in M.R.?

S: fevers, chills, and chest pain, productive cough - rusty-colored sputum and dyspnea with exertion (3d), had been released of 2-year period of incarceration
O: T 40.1 ◦ C, HR 128 bpm, BP 130/76 mmHg,RR 32, SO2 85%
A: dx: CAP (chest pain, productive and rusty colored sputum, dyspnea), objective data raised (tachypnea and tachycardia), WBC high, disease history: atshma and depression. physical examination: confusion, crackly and diffuse billatery and prominent on right side.
P: treatment plan:

- ICU oxygen supplemental and preparation for ventilator
- β-lactam (ceftriaxone)+ macrolide (azithromycin)should be initiated empirically --other option fluoroquinolone.
- symptomatic agent
- culture for definitive antimicrobial

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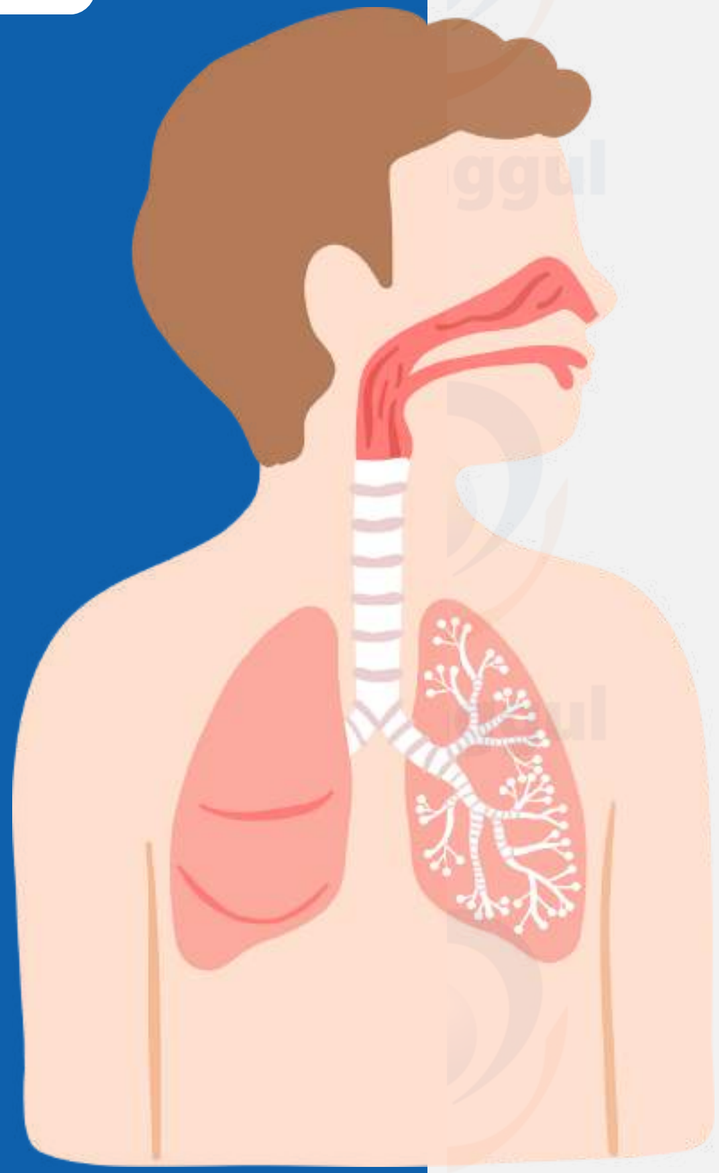
Rise your hand!

any question?



PSF402

Infeksi Sistemik - Sepsis

Sesi Ke 5

Topik Sesuai RPS:
Prinsip pemilihan antibiotik untuk ISPA

Dosen Pengampu:

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E-mail:

nadiya.nurul@esaunggul.ac.id / +62 856 977 44470

Topik Sebelum UAS

Sesi 1

Prinsip Infeksi

Sesi 2

Prinsip Pemilihan Antibiotik

Sesi 3

Farmakoterapi Infeksi Saluran nafas atas

Sesi 4

Farmakoterapi saluran nafas bawah

Sesi 5

Farmakoterapi TBC

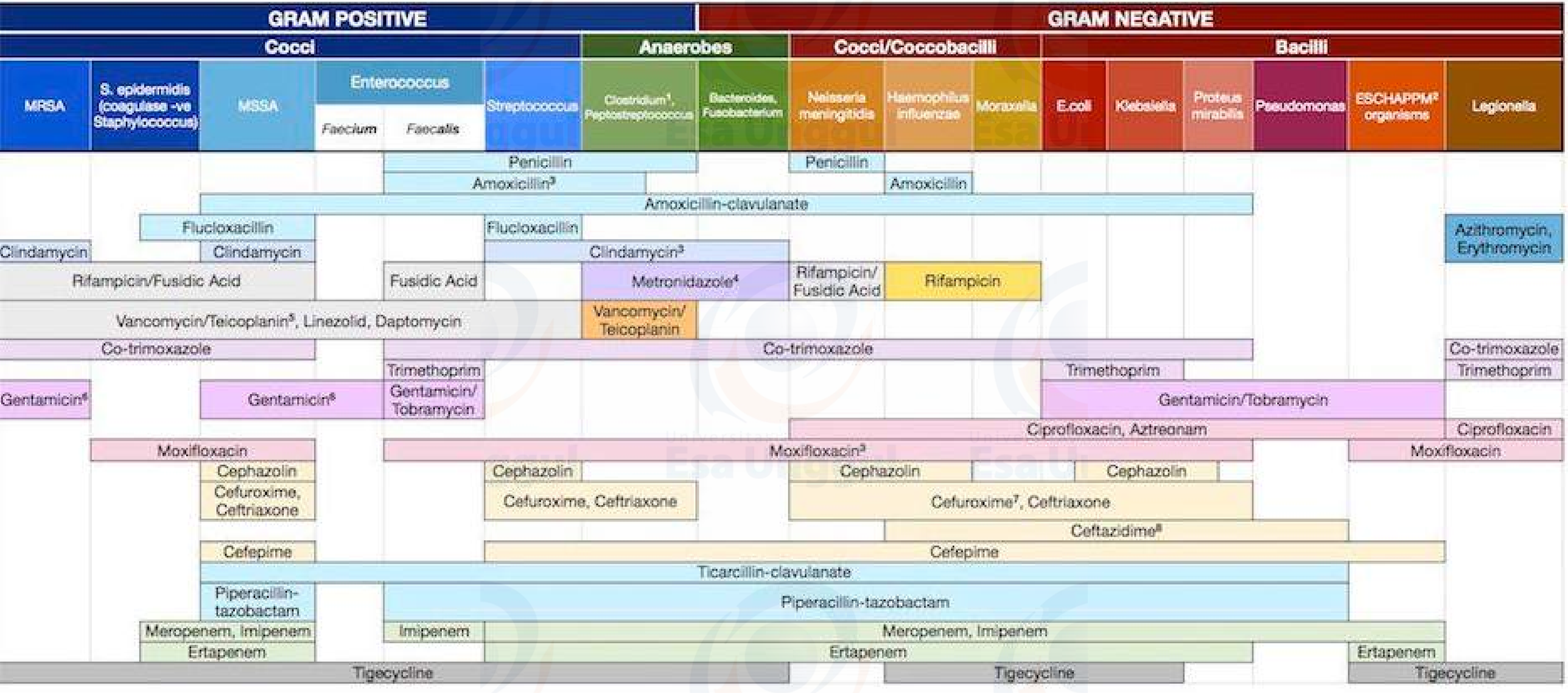
Sesi 6

Farmakoterapi saluran pencernaan

Sesi 7

Farmakoterapi sepsis

Ujian Tengah Semester


GRAM POSITIVE
GRAM NEGATIVE
Cocci
Anaerobes
Cocci/Coccobacilli
Bacilli
MRSA
S. epidermidis (coagulase -ve Staphylococcus)
MSSA
Enterococcus
Faecium
Faecalis
Streptococcus
Clostridium[1], Peptostreptococcus
Bacteroides, Fusobacterium
Neisseria meningitidis
Haemophilus influenzae
Moraxella
E.coli
Klebsiella
Proteus mirabilis
Pseudomonas
ESCHAPPM[2] organisms
Legionella
Penicillin
Penicillin
Amoxicillin[3]
Amoxicillin
Amoxicillin-clavulanate
Flucloxacillin
Flucloxacillin
Azithromycin, Erythromycin
Clindamycin
Clindamycin
Clindamycin[3]
Rifampicin/Fusidic Acid
Fusidic Acid
Metronidazole[4]
Rifampicin/ Fusidic Acid
Rifampicin
Vancomycin/Teicoplanin[5], Linezolid, Daptomycin
Vancomycin/ Teicoplanin
Co-trimoxazole
Co-trimoxazole
Co-trimoxazole
Trimethoprim
Trimethoprim
Trimethoprim
Gentamicin[6]
Gentamicin[6]
Gentamicin/ Tobramycin
Gentamicin/Tobramycin
Ciprofloxacin, Aztreonam
Ciprofloxacin
Moxifloxacin
Moxifloxacin[3]
Moxifloxacin
Cephazolin
Cephazolin
Cephazolin
Cephazolin
Cefuroxime, Ceftriaxone
Cefuroxime, Ceftriaxone
Cefuroxime[7], Ceftriaxone
Ceftazidime[8]
Cefepime
Cefepime
Ticarcillin-clavulanate
Piperacillin-tazobactam
Piperacillin-tazobactam
Meropenem, Imipenem
Imipenem
Meropenem, Imipenem
Ertapenem
Ertapenem
Ertapenem
Tigecycline
Tigecycline
Tigecycline

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Different classes of antibiotics

B-Lactams

Inhibit bacteria cell wall biosynthesis

Examples
Amoxicillin
Flucloxacillin
Cefalexin

Aminoglycosides

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Kanamycin
Paromomycin

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Sulfadiazine
Sulfisoxazole

Chloramphenicol

Inhibits synthesis of proteins

No longer a first line drug in any developed country

Tetracyclines

Inhibits synthesis of proteins by bacteria

Examples
Tetracycline
Doxycycline
Lymecycline
Oxytetracycline

Macrolides

Inhibits protein synthesis by bacteria

Examples
Erythromycin
Clarithromycin
Azithromycin

Oxazolidinones

Inhibits synthesis of proteins by bacteria

Examples
Linezolid
Posizolid
Tedizolid
Cycloserine

Commonly act as bactericidal agents, causing bacterial cell death

Commonly act as bacteriostatic agents, restrict growth & multiplication

When it comes to sepsis, remember

IT'S ABOUT TIME™. Watch for:

T — **I** — **M** — **E**™

TEMPERATURE
higher or lower than normal

INFECTION
may have signs and symptoms of an infection

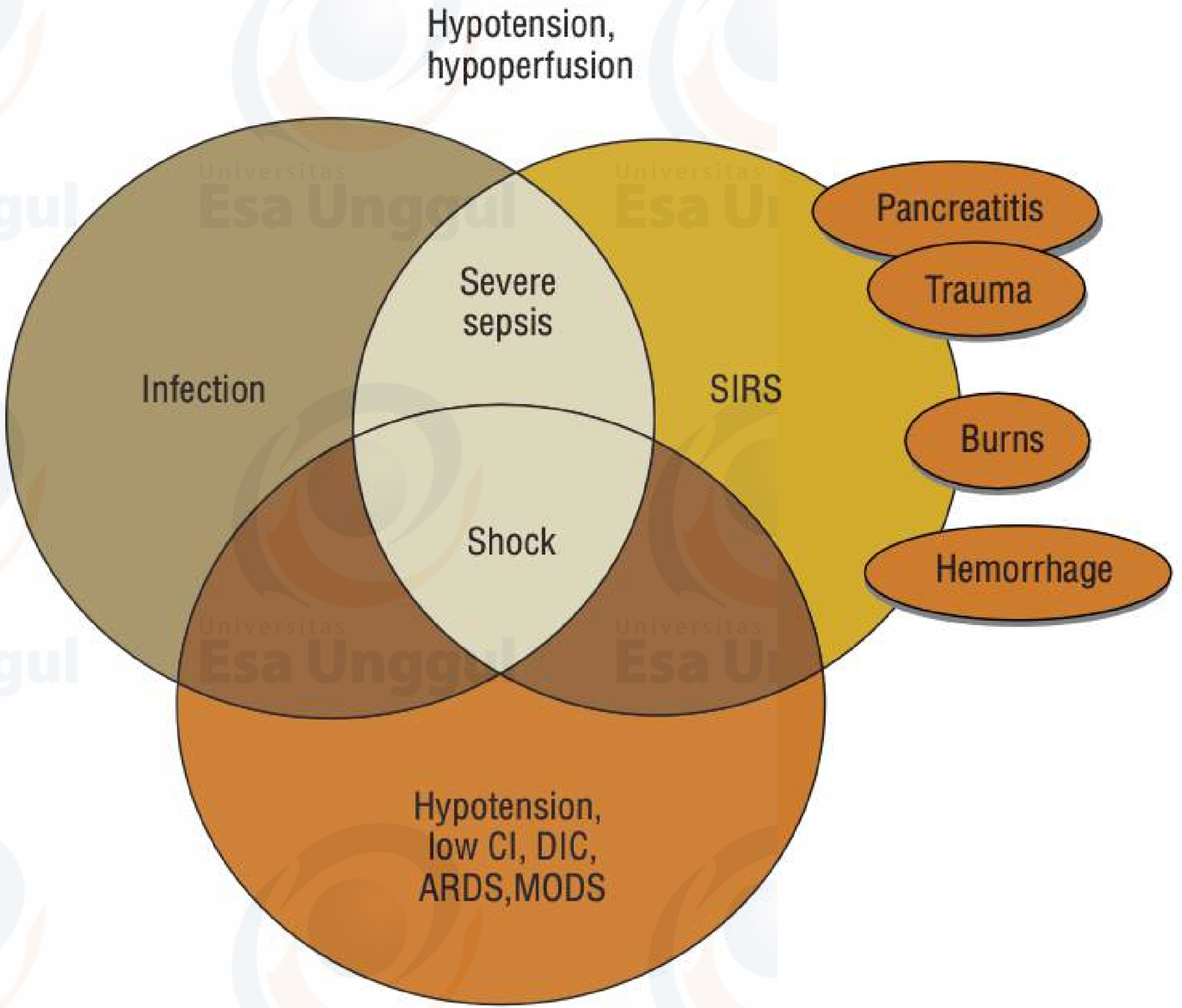
MENTAL DECLINE
confused, sleepy, difficult to rouse

EXTREMELY ILL
"I feel like I might die," severe pain or discomfort

Watch for a combination of these symptoms. If you suspect sepsis, see a doctor urgently, CALL 911 or go to a hospital and say, "I AM CONCERNED ABOUT SEPSIS."

SEPSIS.ORG

SEPSIS ALLIANCE


Hypotension,
hypoperfusion
Infection
Severe
sepsis
SIRS
Pancreatitis
Trauma
Burns
Hemorrhage
Shock
Hypotension,
low CI, DIC,
ARDS,MODS

What is Sepsis

- **Systemic inflammatory response to a variety of clinical insults, which can be infectious or noninfectious.**
- **The response is manifested by two or more of the following conditions:**
  - T= 38
  - HR > 90bpm/min
  - RR > 20bpm/min
  - WBC > 12000 cells/ mm3 / < 4000 cells/mm3
  - Positive fluid balance (>20 mL/kg over 24 h)
  - hyperglycemia, CRP > 2 SD
  - arterial hypotension
  - CrCl > 3.5 L/min
  - Arterial hypoxemia
  - acute oligoria
  - creatinin increase > 0,5 mg/dL
  - coagulation abnormalities
  - Trombosit < 100,000 mcL
  - Bilirubin > 4mg/dL
  - hyperlactatemia

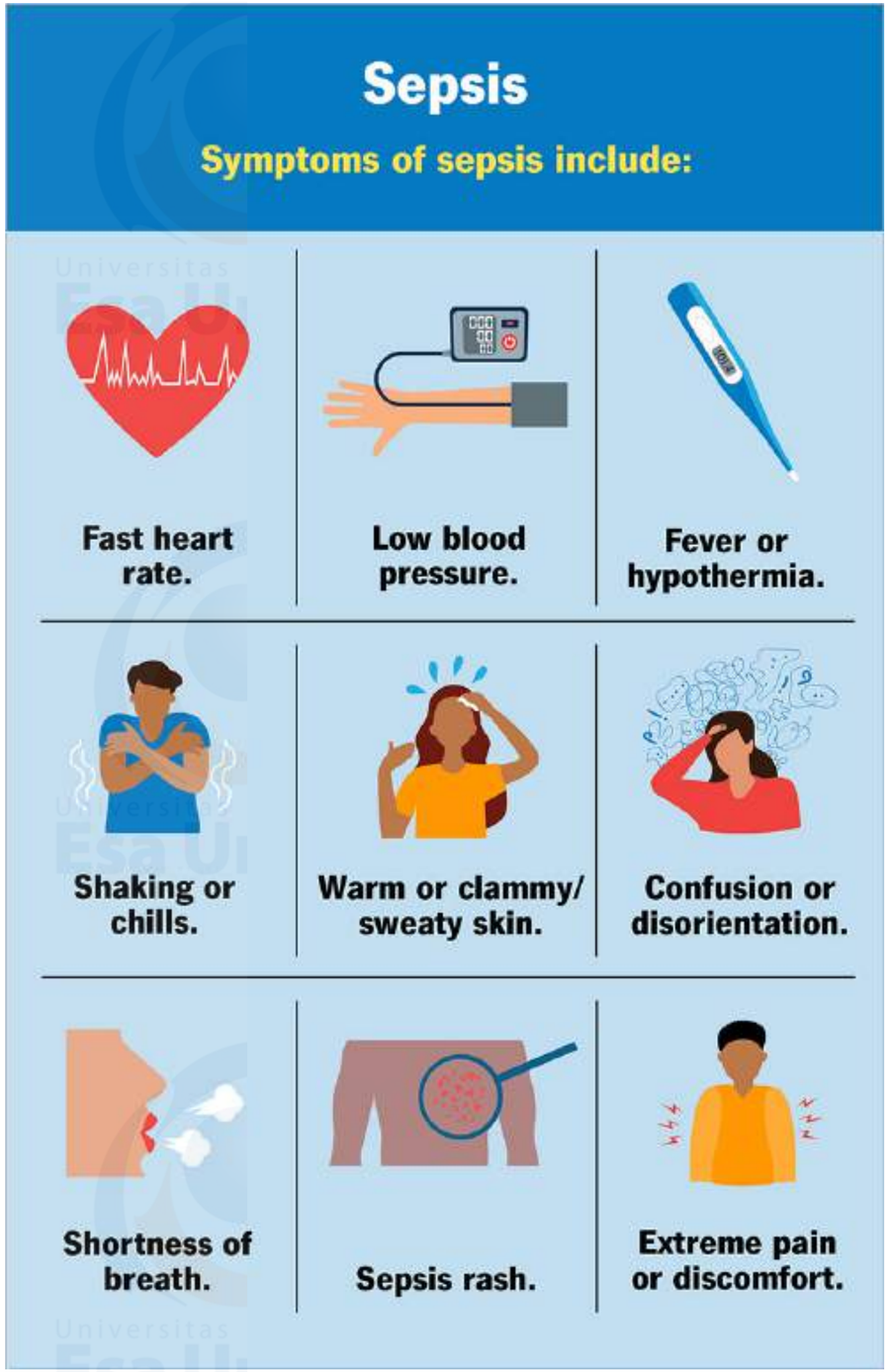
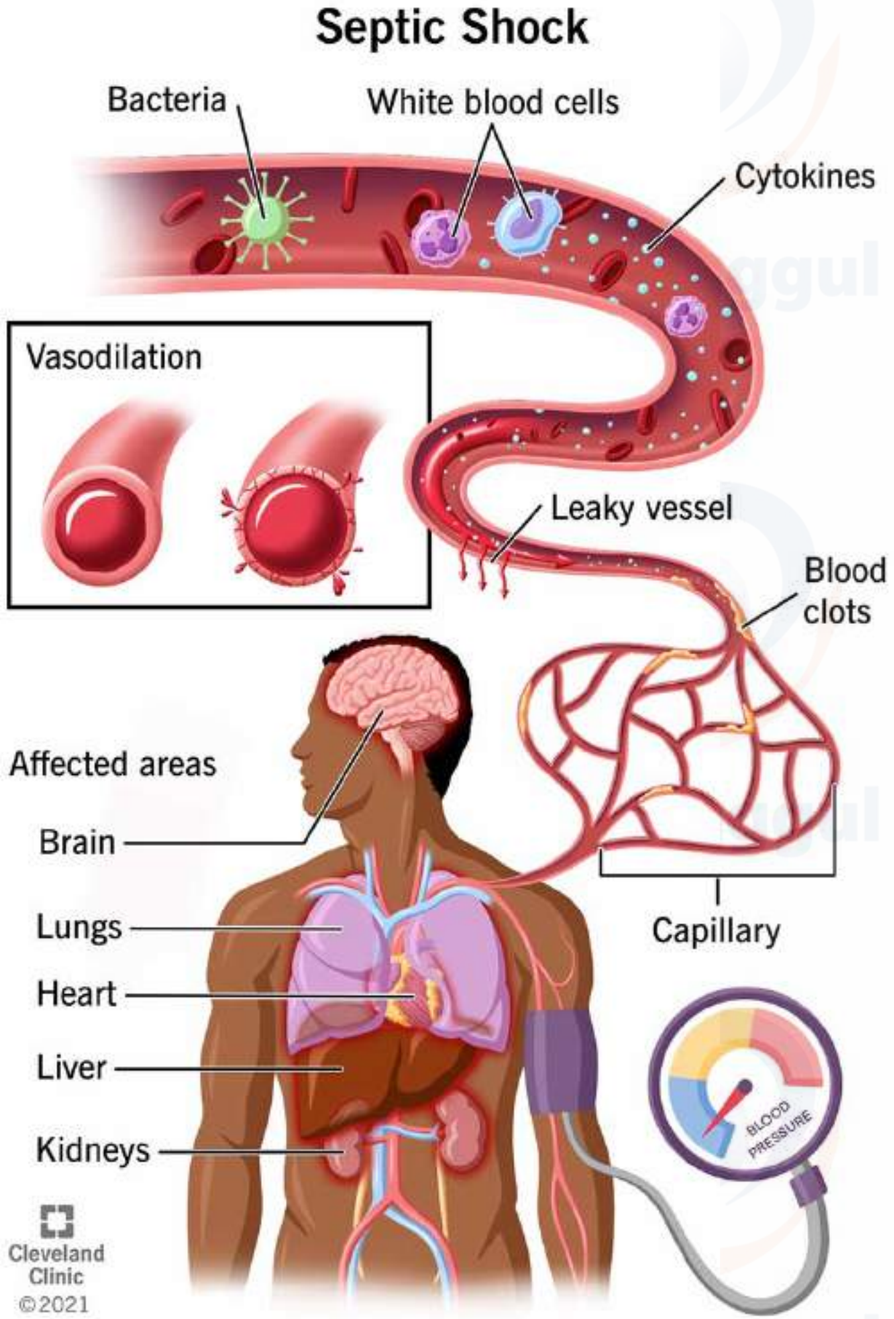
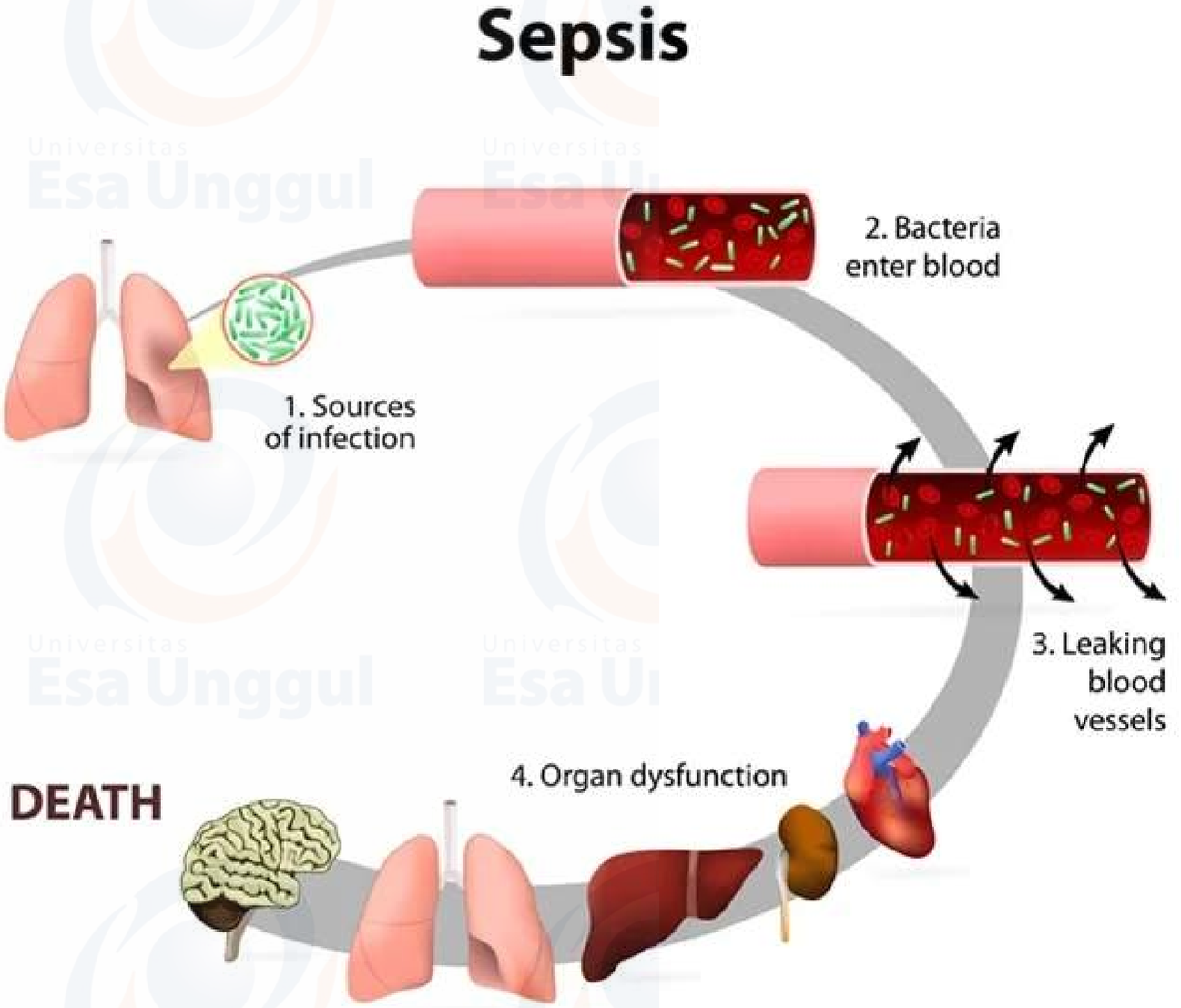


TABLE 128-2 Signs and Symptoms Associated with Sepsis

Early Sepsis	Late Sepsis
Fever or hypothermia	Lactic acidosis
Rigors, chills	Oliguria
Tachycardia	Leukopenia
Tachypnea	DIC
Nausea, vomiting	Myocardial depression
Hyperglycemia	Pulmonary edema
Myalgias	Hypotension (shock)
Lethargy, malaise	Hypoglycemia
Proteinuria	Azotemia
Hypoxia	Thrombocytopenia
Leukocytosis	ARDS
Hyperbilirubinemia	GI hemorrhage
	Coma

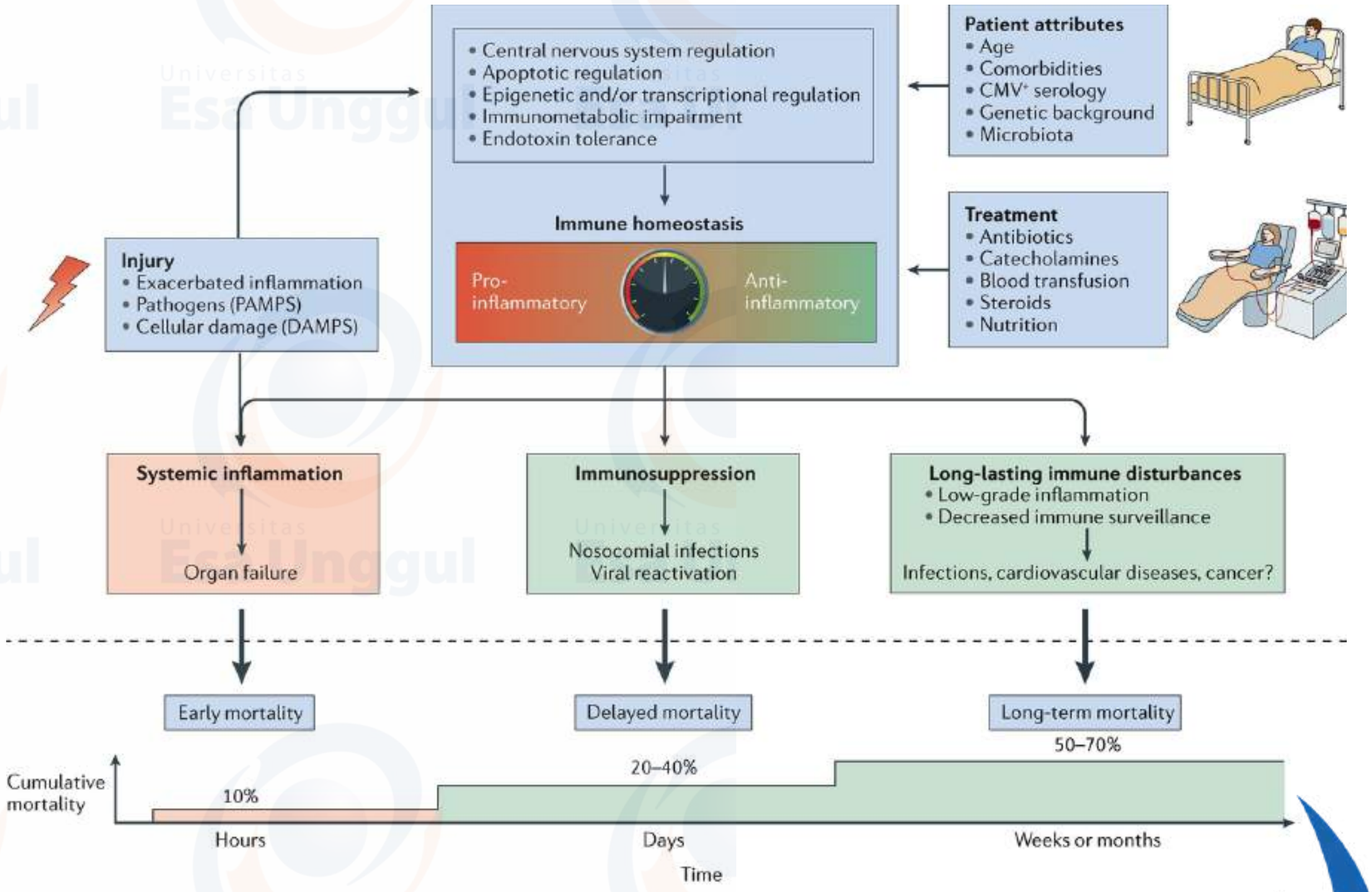
ARDS = acute respiratory distress syndrome; DIC = disseminated intravascular coagulation; GI = gastrointestinal.


Septic Shock
Bacteria
White blood cells
Cytokines
Vasodilation
Leaky vessel
Blood clots
Affected areas
Brain
Lungs
Heart
Liver
Kidneys
Capillary
BLOOD PRESSURE
Cleveland Clinic
©2021


Sepsis
1. Sources of infection
2. Bacteria enter blood
3. Leaking blood vessels
4. Organ dysfunction
DEATH

Treatment Principle

- **Hemodynamic Management**
  - **IV Fluids**
  - **Vasoactive Agent** (Dopamine and norepinephrine)
- **Modulation of the host response**
  - Steroid (Hydrocortison IV)
  - Vasopressin (Epinephrin/ adrenalin)
- **Infection Management**
  - Antibiotics



Treatment Principle

TABLE 128-3 Evidence-based Treatment Recommendations for Sepsis and Septic Shock

Recommendations	Recommendation Grades[a]
Initial resuscitation (first 6 hours)	
Early goal-directed goals, including CVP 8–12 mm Hg, MAP ≥65 mm Hg, central venous oxygen saturation ≥70%	1C
Antibiotic therapy	
IV broad-spectrum antibiotic within 1 hour of diagnosis of septic shock and severe sepsis against likely bacterial/fungal pathogens	1B
Reassess antibiotic therapy daily with microbiology and clinical data to narrow coverage	1C
Fluid therapy	
No clinical outcome difference between colloids and crystalloids	1B
Fluid challenges of 1000 mL of crystalloids or 300–500 mL of colloids over 30 minutes	1D
Vasopressors	
Norepinephrine and dopamine are the initial choices	1C
Maintain MAP ≥65 mm Hg	1C
Inotropic therapy	
Use dobutamine when cardiac output remains low despite fluid resuscitation and combined inotropic/vasopressor therapy	1C
Glucose control	
Use IV insulin to keep blood glucose ≤150 mg/dL	2C
Steroids	
IV hydrocortisone for septic shock when hypotension remains poorly responsive to adequate fluid resuscitation and vasopressors	2C
Hydrocortisone dose should be <300 mg/day	1A
Recombinant human activated protein C (drotrecogin)	
Consider in sepsis-induced organ dysfunction with high risk of death (typically APACHE II ≥25 or multiple organ failure) in the absence of contraindications	2B
Deep vein thrombosis prophylaxis	
Use either low-molecular-weight heparin or low-dose unfractionated heparin in preventing deep vein thrombosis	1A
Stress ulcer prophylaxis	
H2 receptor blocker or proton pump inhibitor is effective	1A, 1B

TABLE 128-4 Empiric Antimicrobial Regimens in Sepsis

Infection (Site or Type)	Antimicrobial Regimen	
	Community-acquired	**Hospital-acquired**
Urinary tract	ceftriaxone or ciprofloxacin/levofloxacin	ciprofloxacin/levofloxacin or ceftriaxone or ceftazidime
Respiratory tract	levofloxacin[a]/moxifloxacin or ceftriaxone + clarithromycin/azithromycin	piperacillin/tazobactam or ceftazidime or cefipime + levofloxacin/ciprofloxacin or aminoglycoside
Intraabdominal	piperacillin/tazobactam or ciprofloxacin + metronidazole	piperacillin/tazobactam or carbapenem[b]
Skin/soft tissue	vancomycin or linezolid or daptomycin	vancomycin + ampicillin/sulbactam or piperacillin/tazobactam
Catheter-related		vancomycin
Unknown		piperacillin/tazobactam or ceftazidime/cefipime or imipenem/meropenem } +/- vancomycin not gentamicin.

[a]750 mg orally once daily.
[b]Imipenem, meropenem, doripenem.

TABLE 128-5 Receptor Activity of Cardiovascular Agents Commonly used in Septic Shock

Agent	α_1	α_2	β_1	β_2	Dopaminergic
Dopamine	++/+++	?	++++	++	++++
Dobutamine	+	+	++++	++	0
Norepinephrine	+++	+++	+++	+/++	0
Phenylephrine	++/+++	+	?	0	0
Epinephrine	++++	++++	++++	+++	0

α_1 = α_1-adrenergic receptor, α_2 = α_2-adrenergic receptor, β_1 = β_1-adrenergic receptor, β_2 = β_2-adrenergic receptor, 0 = no activity, ++++ = maximal activity, ? = unknown activity.

LETS TRY

Case-based learning: recognising sepsis

Sepsis can lead to organ failure and death. However, early diagnosis and recognition in the pharmacy may help prevent these potentially fatal consequences.

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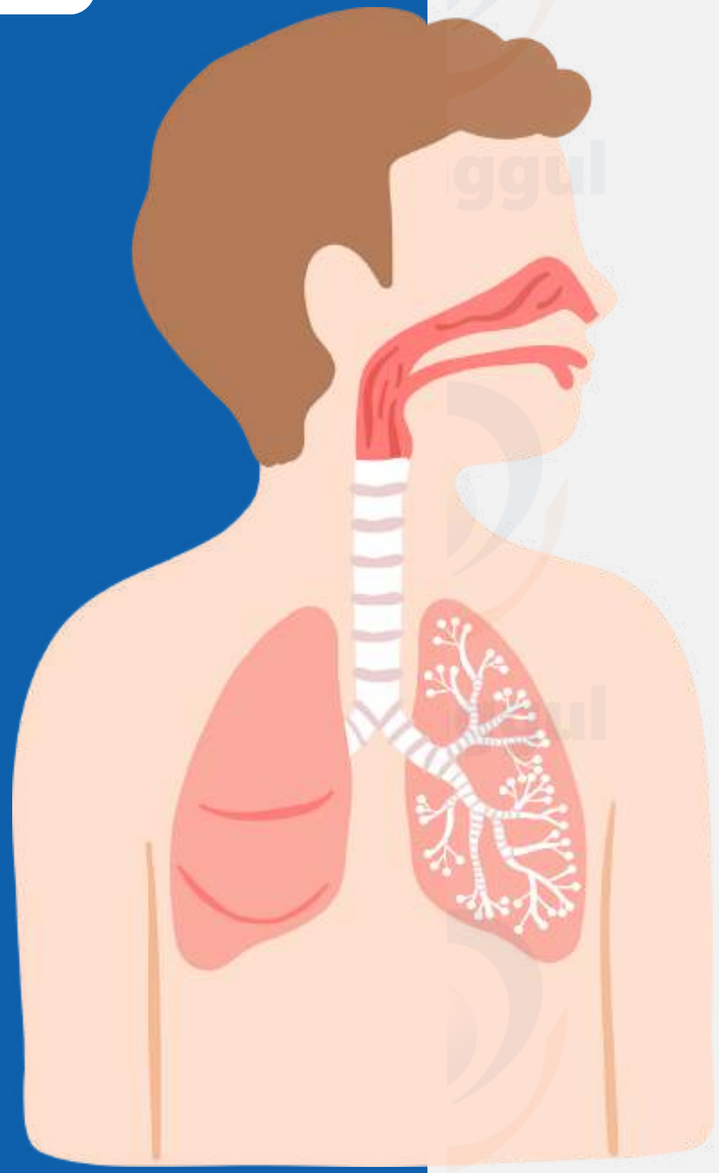
Rise your hand!

any question?



PSF402

Tuberkulosis dan Pencernaan

Sesi Ke 6&7

Topik Sesuai RPS:
Prinsip pemilihan antibiotik untuk tuberkulosis dan pencernaan

Dosen Pengampu:

apt. Nadiya Nurul Afifah, M.Farm.Klin

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223080974

E-mail:

nadiya.nurul@esaunggul.ac.id / +62 856 977 44470

Topik Sebelum UAS

Sesi 1

Prinsip Infeksi

Sesi 2

Prinsip Pemilihan Antibiotik

Sesi 3

Farmakoterapi Infeksi Saluran nafas atas

Sesi 4

Farmakoterapi saluran nafas bawah

Sesi 5

Farmakoterapi TBC

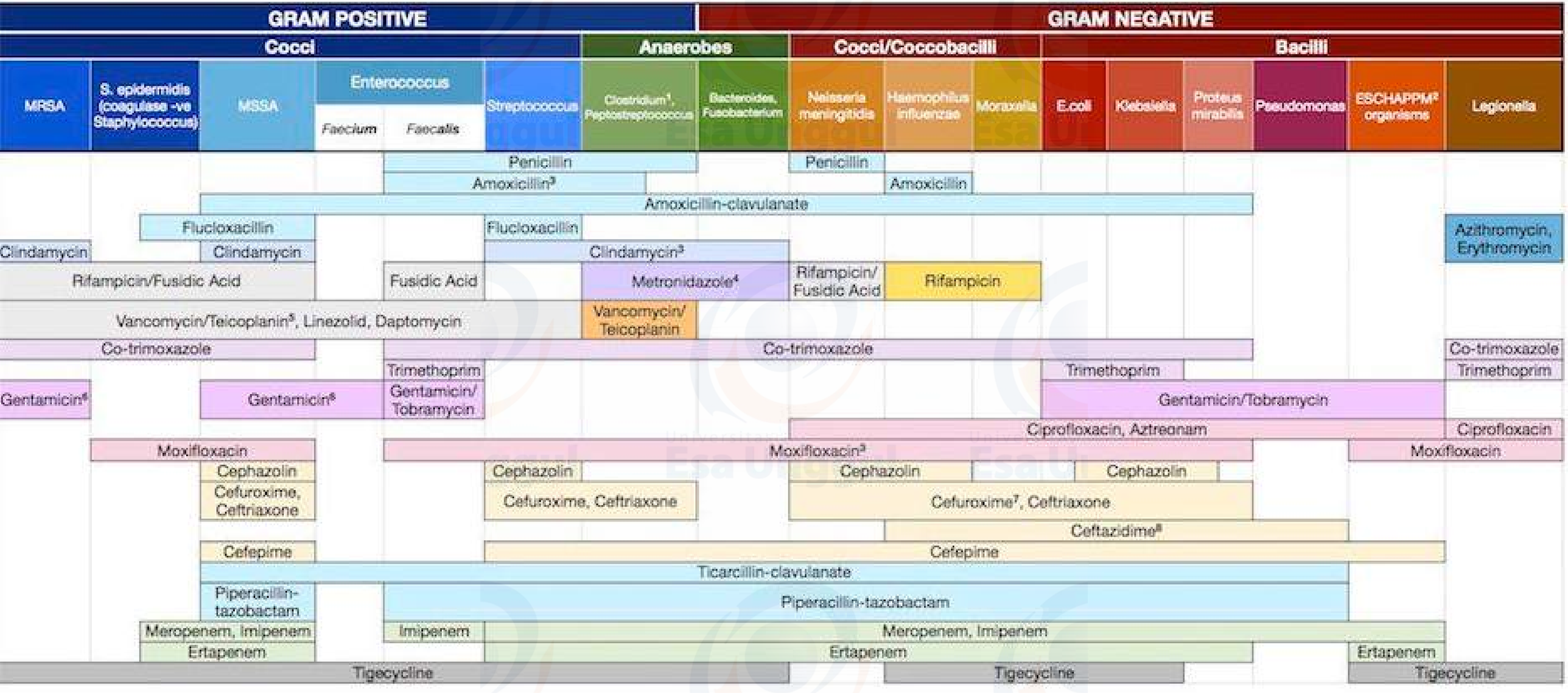
Sesi 6

Farmakoterapi saluran pencernaan

Sesi 7

Farmakoterapi sepsis

Ujian Tengah Semester


GRAM POSITIVE
GRAM NEGATIVE
Cocci
Anaerobes
Cocci/Coccobacilli
Bacilli
MRSA
S. epidermidis (coagulase -ve Staphylococcus)
MSSA
Enterococcus
Faecium
Faecalis
Streptococcus
Clostridium[1], Peptostreptococcus
Bacteroides, Fusobacterium
Neisseria meningitidis
Haemophilus influenzae
Moraxella
E.coli
Klebsiella
Proteus mirabilis
Pseudomonas
ESCHAPPM[2] organisms
Legionella
Penicillin
Penicillin
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Amoxicillin
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Flucloxacillin
Flucloxacillin
Azithromycin, Erythromycin
Clindamycin
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Clindamycin[3]
Rifampicin/Fusidic Acid
Fusidic Acid
Metronidazole[4]
Rifampicin/ Fusidic Acid
Rifampicin
Vancomycin/Teicoplanin[5], Linezolid, Daptomycin
Vancomycin/ Teicoplanin
Co-trimoxazole
Co-trimoxazole
Co-trimoxazole
Trimethoprim
Trimethoprim
Trimethoprim
Gentamicin[6]
Gentamicin[6]
Gentamicin/ Tobramycin
Gentamicin/Tobramycin
Ciprofloxacin, Aztreonam
Ciprofloxacin
Moxifloxacin
Moxifloxacin[3]
Moxifloxacin
Cephazolin
Cephazolin
Cephazolin
Cephazolin
Cefuroxime, Ceftriaxone
Cefuroxime, Ceftriaxone
Cefuroxime[7], Ceftriaxone
Ceftazidime[8]
Cefepime
Cefepime
Ticarcillin-clavulanate
Piperacillin-tazobactam
Piperacillin-tazobactam
Meropenem, Imipenem
Imipenem
Meropenem, Imipenem
Ertapenem
Ertapenem
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Tigecycline
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Flucloxacillin
Cefalexin

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Commonly act as bacteriostatic agents, restrict growth & multiplication

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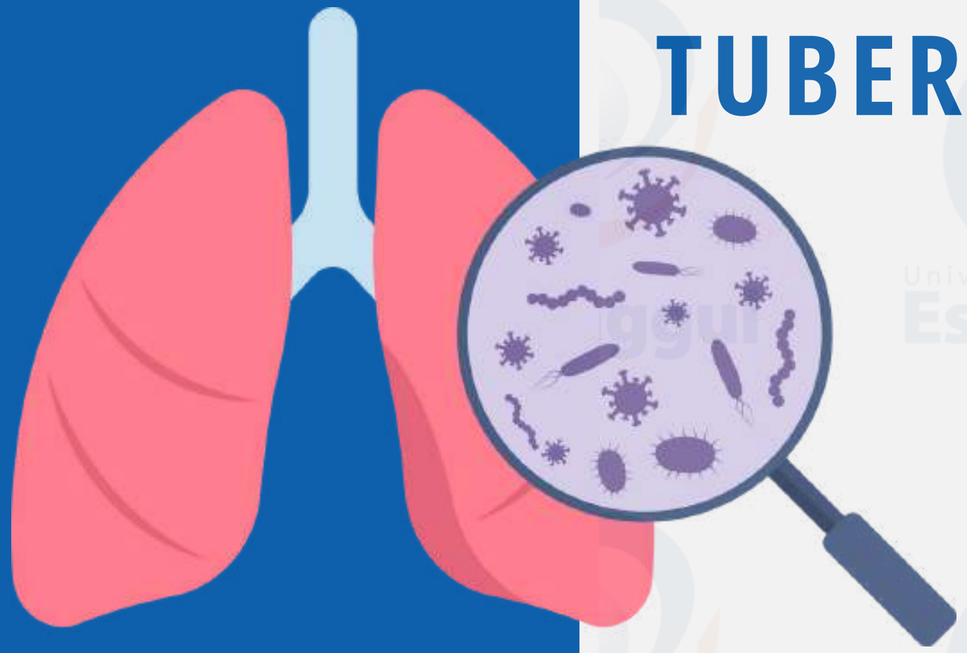
TUBERCULOSIS

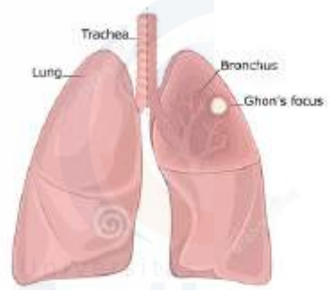


TUBERCULOSIS

Mycobacterium tuberculosis

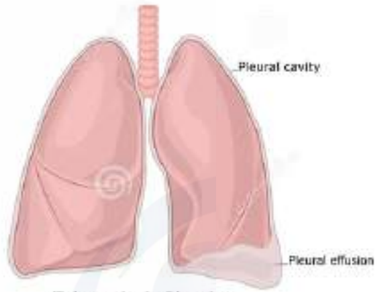
- **Bakteri Tahan Asam (BTA)**
- **Batang**

Paru

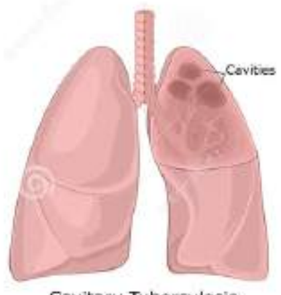


Primary Tuberculosis

Miliary Tuberculosis

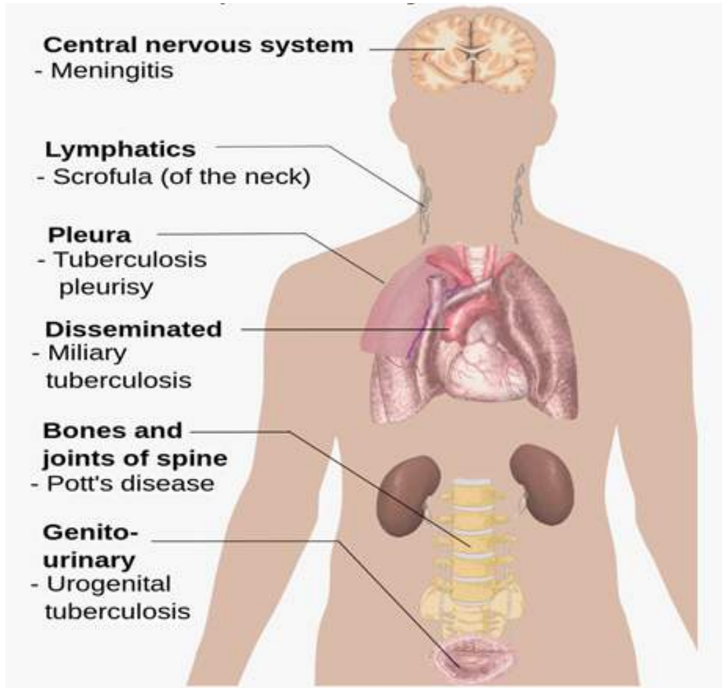


Tuberculosis Pleurisy

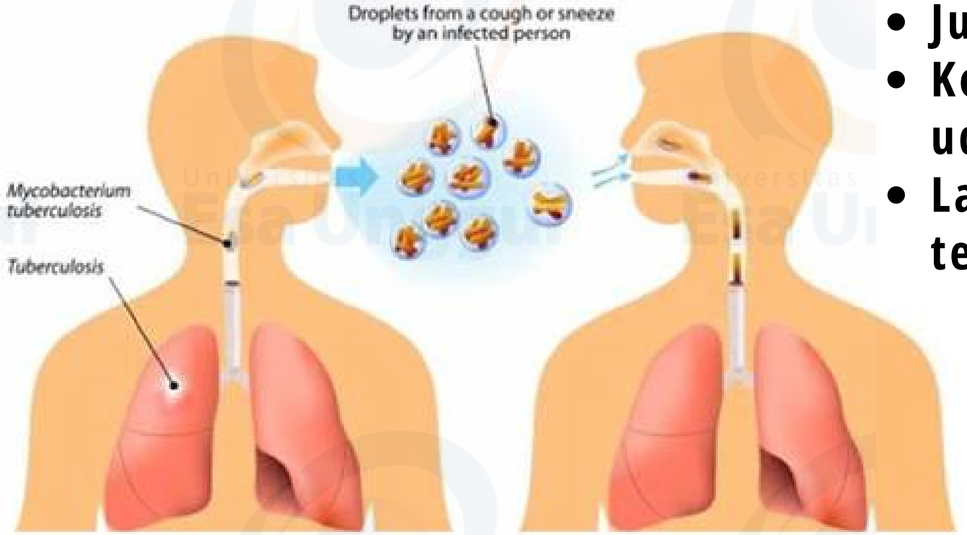


Cavitary Tuberculosis

Ekstra Paru



Transmisi



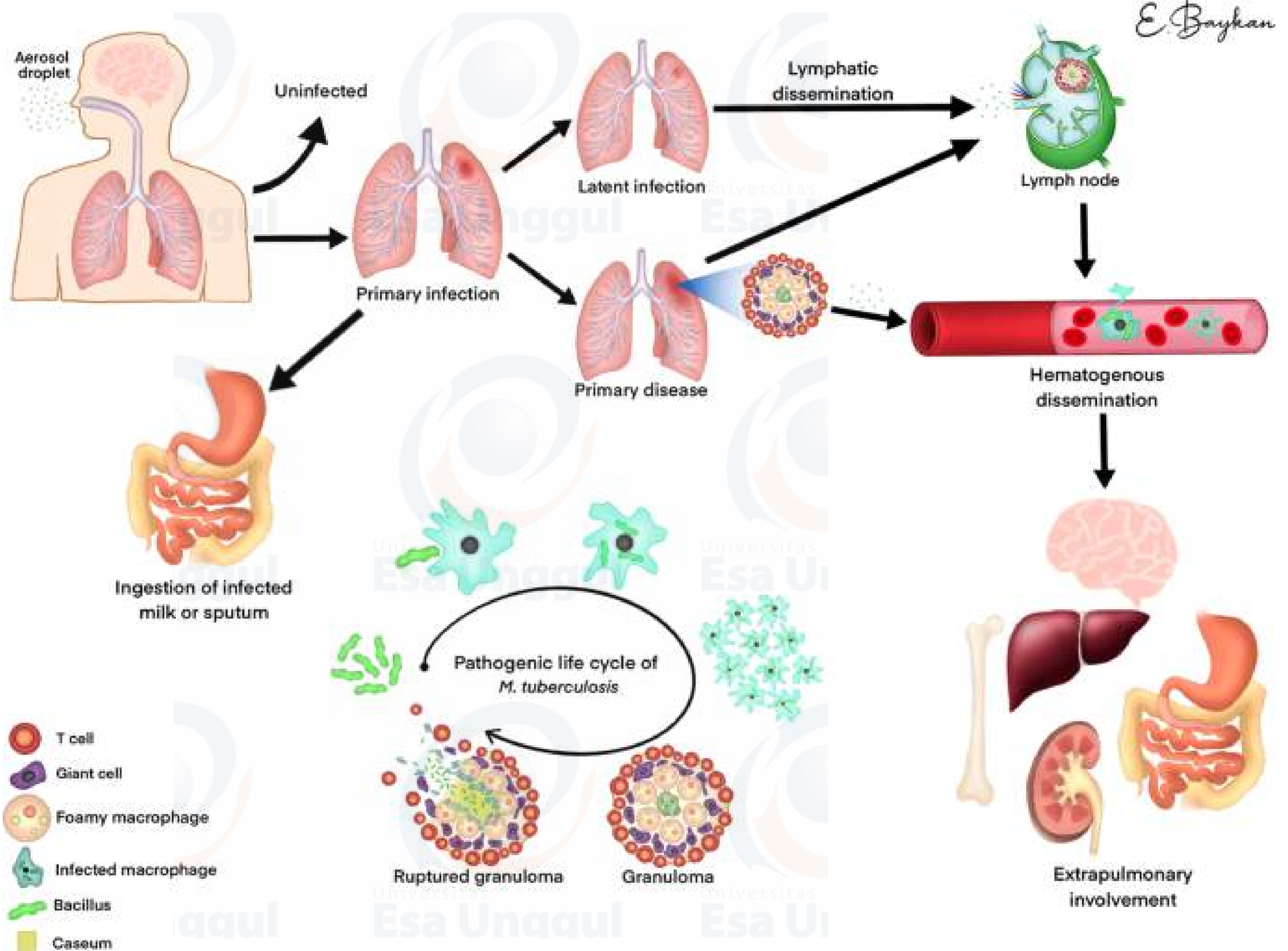
- **Jumlah Droplet**
- **Konsentrasi organisme dalam udara**
- **Lama durasi seseorang terkontaminasi**

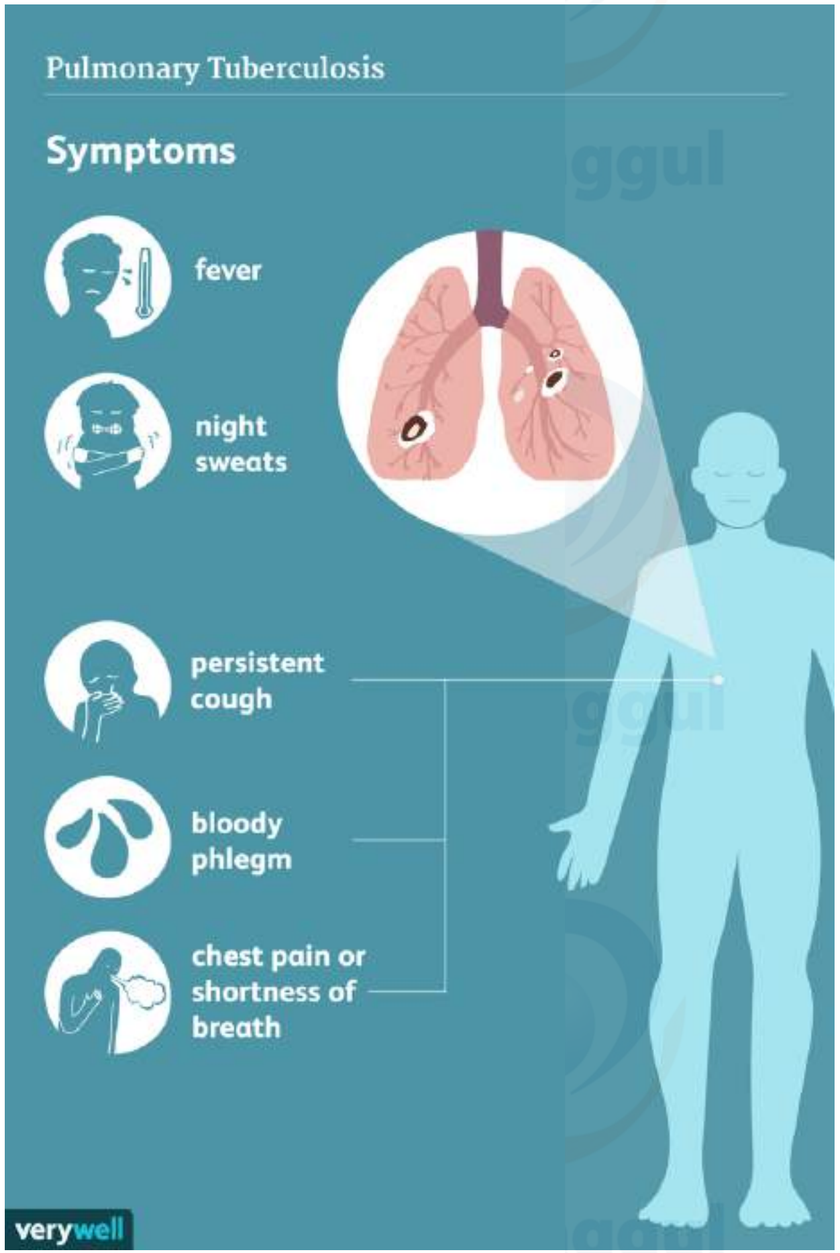
Etiologi

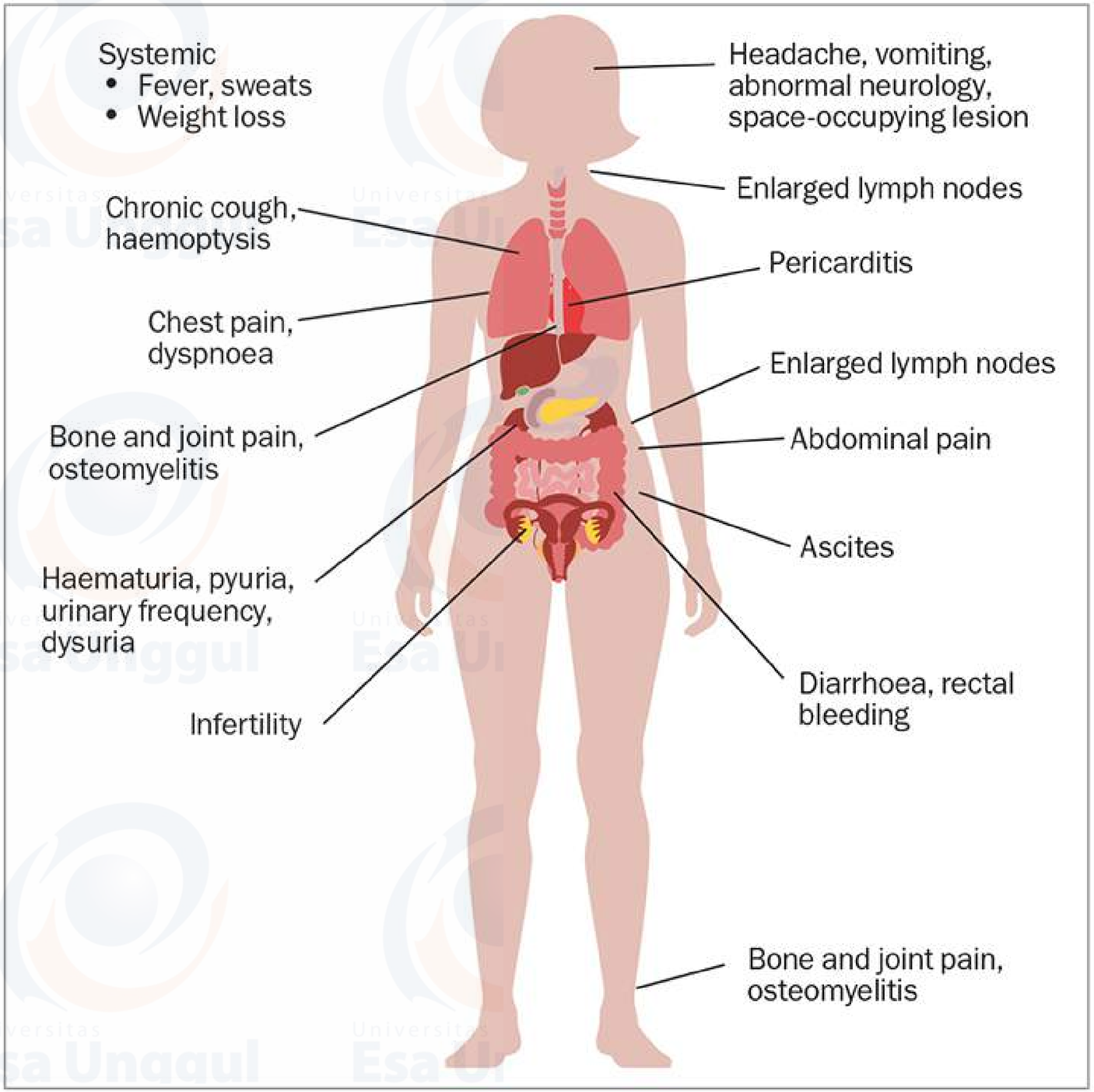
- **Mycobacterium tuberculosis,**
- Mycobacterium bovis,
- Mycobacterium africanum,
- Mycobacterium microti and
- Mycobacterium cannettii

Faktor Resiko

1. Orang dengan HIV positif dan penyakit imunokompromais lain.
2. Orang yang mengonsumsi obat imunosupresan dalam jangka waktu panjang.
3. Perokok
4. Konsumsi alkohol tinggi
5. Anak usia <5 tahun dan lansia
6. Memiliki kontak erat dengan orang dengan penyakit TB aktif yang infeksius.
7. Berada di tempat dengan risiko tinggi terinfeksi tuberkulosis
8. Petugas kesehatan




Pulmonary Tuberculosis
Symptoms
fever
night sweats
persistent cough
bloody phlegm
chest pain or shortness of breath
verywell


Systemic
• Fever, sweats
• Weight loss
Headache, vomiting, abnormal neurology, space-occupying lesion
Enlarged lymph nodes
Chronic cough, haemoptysis
Pericarditis
Chest pain, dyspnoea
Enlarged lymph nodes
Bone and joint pain, osteomyelitis
Abdominal pain
Ascites
Haematuria, pyuria, urinary frequency, dysuria
Diarrhoea, rectal bleeding
Infertility
Bone and joint pain, osteomyelitis

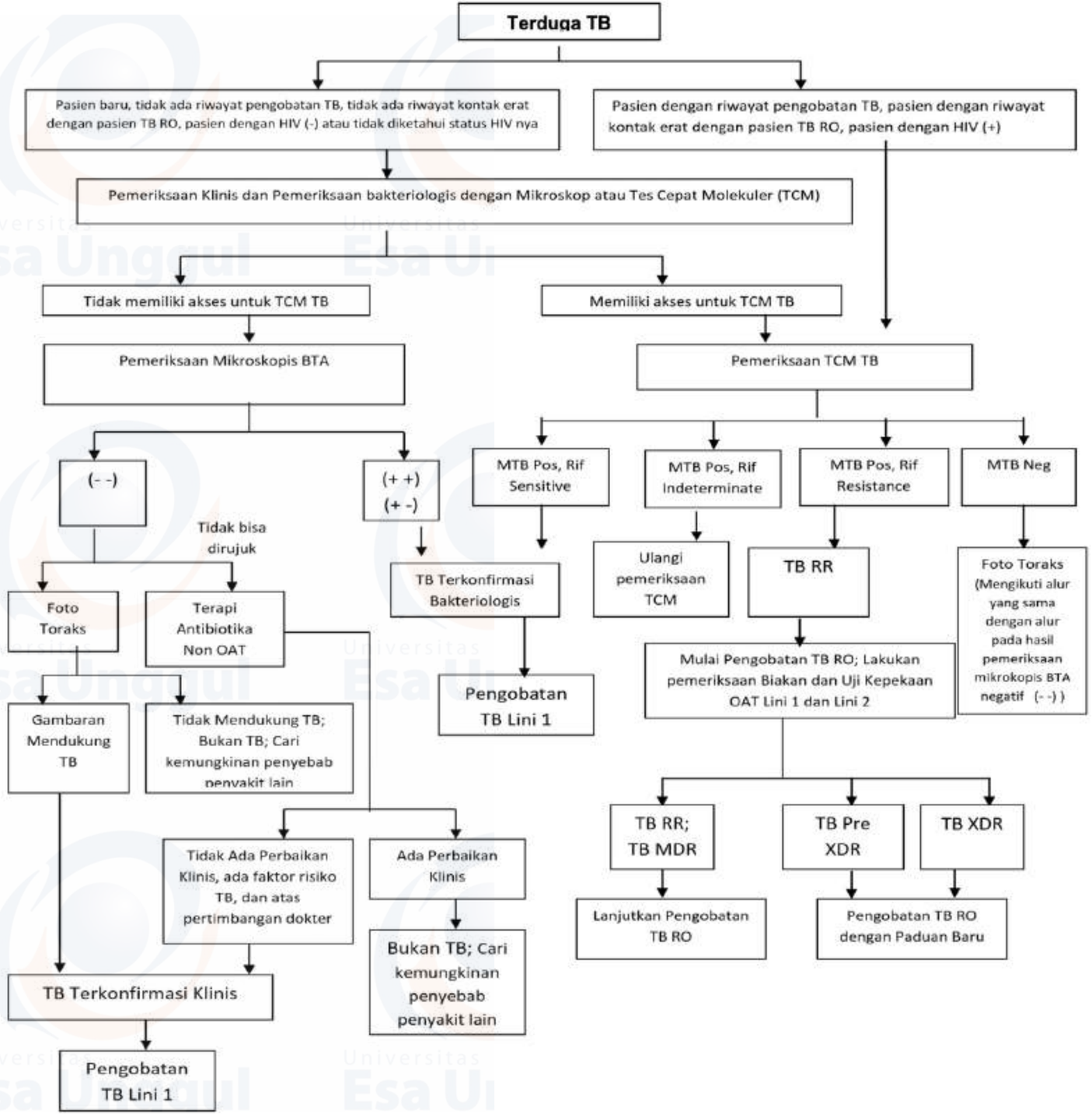
KASUS	DEFINISI
Kasus Baru	Belum pernah mendapat OAT sebelumnya atau riwayat mendapatkan OAT kurang dari 1 bulan (< dari 28 dosis bila memakai obat program).
Kasus dengan Riwayat Pengobatan	Pasien yang pernah mendapatkan OAT 1 bulan atau lebih (>28 dosis bila memakai obat program).
	• **Kasus Kambuh:** ebelumnya pernah mendapatkan OAT dan dinyatakan sembuh atau pengobatan lengkap • **Kasus pengobatan setelah gagal:** sebelumnya pernah mendapatkan OAT dan dinyatakan gagal pada akhir pengobatan. • **Kasus loss to follow up:** pernah menelan OAT 1 bulan atau lebih dan tidak meneruskannya selama lebih dari 2 bulan berturut-turut • **Kasus lain-lain:** sebelumnya pernah mendapatkan OAT dan hasil akhir pengobatannya tidak diketahui atau tidak didokumentasikan • **Kasus dengan riwayat pengobatan tidak diketahui:** tidak diketahui riwayat pengobatan sebelumnya sehingga tidak dapat dimasukkan dalam salah satu kategori di atas.

Tabel 3.3 Definisi hasil pengobatan

Hasil	Definisi
Sembuh	Pasien TB paru dengan konfirmasi bakteriologis positif pada awal pengobatan dan BTA sputum negatif atau biakan negatif pada akhir pengobatan dan memiliki hasil pemeriksaan negatif pada salah satu pemeriksaan sebelumnya.
Pengobatan lengkap	Pasien TB yang telah menyelesaikan pengobatan secara lengkap dantidak memiliki bukti gagal pengobatan tetapi juga tidak memiliki hasil BTA sputum atau biakan negatif pada akhir pengobatan dan satu pemeriksaan sebelumnya, baik karena tidak dilakukan atau karena hasilnya tidak ada.
Pengobatan gagal	Pasien TB dengan hasil pemeriksaan BTA sputum atau biakan positif pada bulan kelima atau akhir pengobatan.
Meninggal	Pasien TB yang meninggal dengan alasan apapunsebelum dan selama pengobatan TB
Putus obat	Pasien TB yang tidak memulai pengobatan setelah terdiagnosis TB atau menghentikan pengobatan selama 2 bulan berturut-turut atau lebih
Tidak dievaluasi	Pasien yang tidak memiliki hasil pengobatan pada saat akhir pelaporan kohort pengobatan, termasuk pasien yang sudah pindah ke fasilitas kesehatan lain dan tidak diketahui hasil pengobatannya oleh fasilitas yang merujuk pada batas akhir pelaporan kohort pengobatan.
Keberhasilan pengobatan	Jumlah kasus dengan hasil pengobatan sembuh dan lengkap.

Algoritma TB

- WAJIB dengan TCM
- Tidak dibenarkan mendiagnosis TB hanya berdasarkan pemeriksaan foto toraks saja. Foto toraks tidak selalu memberikan gambaran yang spesifik pada TB paru, sehingga dapat menyebabkan terjadi over diagnosis ataupun under diagnosis.
- Tidak dibenarkan mendiagnosis TB dengan pemeriksaan serologis.



Type of Tuberculosis

- **TB sensitive**
- **Mono- resistant** Resisten terhadap satu jenis obat lini pertama
  Co/ rifampisin resistant
- **Poli resistant** Resisten terhadap lebih dari satu jenis obat di lini pertama, selain INH dan R
  Co/ ethambutol, streptomisin resistant
- **Multi Drugs Resistant** Resisten terhadap INH dan Rifampisin
- **Extensive Drugs Resistant** Resisten terhadap salah satu obat fluoroquinolon (lini kedua), dan salah satu OAT injeksi golongan aminoglikosida

Tahap Awal (Inisial)

Obat diberikan untuk setiap hari
Intensif, virulensi tinggi

Tahap Lanjutan

Obat diberikan 3 kali seminggu
Membunuh sisa kuman
Virulensi rendah

Regiment for TB sensitive

Tabel 3.1. Dosis rekomendasi OAT lini pertama untuk dewasa

	dosis rekomendasi harian		3 kali per minggu	
	dosis (mg/kgBB)	maksimum (mg)	dosis (mg/kgBB)	maksimum (mg)
Isoniazid	5 (4-6)	300	10 (8-12)	900
Rifampisin	10 (8-12)	600	10 (8-12)	600
Pirazinamid	25 (20-30)	-	35 (30-40)	-
Etambutol	15 (15-20)	-	30 (25-35)	-
Streptomisin*	15 (12-18)	-	15 (12-18)	-

Regiment for TB RO

Tabel 1. Jenis obat dan durasi pengobatan jangka pendek

Nama Obat	Tahap Awal						Tahap Lanjutan				
	1	2	3	4	5	6	5	6	7	8	9
	1	2	3	4			7	8	9	10	11
1. Kanamisin (Km)	√	√	√	√	√*	√*	-	-	-	-	-
2. Etionamid (Eto) / Protionamid (Pto)	√	√	√	√	√*	√*	-	-	-	-	-
3. Isoniazid (H) dosis tinggi (DT)	√	√	√	√	√*	√*	-	-	-	-	-
4. Moxifloxacin (Mfx)	√	√	√	√	√*	√*	√	√	√	√	√
5. Clofazimin (Cfz)	√	√	√	√	√*	√*	√	√	√	√	√
6. Etambutol (E)	√	√	√	√	√*	√*	√	√	√	√	√
7. Pirazinamid (Z)	√	√	√	√	√*	√*	√	√	√	√	√

*Pengobatan tahap awal diperpanjang sampai bulan ke-6 jika belum terjadi konversi BTA pada bulan ke-4

1. Durasi total pengobatan adalah 9–11 bulan, durasi tahap awal adalah 4–6 bulan dan tahap lanjutan 5 bulan
2. Intoleransi Z tidak boleh mendapatkan paduan jangka pendek.
3. Intoleransi / resistansi terhadap E, paduan jangka pendek diberikan tanpa Etambutol
4. Capreomisin dapat menggantikan kanamisin apabila muncul efek samping di dalam masa pengobatan. Mengingat ketersediaan capreomisin yang terbatas, maka penggunaannya harus berkordinasi dengan tim logistik MTPTRO.

Regiment for TB RO

Tabel 2. Dosis OAT berdasarkan berat badan

Nama Obat	Dosis berdasarkan kelompok berat badan			
	<33 kg	**33 – 50 kg**	**>50 – 70 kg**	**>70 kg**
Kanamisin*	0,5 g	0,75 g	0,75 g	1 g
Moxifloxacin	400 mg	400 mg	400 mg	400 mg
Clofazimin	50 mg#	100 mg	100 mg	100 mg
Etambutol	600 mg	800 mg	1000 mg	1200 mg
Pirazinamid	750 mg	1500 mg	2000 mg	2000 mg
Isoniazid[DT]	300 mg	**450 mg / **600 mg	600 mg	600 mg
Etionamid	500 mg	500 mg	750 mg	1000 mg
Protionamid	500 mg	500 mg	750 mg	1000 mg

Regiment for TB RO

- Paduan pengobatan terdiri dari tiga obat dalam Grup A dan dua obat dari Grup B

Misal : 6 Bdq – Lfx – Lnz – Cfz-Cs // 14 Lfx – Lnz – Cfz-Cs

- Jika paduan tidak dapat dibentuk dengan obat dari Grup A dan B saja, obat dari Grup C ditambahkan untuk melengkapi paduan pengobatan.

Misal : 6 Bdq – Lfx – Cfz – Cs - E // 14 Lfx – Cfz – Cs - E

KELOMPOK	JENIS OBAT	
Kelompok A	Levofloxacin atau	Lfx
	Moxifloxacin	Mfx
	Bedaquiline	Bdq
	Linezolid	Lzd
Kelompok B	Clofazimine	Cfz
	Cycloserine atau	Cs
	Terizidone	Trd
Kelompok C	Ethambutol	E
	Delamanid	Dlm
	Pyrazinamide	Z
	Imipenem-cilastatin atau	Ipm-Cln
	Meropenem	Mpm
	Amikacin	Am
	Atau Streptomycin	(S)
	Ethionamide atau Prothionamide	Eto/Pto
	p-aminosalicylic acid	PAS

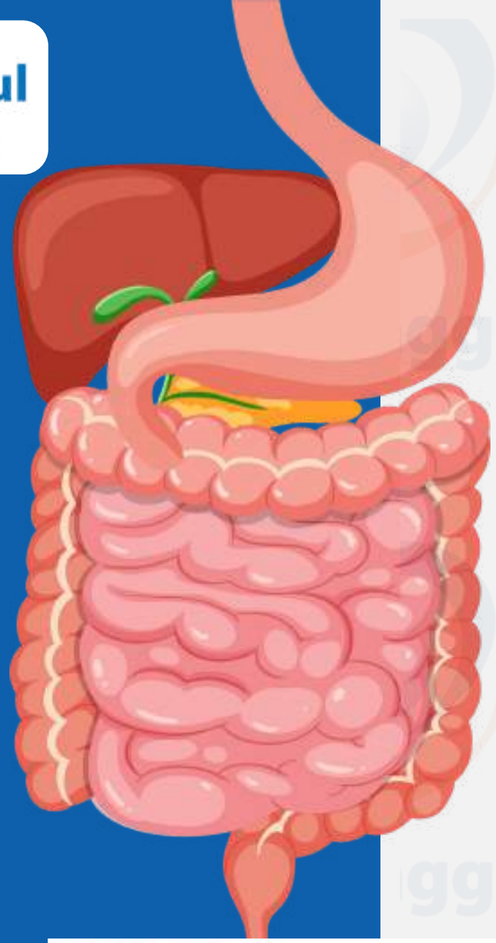
Regiment for TB RO

Paduan jangka panjang	Tahap awal	Total lama pengobatan	Pemberian setelah konversi (n)
Dengan injeksi Am/S	6 bulan	Min. 20 bulan	16 bulan
Tanpa injeksi atau tanpa BDQ/DLM	-	Min. 20 bulan	16 bulan
Dengan BDQ/DLM	-	Min. 20 bulan	16 bulan
TB RO pada anak		18–20 bulan	
TB RO ekstra paru	-	Min. 20 bulan	-

Bulan Konversi	Lama Pengobatan Setelah Konversi	Total Lama Pengobatan
1	15	18
2	15	18
3	15	18
4	15	19
5	15	20
6	15	20

Suspect Drugs Resistance

- Pasien TB gagal pengobatan kategori 2.
- Pasien TB pengobatan kategori 2 yang tidak konversi setelah 3 bulan pengobatan.
- Pasien TB yang mempunyai riwayat pengobatan TB yang tidak standar serta menggunakan kuinolon dan obat injeksi lini kedua paling sedikit selama 1 bulan.
- Pasien TB gagal pengobatan kategori 1.
- Pasien TB pengobatan kategori 1 yang tidak konversi setelah 2
- bulan pengobatan.
- Pasien TB kasus kambuh (relaps), dengan pengobatan OAT
- kategori 1 dan kategori 2.
- Pasien TB yang kembali setelah loss to follow-up (lalai
- berobat/default).
- Terduga TB yang mempunyai riwayat kontak erat dengan
- pasien TB- RO, termasuk dalam hal ini warga binaan yang ada di lapas/rutan, hunian padat seperti asrama, barak, buruh pabrik.
- Pasien ko-infeksi TB-HIV yang tidak respons secara bakteriologis maupun klinis terhadap pemberian OAT, (bila pada penegakan diagnosis awal tidak menggunakan TCM TB).



INFEKSI PADA PENCERNAAN

TABLE 123-2 Usual Microflora of the Gastrointestinal Tract

Site	Commonly Found Bacteria	Approximate Concentration (Log No. Organisms/mL)	
		Aerobes	***Anaerobes***
Stomach[a]	*Streptococcus, Lactobacillus*	10–100	Rare
Biliary tract	Normally sterile (*Escherichia coli, Klebsiella*, or enterococci in some patients)	0	0
Proximal small bowel	*Streptococcus* (including enterococci), *E. coli, Klebsiella, Lactobacillus*, diphtheroids	100	Few
Distal ileum	*E. coli, Klebsiella, Enterobacter*, enterococci, *Bacteroides fragilis, Clostridium*, peptostreptococci	10^4–10^6	10^5–10^7
Colon	*Bacteroides* spp., peptostreptococci, *Clostridium, E. coli, Klebsiella*, enterococci, *Enterobacter*, and many others	10^5–10^8	10^9–10^{11}

Diare

- Vibrio cholerae
- *Shigella* speciesa
- *Salmonella* Nontyphoidala
- *Clostridium diffici*

Peritonitis

Parasitic

- Giardiasis
- Amebiasis
- Malaria
- Scabies

TABLE 123-5 Likely Intraabdominal Pathogens

Type of Infection	Aerobes	Anaerobes
Primary bacterial peritonitis		
Children (spontaneous)	Group A *Streptococcus*, *E. coli*, pneumococci	–
Cirrhosis	*E. coli*, *Klebsiella*, pneumococci (many others)	–
Peritoneal dialysis	*Staphylococcus*, *Streptococcus*, *E. coli*, *Klebsiella*, *Pseudomonas*	–
Secondary bacterial peritonitis		
Gastroduodenal	*Streptococcus*, *E. coli*	–
Biliary tract	*E. coli*, *Klebsiella*, enterococci	*Clostridium* or *Bacteroides* (infrequent)
Small or large bowel	*E. coli*, *Klebsiella* spp., *Proteus* spp.	*Bacteroides fragilis* and other *Bacteroides*, *Clostridium*
Appendicitis	*E. coli*, *Pseudomonas*	*Bacteroides* spp.
Abscesses	*E. coli*, *Klebsiella*, enterococci	*B. fragilis* and other *Bacteroides*, *Clostridium*, anaerobic cocci
Liver	*E. coli*, *Klebsiella*, enterococci staphylococci, amoeba	*Bacteroides* (infrequent)
Spleen	*Staphylococcus*, *Streptococcus*	

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Antibiotic for diarrhea

TABLE 122-4 Recommendations for Antibiotic Therapy

Pathogen	First-Line Agents	Alternative Agents
Enterotoxigenic (cholera-like) diarrhea		
Vibrio cholerae O1 or O139	Doxycycline 300 mg orally × 1	Tetracycline 500 mg orally four times daily × 3 days; ciprofloxacin 500 mg orally every 12 hours × 3 days or 1 g orally single dose; norfloxacin 400 mg orally every 12 hours × 3 days; levofloxacin 500 mg orally once daily × 3 days; trimethoprim-sulfamethoxazole DS tablet twice daily × 3 days; erythromycin 250–500 mg orally every 6–8 hours; azithromycin 1,000 mg orally × 1
Enterotoxigenic *Escherichia coli*	Ciprofloxacin 500 mg orally every 12 hours, norfloxacin 400 mg orally every 12 hours, levofloxacin 500 mg orally once daily × 3 days	Rifaximin 200 mg 3 times daily × 3 days; azithromycin 1,000 mg orally × 1 or 500 mg orally daily × 3 days
Invasive (dysentery-like) diarrhea		
Shigella species[a]	Ciprofloxacin 500 mg orally every 12 hours, norfloxacin 400 mg orally every 12 hours, levofloxacin 500 mg orally 1 daily × 5 days	Azithromycin 500 mg orally × 1, then 250 mg orally daily × 4 days
Salmonella Nontyphoidal[a]	Gastroenteritis: Ciprofloxacin 500 mg every 12 hours × 5–7 days Bacteremia: Ceftriaxone 2 g IV daily × 7–14 days Chronic carriers: Ciprofloxacin 750 mg orally every 12 hours × 1 month	Gastroenteritis: Azithromycin 1,000 mg orally × 1 day, followed by 500 mg orally once daily × 6 days; trimethoprim-sulfamethoxazole DS orally every 12 hours × 5–7 days Chronic carriers: amoxicillin 1,000 mg orally every 8 hours × 3 months; trimethoprim-sulfamethoxazole DS orally every 12 hours × 3 months
Campylobacter[a]	Erythromycin 500 mg orally twice daily, azithromycin 1,000 mg orally × 1 day followed by 500 mg daily or clarithromycin 500 mg orally twice daily × 5 days	Ciprofloxacin 500 mg or norfloxacin 400 mg orally twice daily × 5 days
Yersinia species[a]	A combination therapy with doxycycline, aminoglycosides, trimethoprim-sulfamethoxazole, or fluoroquinolones	
Clostridium difficile	Mild to moderate disease: Metronidazole 250 mg every 6 hours to 500 mg every 8 hours orally or intravenously daily × 10–14 days Severe disease: Vancomycin 125 mg every 6 hours orally × 10–14 days First relapse: same as above Subsequent relapses: Tapered pulse dose of oral vancomycin (125 mg every 6 hours × 2 weeks, every 12 hours × 1 week, every 24 hours × 1 week, every 48 hours × 8 days (4 doses), every 72 hours × 15 days (5 doses)	Subsequent relapses: Oral vancomycin 125 mg every 6 hours × 10–14 days followed by rifaximin 400 mg every 12 hours orally × 2 weeks; Nitazoxanide 500 mg every 12 hours × 10 days
Traveler's diarrhea		
Prophylaxis[a]	Norfloxacin 400 mg or ciprofloxacin 750 mg orally daily	Rifaximin 200 mg one to three times daily up to 2 weeks
Treatment	Norfloxacin 800 mg orally × 1 or 400 mg orally every 12 hours × 3 days, or Ciprofloxacin 750 mg orally ×1 or 500 mg orally every 12 hours × 3 days, or Levofloxacin 1,000 mg orally × 1 or 500 mg orally daily × 3 days Azithromycin 1,000 mg orally × 1 or 500 mg orally daily × 3 days	Rifaximin 200 mg 3 times daily × 3 days

Viral diarrhea

TABLE 122-5 Characteristics of Agents Responsible for Acute Viral Gastroenteritis and Diarrhea

Virus	Peak Age of Onset	Time of Year	Duration	Mode of Transmission	Symptoms
Rotavirus	6 months–2 years	October to April	3–8 days	Fecal–oral, water, food	Vomiting, diarrhea, fever, abdominal pain, lactose intolerance
Norovirus	3 months–6 years	Peak in winter	4 days	Fecal–oral, water, shellfish	Vomiting, diarrhea
Astrovirus	<7 years	Winter	1–4 days	Fecal–oral, water, shellfish	Diarrhea, headache, malaise, nausea,
Enteric adenovirus	<2 years	Year-round	7–9 days	Fecal–oral	Diarrhea, respiratory symptoms, vomiting, fever
Pestivirus	<2 years	NR	3 days	NR	Mild
Coronavirus-like particles	<2 years	Fall and early winter	7 days	NR	Respiratory disease
Enterovirus	NR	NR	NR	NR	Mild diarrhea, secondary organ damage
Norwalk	>5 y	Variable	12–24 hours	Fecal–oral, food, aerosol	Nausea, vomiting, diarrhea, abdominal cramps, headache, fever, chills, myalgia

antibiotics for intraabdomen infection

TABLE 123-8 Guidelines for Initial Antimicrobial Agents for Intraabdominal Infections

	Primary Agents	Alternatives
Primary bacterial peritonitis		
Cirrhosis	Cefotaxime	1. Add clindamycin or metronidazole if anaerobes are suspected 2. Other third-generation cephalosporins, extended-spectrum penicillins, aztreonam, and imipenem as alternatives 3. Piperacillin–tazobactam
Peritoneal dialysis	Initial empiric regimens Cefazolin or cephalothin plus ceftazidime or cefepime	1. An aminoglycoside may be used in place of ceftazidime or cefepime 2. Imipenem/cilastatin or cefepime may be used alone 3. Quinolones may be used in place of ceftazidime or cefepime if local susceptibilities allow
	1. *Staphylococcus*: penicillinase-resistant penicillin or first-generation cephalosporin	1. Alternative for methicillin resistant staphylococci is vancomycin 2. For vancomycin-resistant *Staphylococcus aureus*, linezolid, daptomycin, or quinupristin-dalfopristin must be used
	2. *Streptococcus or Enterococcus:* ampicillin	1. An aminoglycoside may be added for enterococcal peritonitis 2. Linezolid or quinupristin-dalfopristin should be used to treat vancomycin-resistant enterococcus not susceptible to ampicillin
	3. Aerobic gram-negative bacilli: ceftazidime or cefepime 4. *Pseudomonas aeruginosa*: two agents with differing mechanisms of action, such as an oral quinolone plus ceftazidime, cefepime, tobramycin, or piperacillin	1. The regimen should be based on in vitro sensitivity tests

Antibiotics for intraabdomen infection

Secondary bacterial peritonitis		
Perforated peptic ulcer	First-generation cephalosporins	1. Antianaerobic cephalosporins[a] 2. Possibly add aminoglycoside if patient condition is poor 3. Aminoglycoside with clindamycin or metronidazole; add ampicillin if patient is immunocompromised or if biliary tract origin of infection
Other	Imipenem-cilastatin, meropenem, ertapenem, or extended-spectrum penicillins with β-lactamase inhibitor	1. Ciprofloxacin with metronidazole 2. Aztreonam with clindamycin or metronidazole 3. Antianaerobic cephalosporins[a]
Abscess		
General	Imipenem-cilastatin, meropenem, ertapenem, or extended-spectrum penicillins with β-lactamase inhibitor	1. Aztreonam with clindamycin or metronidazole 2. Ciprofloxacin with metronidazole 3. Aminoglycoside with clindamycin or metronidazole;
Liver	As above but add a first-generation cephalosporin	Use metronidazole if amoebic liver abscess is suspected
Spleen	Aminoglycoside plus penicillinase-resistant penicillin	Alternatives for penicillinase-resistant penicillin are first-generation cephalosporins or vancomycin
Appendicitis		
Normal or inflamed	Antianaerobic cephalosporins[a] (discontinued immediately postoperation)	1. Ampicillin-sulbactam
Gangrenous or perforated	Imipenem-cilastatin, meropenem, ertapenem, antianaerobic cephalosporins, or extended-spectrum penicillins with β-lactamase inhibitor	1. Aztreonam with clindamycin or metronidazole 2. Ciprofloxacin with metronidazole 3. Aminoglycoside with clindamycin or metronidazole
Acute cholecystitis **Cholangitis**	First-generation cephalosporin Aminoglycoside with ampicillin with or without clindamycin or metronidazole	Aminoglycoside plus ampicillin if severe infection Use vancomycin instead of ampicillin if patient is allergic to penicillin
Acute contamination from abdominal trauma	Antianaerobic cephalosporins[a] or ampicillin-sulbactam	1. A carbapenem 2. Ciprofloxacin plus metronidazole
Pelvic inflammatory disease	Cefotetan or cefoxitin with doxycycline	1. Clindamycin with gentamicin 2. Ciprofloxacin with doxycycline and metronidazole

Parasitic Infection

TABLE 124-1 Clinical Presentation of Giardiasis

Acute onset

Diarrhea, cramp-like abdominal pain, bloating, and flatulence[10–12]

Malaise, anorexia, nausea, and belching[12]

Chronic

Diarrhea: foul-smelling, copious, light-colored, fatty stools; weight loss

Periods of diarrhea alternating with constipation

Steatorrhea, lactose intolerance, vitamin B_{12}, and fat-soluble vitamin deficiencies[10–14]

TABLE 124-2 Most Common Manifestations of Amebiasis

Intestinal disease

Vague abdominal discomfort, malaise to severe abdominal cramps, flatulence, bloody diarrhea (heme-positive in 100% of cases) with mucus[19–21]

Eosinophilia is usually absent, although moderate leukocytosis is not unusual[20,21]

Amebic liver abscess

High fever, rigors and profuse sweating, significant leukocytosis with left shift, elevated alkaline phosphatase, and liver tenderness on palpation[21,22,24]

Right-upper-quadrant pain, hepatomegaly, and liver tenderness, with referred pain to the left or right shoulder

Erosion of liver abscesses may also present as peritonitis[19–21]

TABLE 124-4 Clinical Presentation of Malaria

Initial presentation

Nonspecific fever, chills, rigors, diaphoresis, malaise, vomiting[48,49,52]

Orthostatic hypotension

Electrolyte abnormalities

Erythrocytic phase

Prodrome: headache, anorexia, malaise, fatigue, myalgia

Nonspecific complaints such as abdominal pain, diarrhea, chest pain, and arthralgia

Paroxysm: high fever, chills, and rigor[9,49,52,59]

Cold phase: severe pallor and cyanosis of the lips[9,49,52]

Hot phase: fever between 40.5°C (104.9°F) and 41°C (105.8°F)

Sweating phase:

- Follows hot phase by 2–6 hours
- Fever resolves
- Marked fatigue and drowsiness, warm, dry skin, tachycardia, cough, severe headache, nausea, vomiting, abdominal pain, diarrhea, and delirium
- Lactic acidosis and hypoglycemia (with falciparum malaria)[48,49,52,59]

Anemia

Splenomegaly

***P falciparum* infections**

Hypoglycemia, acute renal failure, pulmonary edema, severe anemia, thrombocytopenia, high-output heart failure, cerebral congestion, seizures and coma, and adult respiratory syndrome[49,52,59]

Parasitic Infection

Drug	Indications	Side Effects	Comments	References
Albendazole 200 mg tablet (Albenza)	Giardiasis, Ascariasis, Neurocysticercosis	GI: abdominal pain, nausea, diarrhea, increase in liver function enzymes	Not recommended in children <2 years old	9, 16, 42, 45, 46
Artemether 20 mg/Lumefantrine 120 mg tablet (Coartem	Acute uncomplicated Falciparum malaria	Headache, dizziness, asthenia, fatigue, and arthralgia	Approved for patients >5 kg body weight	52, 75
Artesunate[a]	Severe *falciparum* malaria	Rash, dizziness, and pruritus	Obtained by IND from CDC (when IV Quinidine is not readily available)	16, 58
Atovaquone 250 mg *plus* proguanil 100 mg (Malarone)[b]	Prevention and treatment of *Plasmodium falciparum* malaria	Abdominal pain, nausea, vomiting, and headache		9, 16, 48, 49, 52, 61, 62, 75
Chloroquine phosphate (Aralen, Nivaquine) 250- and 500-mg tablets; 50 mg/mL (as HCl); 5-mL ampule	Malaria	GI: nausea, vomiting, diarrhea CNS: dizziness, headache, blurring of vision, confusion, fatigue Derm: pruritus	Administer oral dose after meals IV route: recommend ECG monitoring *Contraindication*: patients with psoriasis or porphyria	9, 16, 48, 49, 52, 61, 62, 75
Diloxanide furoateb (Furamide) 500-mg tablet[c]	Amebiasis	GI: nausea, flatulence Derm: pruritus		9, 16, 19, 20, 21, 23, 75
Furazolidone (Furoxone) 100-mg tablet Suspension: 50 mg/5 mL	Giardiasis Alternative to metronidazole	GI: nausea, vomiting Hypersensitivity: hypotension, fever, arthralgia, urticaria Other: headache	Disulfiram-like reaction with alcohol; avoid in G6PD deficiency; may cause hemolysis; changes color of urine to brown	9,16
Iodoquinol (Yodoxin) 210-mg tablet	Amebiasis	GI: abdominal pain, diarrhea Derm: rash	May interfere with thyroid function test *Contraindication*: patients with iodine intolerance	9, 16, 19–23, 75

Parasitic Infection

			serum levels of theophylline	
Mefloquine (Lariam) 250-mg tablet	*P falciparum* malaria	Incidence 17% GI: nausea, vomiting, abdominal pain, diarrhea Card: sinus bradycardia CNS: vertigo, dizziness, confusion, hallucinations, psychosis, convulsions Derm: itching, skin rash	Patients given doses in excess of 12 mg/kg should be monitored carefully because the side effects are dose related	9, 16, 48–50, 52, 55, 61, 62, 75
Metronidazole (Flagyl) Oral: 250-mg, 500-mg tablets	Amebiasis Giardiasis	GI: nausea, anorexia, vomiting, diarrhea, abdominal cramping, glossitis, metallic taste CNS: dizziness, vertigo, headache, paresthesia	Avoid alcohol; alcohol ingestion will cause the disulfiram reaction: abdominal distress, vomiting, hypotension *Contraindication*: First trimester of pregnancy	9, 11–13, 16,19–21
Primaquine phosphate 26.3-mg tablet	Malaria *(P vivax) (P ovale)*	GI: nausea, abdominal pain CNS: mental depression	In G6PD deficiency can cause hemolysis	9, 16, 48, 49, 52, 55, 62

(continued)

Parasitic Infection

Drug	Indications	Side Effects	Comments	References
Pyrimethamine 25 mg *plus* sulfadoxine 500 mg (Fansidar)	*P falciparum*-resistant malaria	GI: nausea, abdominal pain, stomatitis, headache, and glossitis Hemat: agranulocytosis, aplastic anemia, leukopenia, megaloblastic anemia, hemolytic anemia, hemolysis in patients with G6PD deficiency	Combination was recently reported to cause the Stevens-Johnson syndrome; patients should be advised to call their physician/ pharmacist if a skin rash or other reaction is seen	9, 16, 48, 49, 75
Quinacrine 100 mg[c]	Giardiasis	GI: nausea, anorexia, vomiting Headache, toxic psychosis, hepatitis, and aplastic anemia	Avoid in pregnancy, psychosis, and psoriasis	9, 12, 16
Quinidine gluconate 500 mg base/mL; 10 mL	Acute malaria	GI: nausea, vomiting, diarrhea Card: hypotension, widening of QRS and QT on ECG, heart block	Administration of IV quinidine requires close monitoring; should normally monitor ECG and all vital signs	9, 16, 48, 49, 52
Quinine sulfate 325-mg and 650-mg tablets	Acute malaria	Cinchonism: flushing, dizziness, nausea, vomiting, diarrhea (levels over 10 mcg/mL) Card: hypotension, widening of QRS complex Hemat: hemolysis, leukopenia, thrombocytopenia	When drug is administered IV, it should be administered by slow infusion (600 mg over 8 hours); close monitoring of vitals and ECG *Avoid use*: IM administration	9, 16, 48, 49, 52, 55

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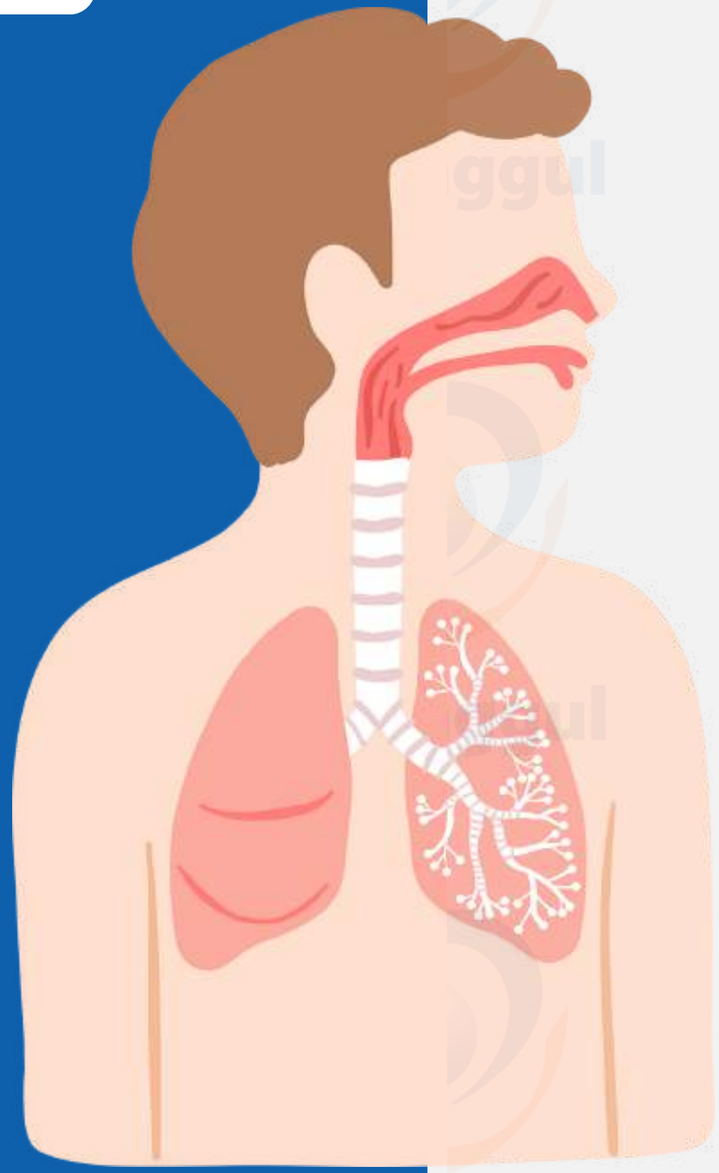

PSF402

Urinary Tract Infections (UTI)

Sesi Ke 9

Topik Sesuai RPS:
Prinsip pemilihan antibiotik untuk UTI

Dosen Pengampu:

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Topik Sebelum UAS

Sesi 9

PBL 1 lanjutan

Sesi 9

Infeksi Saluran Semih

Sesi 10

Infeksi HIV/AIDS

Sesi 11

Modalitas Terapi Kanker

Sesi 12

Farmakoterapi Kanker Payudara

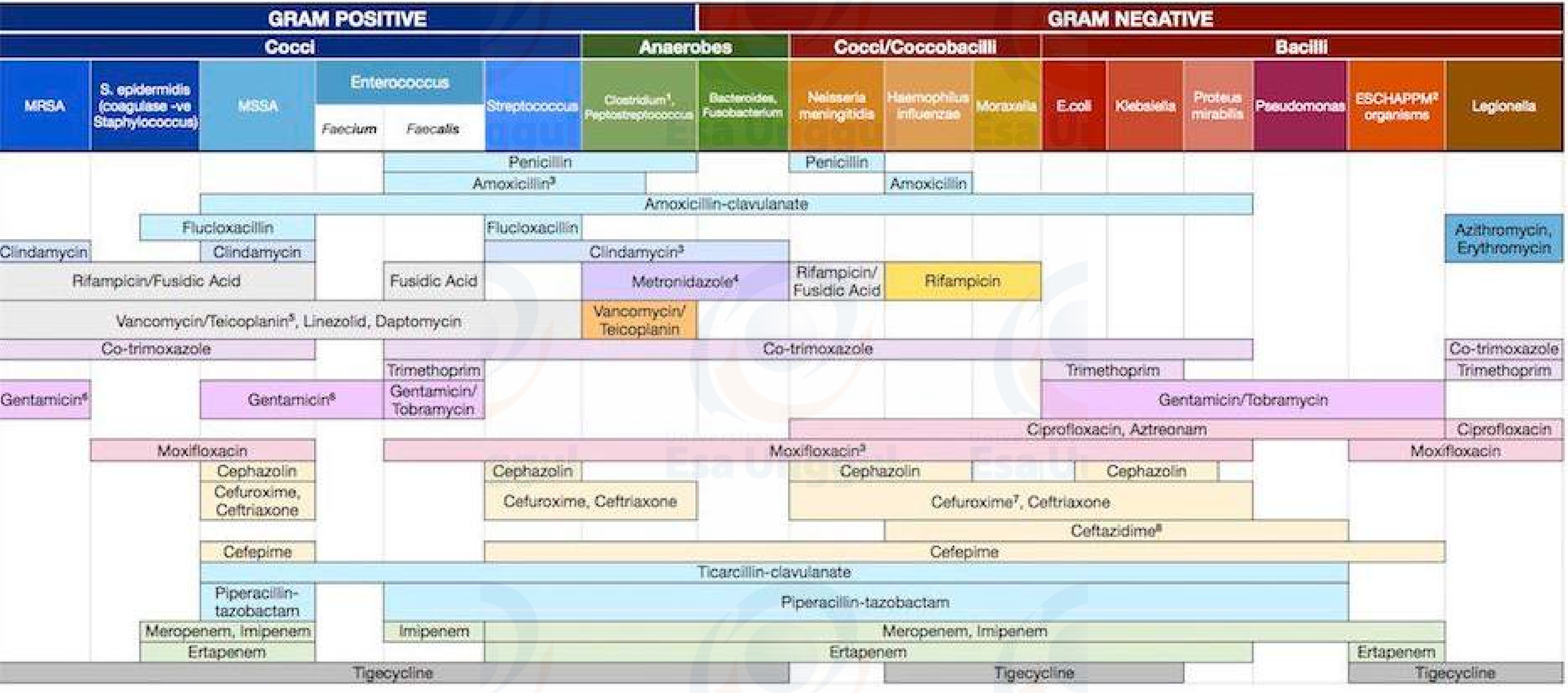
Sesi 6

Farmakoterapi Kanker Paru

Sesi 7

PBL 2

Ujian Tengah Semester


GRAM POSITIVE
GRAM NEGATIVE
Cocci
Anaerobes
Cocci/Coccobacilli
Bacilli
MRSA
S. epidermidis (coagulase -ve Staphylococcus)
MSSA
Enterococcus
Faecium
Faecalis
Streptococcus
Clostridium[1], Peptostreptococcus
Bacteroides, Fusobacterium
Neisseria meningitidis
Haemophilus influenzae
Moraxella
E.coli
Klebsiella
Proteus mirabilis
Pseudomonas
ESCHAPPM[2] organisms
Legionella
Penicillin
Penicillin
Amoxicillin[3]
Amoxicillin
Amoxicillin-clavulanate
Flucloxacillin
Flucloxacillin
Azithromycin, Erythromycin
Clindamycin
Clindamycin
Clindamycin[3]
Rifampicin/Fusidic Acid
Fusidic Acid
Metronidazole[4]
Rifampicin/ Fusidic Acid
Rifampicin
Vancomycin/Teicoplanin[5], Linezolid, Daptomycin
Vancomycin/ Teicoplanin
Co-trimoxazole
Co-trimoxazole
Co-trimoxazole
Trimethoprim
Trimethoprim
Trimethoprim
Gentamicin[6]
Gentamicin[6]
Gentamicin/ Tobramycin
Gentamicin/Tobramycin
Ciprofloxacin, Aztreonam
Ciprofloxacin
Moxifloxacin
Moxifloxacin[3]
Moxifloxacin
Cephazolin
Cephazolin
Cephazolin
Cephazolin
Cefuroxime, Ceftriaxone
Cefuroxime, Ceftriaxone
Cefuroxime[7], Ceftriaxone
Ceftazidime[8]
Cefepime
Cefepime
Ticarcillin-clavulanate
Piperacillin-tazobactam
Piperacillin-tazobactam
Meropenem, Imipenem
Imipenem
Meropenem, Imipenem
Ertapenem
Ertapenem
Ertapenem
Tigecycline
Tigecycline
Tigecycline

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Different classes of antibiotics

B-Lactams

Inhibit bacteria cell wall biosynthesis

Examples
Amoxicillin
Flucloxacillin
Cefalexin

Aminoglycosides

Inhibit the synthesis of proteins by bacteria

Examples
Streptomycin
Neomycin
Kanamycin
Paromomycin

Glycopeptides

Inhibit bacteria cell wall biosynthesis

Examples
Vancomycin
Teicoplanin

Ansamycins

Inhibit the synthesis of RNA by bacteria

Examples
Geldanamycin
Rifamycin
Naphthomycin

Quinolones

Interfere with bacteria DNA replication and transcription

Examples
Ciprofloxacin
Levofloxacin
Trovafloxacin

Streptogramins

Inhibit the synthesis of proteins by bacteria

Examples
Pristinamycin IIA
Pristinamycin IA

Lipopeptides

Disrupt multiple cell membrane functions

Examples
Daptomycin
Surfactin

Sulfonamides

Prevent bacteria growth and multiplication

Examples
Prontosil
Sulfanilamide
Sulfadiazine
Sulfisoxazole

Chloramphenicol

Inhibits synthesis of proteins

No longer a first line drug in any developed country

Tetracyclines

Inhibits synthesis of proteins by bacteria

Examples
Tetracycline
Doxycycline
Lymecycline
Oxytetracycline

Macrolides

Inhibits protein synthesis by bacteria

Examples
Erythromycin
Clarithromycin
Azithromycin

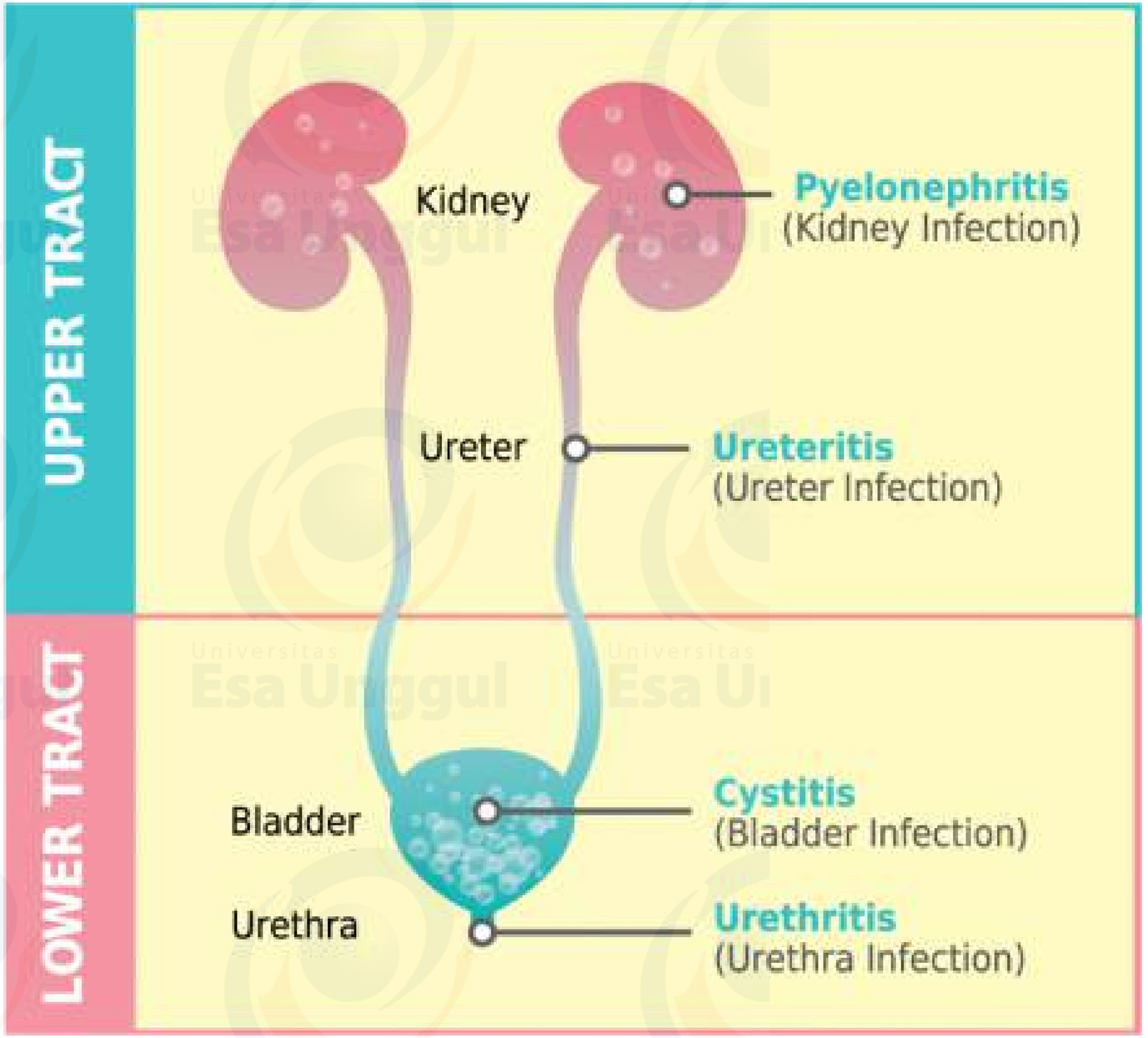
Oxazolidinones

Inhibits synthesis of proteins by bacteria

Examples
Linezolid
Posizolid
Tedizolid
Cycloserine

Commonly act as bactericidal agents, causing bacterial cell death

Commonly act as bacteriostatic agents, restrict growth & multiplication

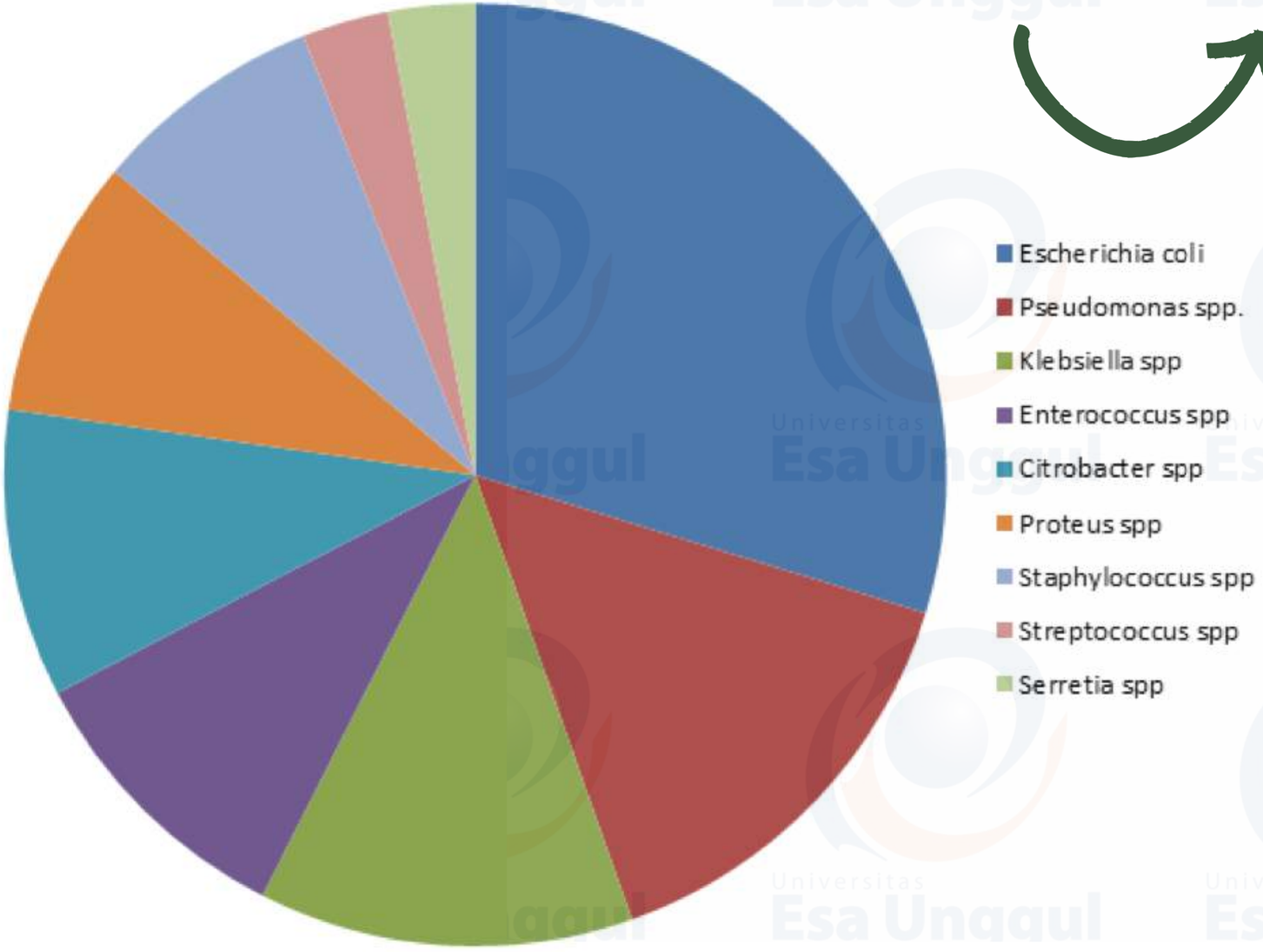


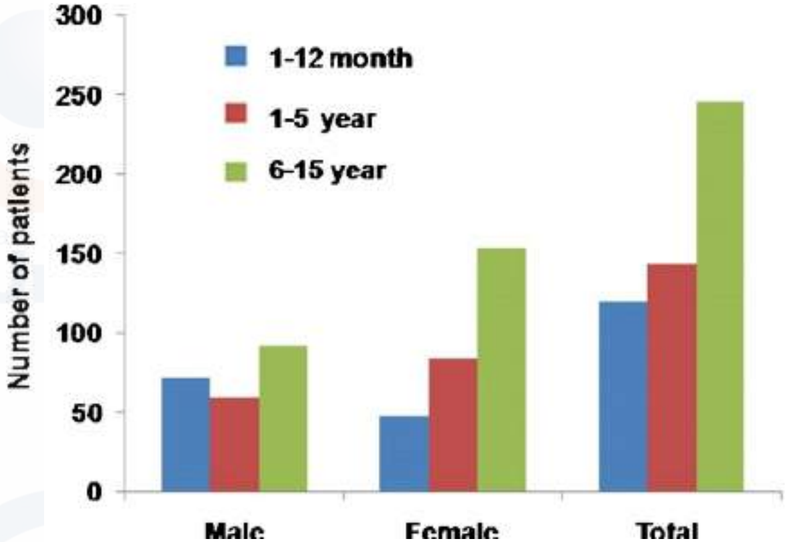
Urinary Tract Infection

UTI FACTs

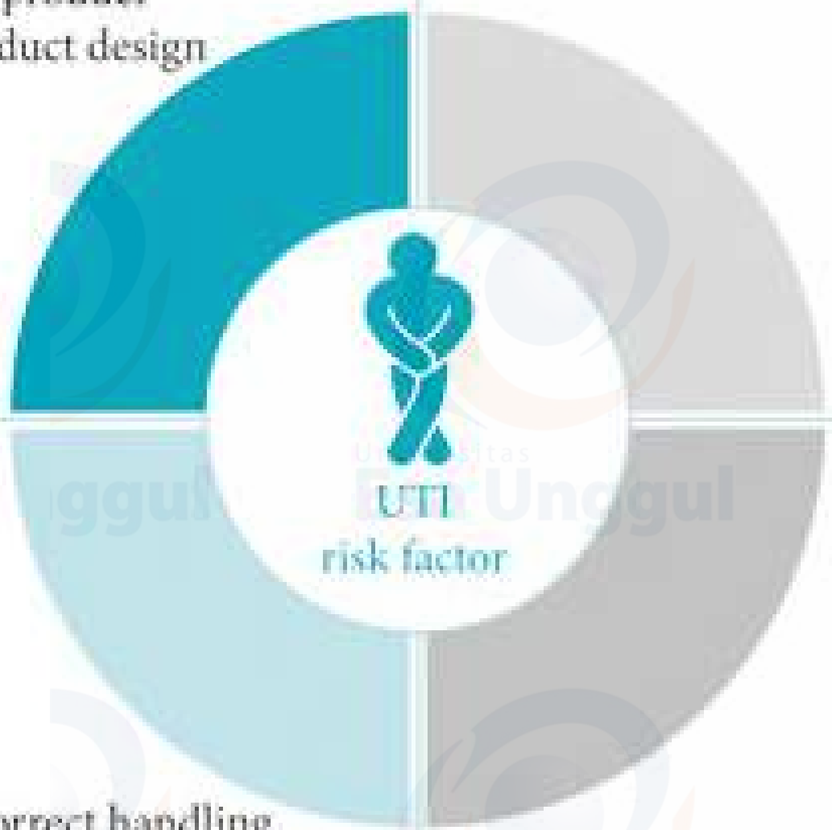
TABLE 1 Prevalence of UTI according to age and gender

Age groups	Male (n=56, %)	Female (n=144, %)	Total (n=200, %)
15-25	5(08.9)	15(10.4)	20(10.0)
26-36	8(14.3)	30 (26.4)	54(27.0)
37-47	6(10.7)	25(17.4)	31(15.5)
48-58	15(26.8)	20(13.9)	35(17.5)
59-70	22(39.3)	46(31.9)	60(30.0)





UTI risk factors model



Intermittent catheterisation

Bacteria inserted by product and no urethral rinsing
Urethral and bladder trauma from product
Post void residual urine due to product design

General conditions

High intravesical pressure/impaired bladder compliance
Host deficiencies
Bowel dysfunction
Diabetes
Age and gender

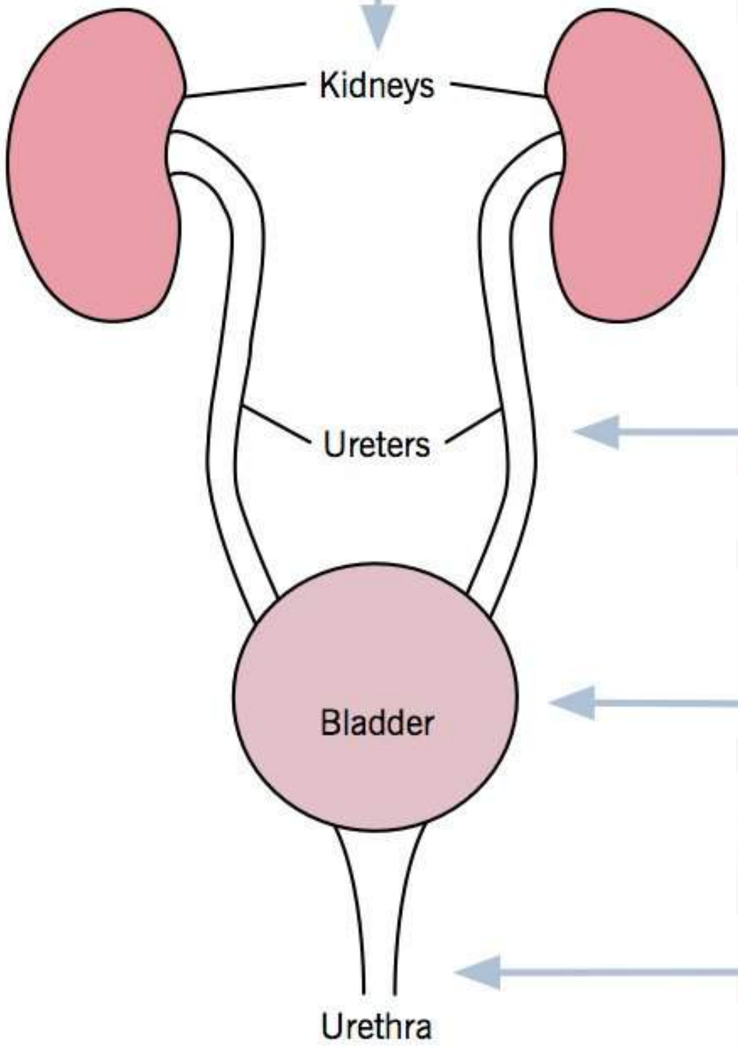
User compliance/adherence

Voiding frequency
Fluid intake
Non-hygienic procedure
Insufficient education
Post void residual urine due to incorrect handling
Residence country and social support system

Local urinary tract conditions

Bacterial virulence
Previous UTI
Botulinum toxin A injections
Urodynamic investigations
Bladder and kidney stones
Post void residual urine caused by bladder shape

Pathogenesis of urinary tract infection



Acute kidney injury

- If the inflammatory cascade continues, tubular obstruction and damage occur, leading to interstitial edema.
- This may lead to interstitial nephritis, causing acute kidney injury (AKI).

Pyelonephritis

- Infection of the renal parenchyma causes an inflammatory response called pyelonephritis
- While infection of the renal parenchyma is usually the result of bacterial ascension, it can also occur from hematogenous spread.

Ascension

- Once sufficient bacterial colonization occurs, bacteria may ascend on the ureter towards the kidney.
- Fimbria may aid in the ascension process
- Bacterial toxins may also play a role by inhibiting peristalsis (reducing the flow of urine)

Uroepithelium penetration

- Fimbria allow bladder epithelial cell attachment and penetration
- Following penetration, bacteria continue to replicate and may form biofilms.

Colonization

- Pathogen colonizes the periuretheral area and ascends through the urethra upwards towards the bladder.

Signs and symptoms

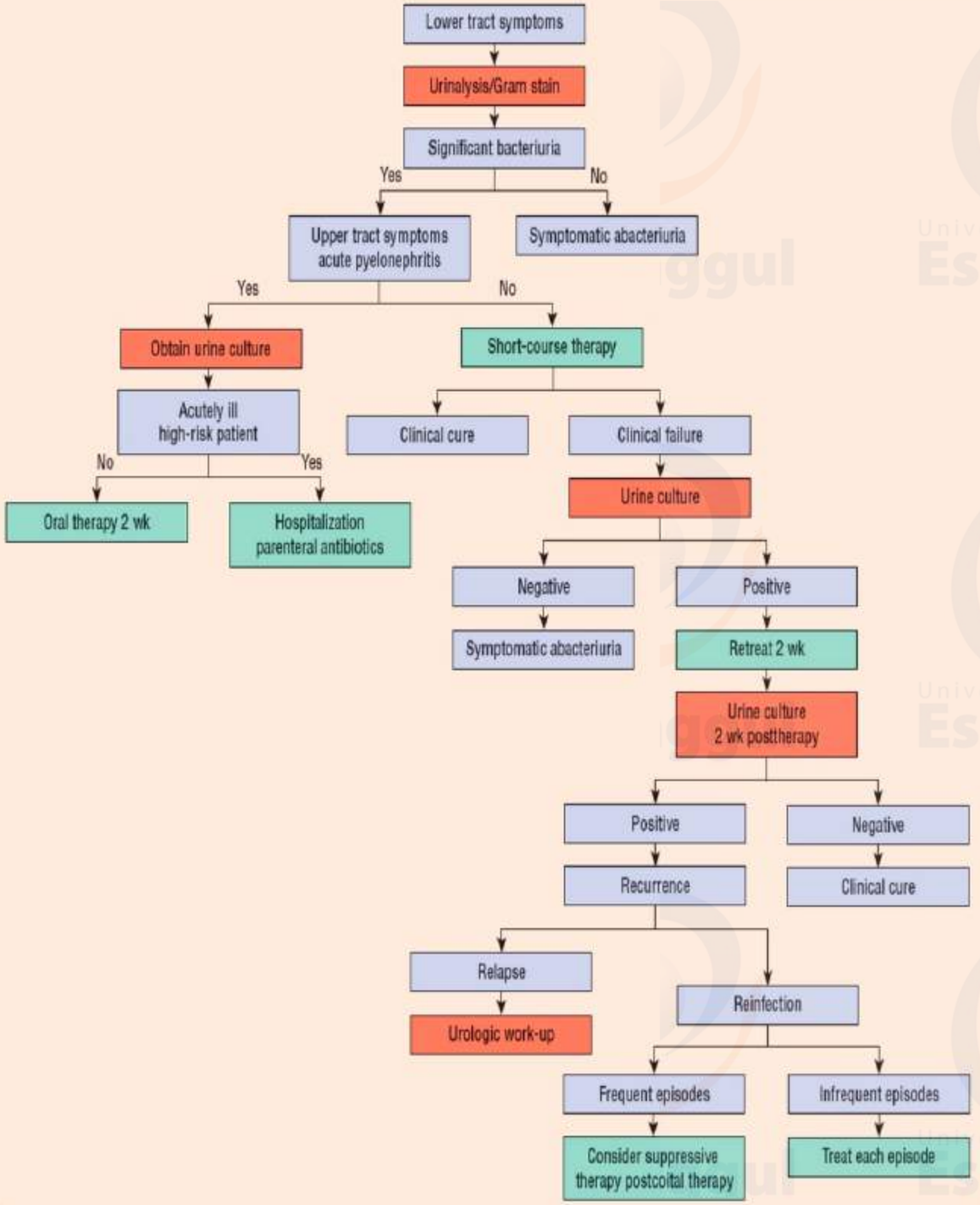
- Lower UTI: dysuria, urgency, frequency, nocturia, and suprapubic heaviness
- Gross hematuria
- Upper UTI: flank pain, fever, nausea, vomiting, and malaise

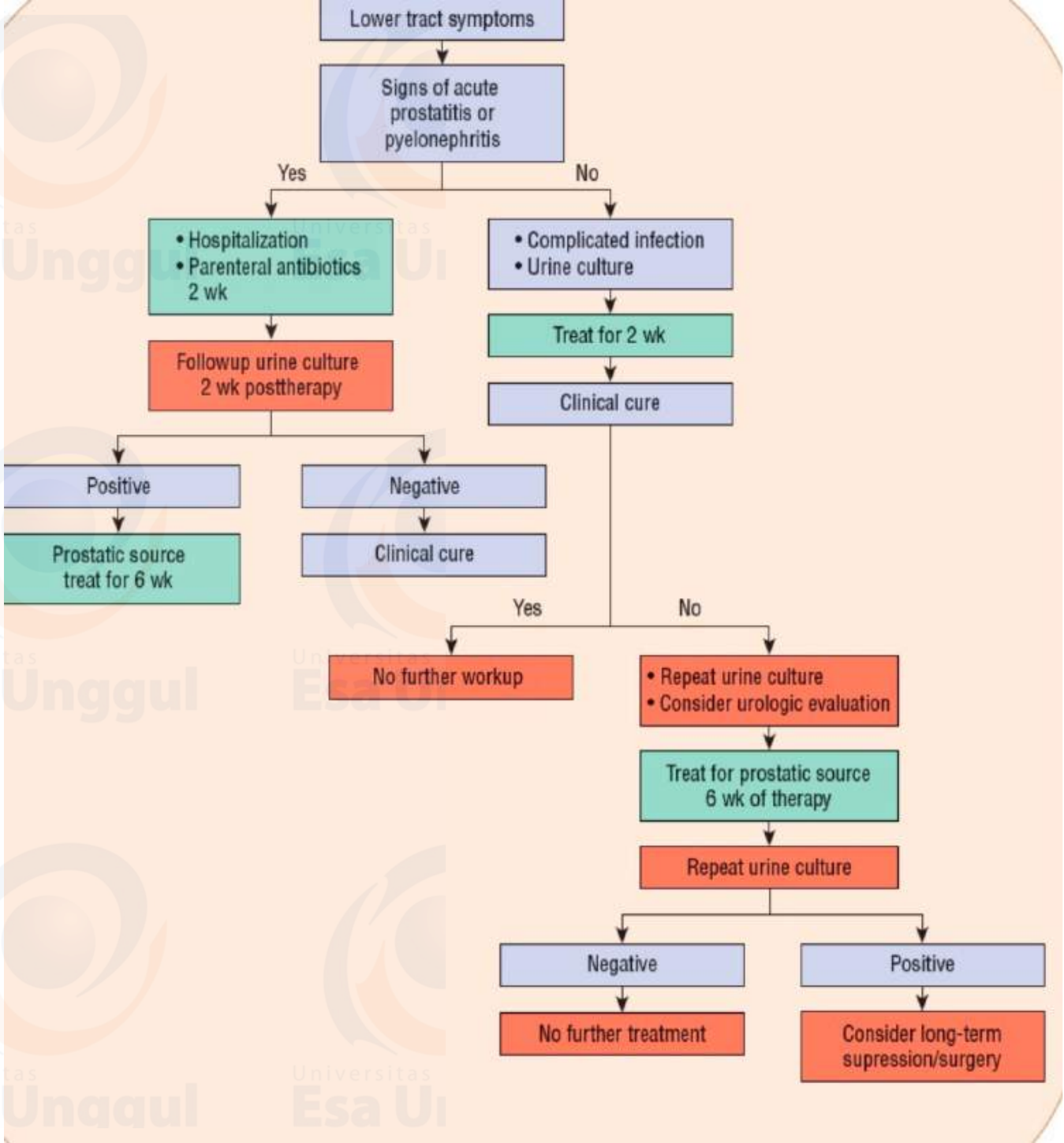
Physical examination

- Upper UTI: costovertebral tenderness

Laboratory tests

- Bacteriuria
- Pyuria (white blood cell count >10/mm^3 [≥10 × 10^6/L])
- Nitrite-positive urine (with nitrite reducers)
- Leukocyte esterase-positive urine
- Antibody-coated bacteria (upper UTI)


Lower tract symptoms
Urinalysis/Gram stain
Significant bacteriuria
Yes
No
Upper tract symptoms acute pyelonephritis
Symptomatic abacteriuria
Yes
No
Obtain urine culture
Short-course therapy
Acutely ill high-risk patient
Clinical cure
Clinical failure
No
Yes
Oral therapy 2 wk
Hospitalization parenteral antibiotics
Urine culture
Negative
Positive
Symptomatic abacteriuria
Retreat 2 wk
Urine culture 2 wk posttherapy
Positive
Negative
Recurrence
Clinical cure
Relapse
Reinfection
Urologic work-up
Frequent episodes
Infrequent episodes
Consider suppressive therapy postcoital therapy
Treat each episode


Lower tract symptoms
Signs of acute prostatitis or pyelonephritis
Yes
No
• Hospitalization
• Parenteral antibiotics 2 wk
• Complicated infection
• Urine culture
Followup urine culture 2 wk posttherapy
Treat for 2 wk
Clinical cure
Positive
Negative
Prostatic source treat for 6 wk
Clinical cure
Yes
No
No further workup
• Repeat urine culture
• Consider urologic evaluation
Treat for prostatic source 6 wk of therapy
Repeat urine culture
Negative
Positive
No further treatment
Consider long-term supression/surgery

General Treatment (antibacterial) for UTI ORAL

Drug	Brand Name	Adverse Drug Reactions	Monitoring Parameters	Comments
Oral Therapy				
Trimethoprim–sulfamethoxazole	Bactrim®, Septra®	Rash, Stevens–Johnson Syndrome, renal failure, photosensitivity, hematologic (neutropenia, anemia, etc.)	Serum creatinine, BUN, electrolytes, signs of rash, and CBC	This combination is highly effective against most aerobic enteric bacteria except *P. aeruginosa*. High urinary tract tissue concentrations and urine concentrations are achieved, which may be important in complicated infection treatment. Also effective as prophylaxis for recurrent infections
Nitrofurantoin	Macrobid®	GI intolerance, neuropathies, and pulmonary reactions	Baseline serum creatinine and BUN	This agent is effective as both a therapeutic and prophylactic agent in patients with recurrent UTIs. Main advantage is the lack of resistance even after long courses of therapy
Fosfomycin	Monurol®	Diarrhea, headache, and angioedema	No routine tests recommended	Single-dose therapy for uncomplicated infections, low levels of resistance, use with caution in patients with hepatic dysfunction
Fluoroquinolones				
Ciprofloxacin	Cipro®	Hypersensitivity, photosensitivity, GI symptoms, dizziness, confusion, and tendonitis (black box warning)	CBC, baseline serum creatinine, and BUN	The fluoroquinolones have a greater spectrum of activity, including *P. aeruginosa*. These agents are effective for pyelonephritis and prostatitis. Avoid in pregnancy and children. Moxifloxacin should not be used owing to inadequate urinary concentrations
Levofloxacin	Levaquin®			
Penicillins				
Amoxicillin–clavulanate	Augmentin®	Hypersensitivity (rash, anaphylaxis), diarrhea, superinfections, and seizures	CBC, signs of rash, or hypersensitivity	Due to increasing *E. coli* resistance, amoxicillin–clavulanate is the preferred penicillin for uncomplicated cystitis
Cephalosporins				
Cefdnir	Omnicef®	Hypersensitivity (rash, anaphylaxis), diarrhea, superinfections, and seizures	CBC, signs of rash, or hypersensitivity	There are no major advantages of these agents over other agents in the treatment of UTIs, and they are more expensive. These agents are not active against enterococci
Cefpodoxime-proxetil	Vantin®			

General Treatment (antibacterial) for UTI PARENTERAL

Parenteral Therapy				
Aminoglycosides				
Gentamicin	Garamycin®	Ototoxicity, nephrotoxicity	Serum creatinine and BUN, serum drug concentrations, and individual pharmacokinetic monitoring	These agents are renally excreted and achieve good concentrations in the urine. Amikacin generally is reserved for multidrug-resistant bacteria
Tobramycin	Nebcin®			
Amikacin	Amikin®			
Penicillins				
Ampicillin–sulbactam	Unasyn®	Hypersensitivity (rash, anaphylaxis), diarrhea, superinfections, and seizures	CBC, signs of rash, or hypersensitivity	These agents generally are equally effective for susceptible bacteria. The extended-spectrum penicillins are more active against *P. aeruginosa* and enterococci and often are preferred over cephalosporins. They are very useful in renally impaired patients or when an aminoglycoside is to be avoided
Piperacillin–tazobactam	Zosyn®			
Cephalosporins				
Ceftriaxone	Rocephin®	Hypersensitivity (rash, anaphylaxis), diarrhea, superinfections, and seizures	CBC, signs of rash, or hypersensitivity	Second- and third-generation cephalosporins have a broad spectrum of activity against gram-negative bacteria, but are not active against enterococci and have limited activity against *P. aeruginosa*. Ceftazidime and cefepime are active against *P. aeruginosa*. They are useful for nosocomial infections and urosepsis due to susceptible pathogens
Ceftazidime	Fortaz®			
Cefepime	Maxipime®			
Carbapenems/Monobactams				
Imipenem–cilistatin	Primaxin®	Hypersensitivity (rash, anaphylaxis), diarrhea, superinfections, and seizures	CBC, signs of rash, or hypersensitivity	Carbapenems have a broad spectrum of activity, including gram-positive, gram-negative, and anaerobic bacteria. Imipenem, meropenem, and doripenem are active against *P. aeruginosa* and enterococci, but ertapenem is not. Aztreonam is a monobactam that is only active against gram-negative bacteria, including some strains of *P. aeruginosa*. Generally useful for nosocomial infections when aminoglycosides are to be avoided and in penicillin-sensitive patients
Meropenem	Merrem®			
Doripenem	Doribax®			
Ertapenem	Invanz®			
Aztreonam	Azactam®			
Fluoroquinolones				
Ciprofloxacin	Cipro®	Hypersensitivity, photosensitivity, GI symptoms, dizziness, confusion, and tendonitis (black box warning)	CBC, baseline serum creatinine, and BUN	These agents have broad-spectrum activity against both gram-negative and gram-positive bacteria. They provide urine and high-tissue concentrations and are actively secreted in reduced renal function
Levofloxacin	Levaquin®			

Commonly Used Oral Antimicrobial Agents for Acute Urinary Tract Infections[1,2,4,27,48,49,96]

Drug	Usual Dose		Pregnancy[a]	Breast Milk[a]	Comments[b]
	Adult	Pediatric			
Amoxicillin	250 mg every 8 hours or 3 g single dose	20–40 mg/kg/d in three doses	Crosses placenta (cord) = 30% (maternal)[c]	Small amount present	High resistance rates, not for empiric use.
Amoxicillin + potassium clavulanate	500 + 125 mg every 12 hours	20 mg/kg/d (amoxicillin content) in three doses	Unknown	Unknown	
Ampicillin	250–500 mg every 6 hours	50–100 mg/kg/d in four doses	Crosses placenta	Variable amount (milk) = 1%–30% (serum)[c]	High resistance rates, not for empiric use. Should be taken on an empty stomach.
Cefadroxil	0.5–1 g every 12 hours	15–30 mg/kg/d in four doses	Crosses placenta	Enters breast milk (milk) = 20% (serum)[c]	Alternate choices for patients allergic to penicillins, although cross-hypersensitivity can occur. May be associated with high failure rates.
Cephalexin	250–500 mg every 6 hours	15–30 mg/kg/d in four doses	Crosses placenta		
Cephradine	250–500 mg every 6 hours	15–30 mg/kg/d in four doses	Crosses placenta (cord) = 10% (maternal)[c]		
Norfloxacin[d]	400 mg every 12 hours	Avoid	Arthropathy in immature animals	Unknown	Useful for pseudomonal infection. *Avoid antacids, divalent and trivalent cations, and sucralfate. May cause dizziness.*[e]
Ciprofloxacin[d]	250–500 mg every 12 hours	Avoid	Arthropathy in immature animals	Unknown	Alternate choices for patients allergic to β-lactams
Levofloxacin	250 mg every 24 hours	Avoid	Arthropathy in immature animals	(milk) = 100% (serum)[c]	

Nitrofurantoin	100 mg every 12 hours	5–7 mg/kg/d in two to four doses	Hemolytic anemia in newborn	Variable amounts; not detectable to 30%; may cause hemolysis in G6PD-deficient baby	Alternate choice. *To be taken with food or milk. May cause brown or rust-yellow discoloration of urine.*
Sulfisoxazole	0.5–1 g every 6 hours	50–100 mg/kg/d in four doses	Crosses placenta; hemolysis in newborn with G6PD deficiency; displacement of bilirubin may lead to hyperbilirubinemia and kernicterus; teratogenic in some animal studies	Enters breast milk; displacement of bilirubin may lead to neonatal jaundice; may cause hemolysis in G6PD-deficient baby	Alters bowel flora to favor resistant organisms. *To be taken on an empty stomach with a full glass of water. Photosensitivity may occur.*
Sulfamethoxazole (SMX)	1 g every 12 hours	60 mg/kg/d in two doses			
Trimethoprim (TMP)	100 mg every 12 hours		Crosses placenta (cord) = 60%; (maternal) folate antagonism; teratogenic in rats	(milk) >1 (serum)[c]	Alternate choice.
TMP-SMX	160 + 800 mg every 12 hours or 0.48 + 2.4 g single dose	10 mg/kg/d (TMP component in two doses)	Crosses placenta (cord) = 60%; (maternal) folate antagonism; teratogenic in rats	(milk) >1 (serum)[c]	*To be taken on an empty stomach with a full glass of water. Photosensitivity may occur.* Monitor HIV-infected patients closely for development of adverse hematologic reactions. First-line agent for prostatitis.
Fosfomycin	3 g single dose	No data	Crosses placenta	Unknown	Recommended option for uncomplicated cystitis.

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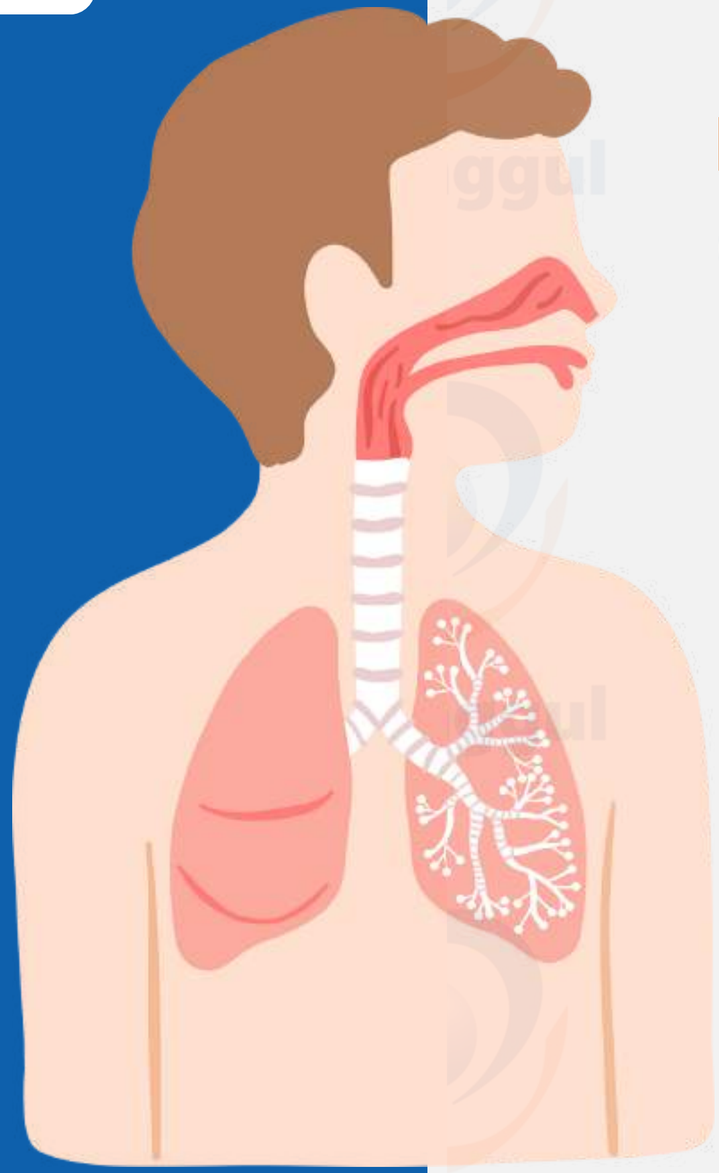

PSF402

Cancer Modality

Sesi Ke 10

Topik Sesuai RPS:
Memahami modalitas terapi

Dosen Pengampu:

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Topik Sebelum UAS

Sesi 9

PBL 1 lanjutan

Sesi 9

Infeksi Saluran Semih

Sesi 10

Infeksi HIV/AIDS

Sesi 11

Modalitas Terapi Kanker

Sesi 12

Farmakoterapi Kanker Payudara

Sesi 6

Farmakoterapi Kanker Paru

Sesi 7

PBL 2

Ujian Tengah Semester

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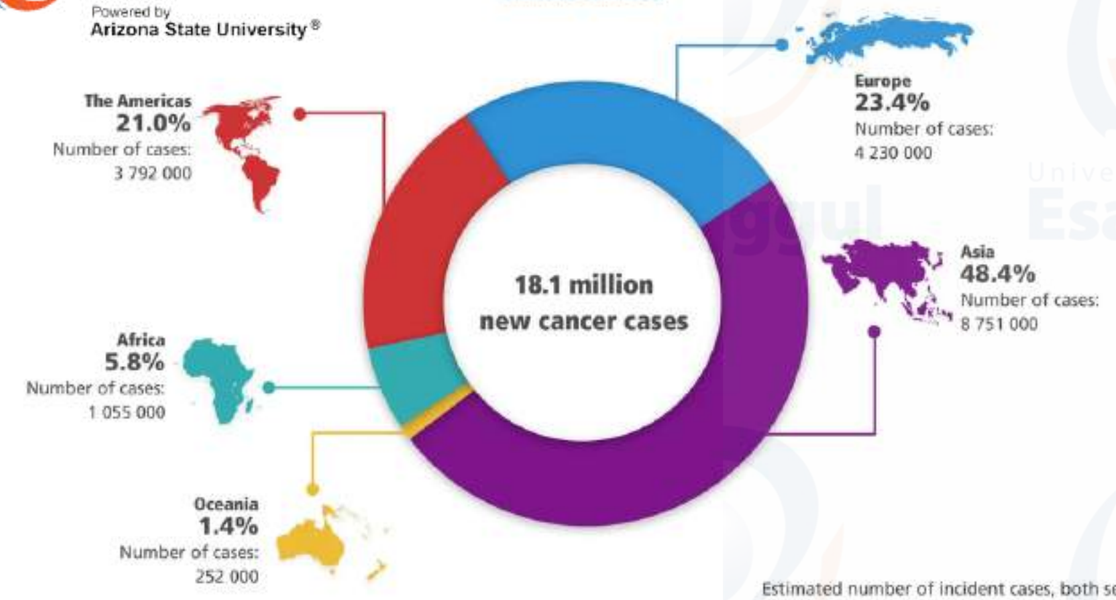
Global cancer incidence



Estimated number of incident cases, both sexes, all cancers including non-melanoma skin cancer, for all ages, worldwide

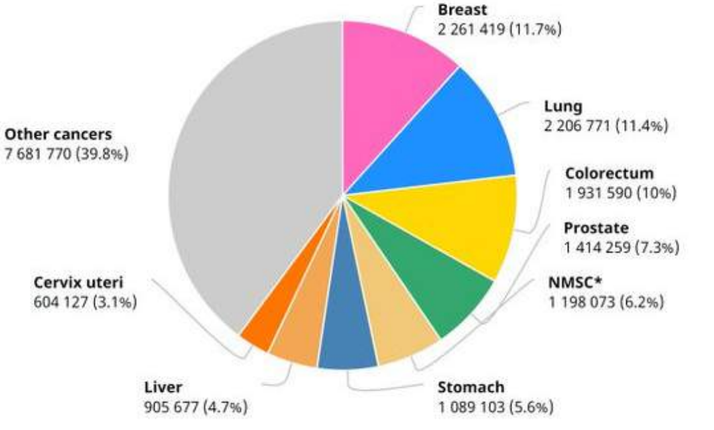
Estimated New Cases

Males			Females		
Prostate	191,930	21%	Breast	276,480	30%
Lung & bronchus	116,300	13%	Lung & bronchus	112,520	12%
Colon & rectum	78,300	9%	Colon & rectum	69,650	8%
Urinary bladder	62,100	7%	Uterine corpus	65,620	7%
Melanoma of the skin	60,190	7%	Thyroid	40,170	4%
Kidney & renal pelvis	45,520	5%	Melanoma of the skin	40,160	4%
Non-Hodgkin lymphoma	42,380	5%	Non-Hodgkin lymphoma	34,860	4%
Oral cavity & pharynx	38,380	4%	Kidney & renal pelvis	28,230	3%
Leukemia	35,470	4%	Pancreas	27,200	3%
Pancreas	30,400	3%	Leukemia	25,060	3%
All Sites	**893,660**	**100%**	**All Sites**	**912,930**	**100%**

Estimated Deaths

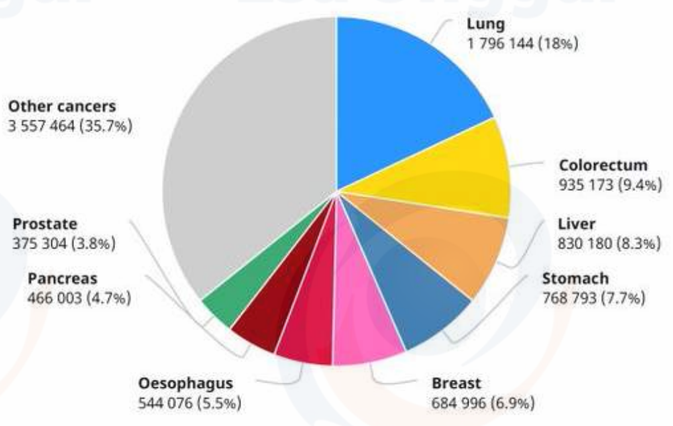
Males			Females		
Lung & bronchus	72,500	23%	Lung & bronchus	63,220	22%
Prostate	33,330	10%	Breast	42,170	15%
Colon & rectum	28,630	9%	Colon & rectum	24,570	9%
Pancreas	24,640	8%	Pancreas	22,410	8%
Liver & intrahepatic bile duct	20,020	6%	Ovary	13,940	5%
Leukemia	13,420	4%	Uterine corpus	12,590	4%
Esophagus	13,100	4%	Liver & intrahepatic bile duct	10,140	4%
Urinary bladder	13,050	4%	Leukemia	9,680	3%
Non-Hodgkin lymphoma	11,460	4%	Non-Hodgkin lymphoma	8,480	3%
Brain & other nervous system	10,190	3%	Brain & other nervous system	7,830	3%
All Sites	**321,160**	**100%**	**All Sites**	**285,360**	**100%**

Number of new cases in 2020, both sexes, all ages



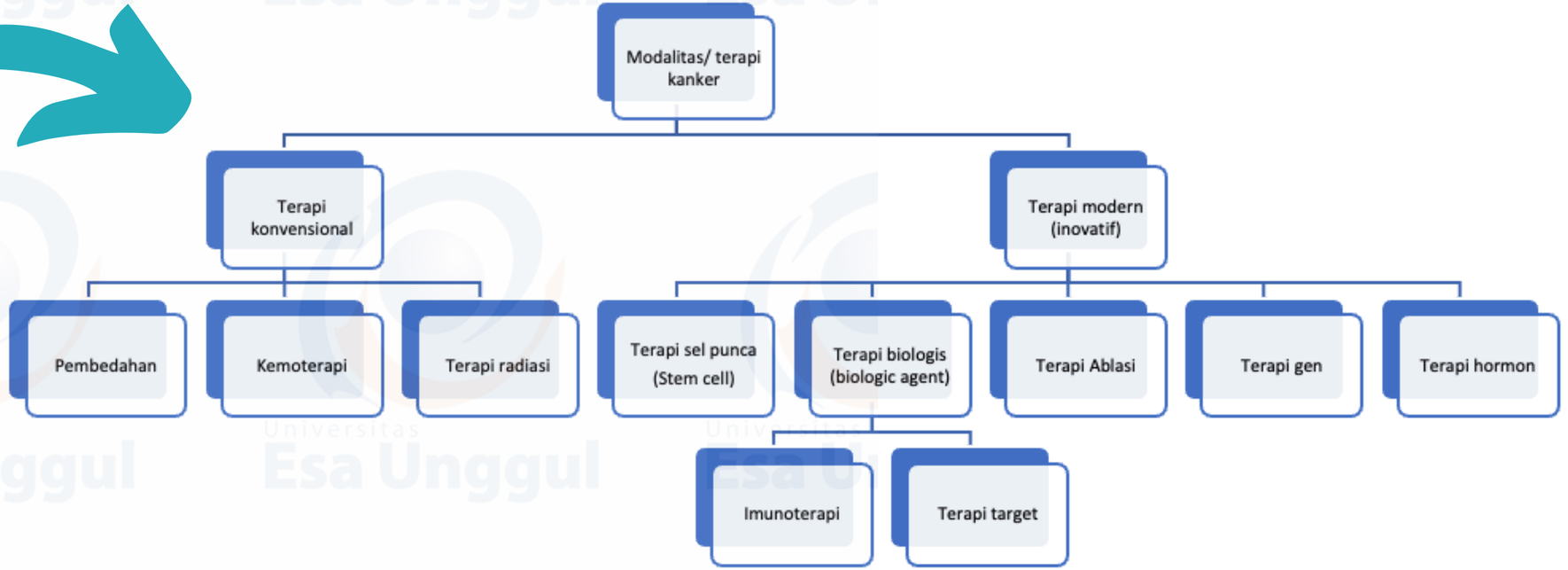
Total: 19 292 789 cases

Number of deaths in 2020, both sexes, all ages



Total: 9 958 133 deaths

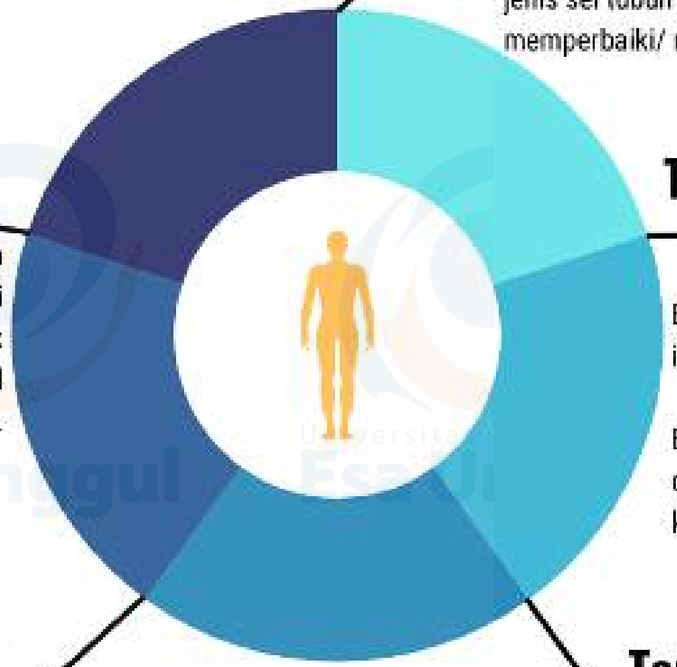
Modalitas Terapi Kanker



Conventional;

- Terapi Pembedahan: Pembedahan dilakukan untuk mengambil dan membuang jaringan tumor dari dalam tubuh
- Terapi Kemoterapi: Kemoterapi adalah jenis pengobatan kanker yang menggunakan obat-obatan dengan tujuan menghambat pertumbuhan/ membunuh sel kanker.
- Terapi Radiasi: Terapi radiasi (juga disebut radioterapi) adalah pengobatan kanker yang menggunakan dosis tinggi radiasi (sinar x-ray) untuk membunuh sel kanker dan mengecilkan tumor.
- Kombinasi

Modern Approach



Terapi Sel Punca

Sel punca adalah sel yang belum differensiasi yang memiliki kemampuan untuk berdiferensiasi menjadi jenis sel tubuh apa pun. Digunakan untuk memperbaiki/ menggantikan sel yang rusak (kanker)

Terapi Agen Biologi

- Imunoterapi

Bekerja dengan meningkatkan sistem imun untuk melawan sel kanker

- Terapi Target

Bekerja secara spesifik disesuaikan dengan mutasi genetik dari sel kanker

Terapi Ablasi

Terapi ini bertujuan untuk menghancurkan tumor tanpa harus mengangkatnya, terutama dianjurkan untuk tumor berukuran kecil kurang dari 3 cm dan ketika pilihan bedah tidak dianjurkan.

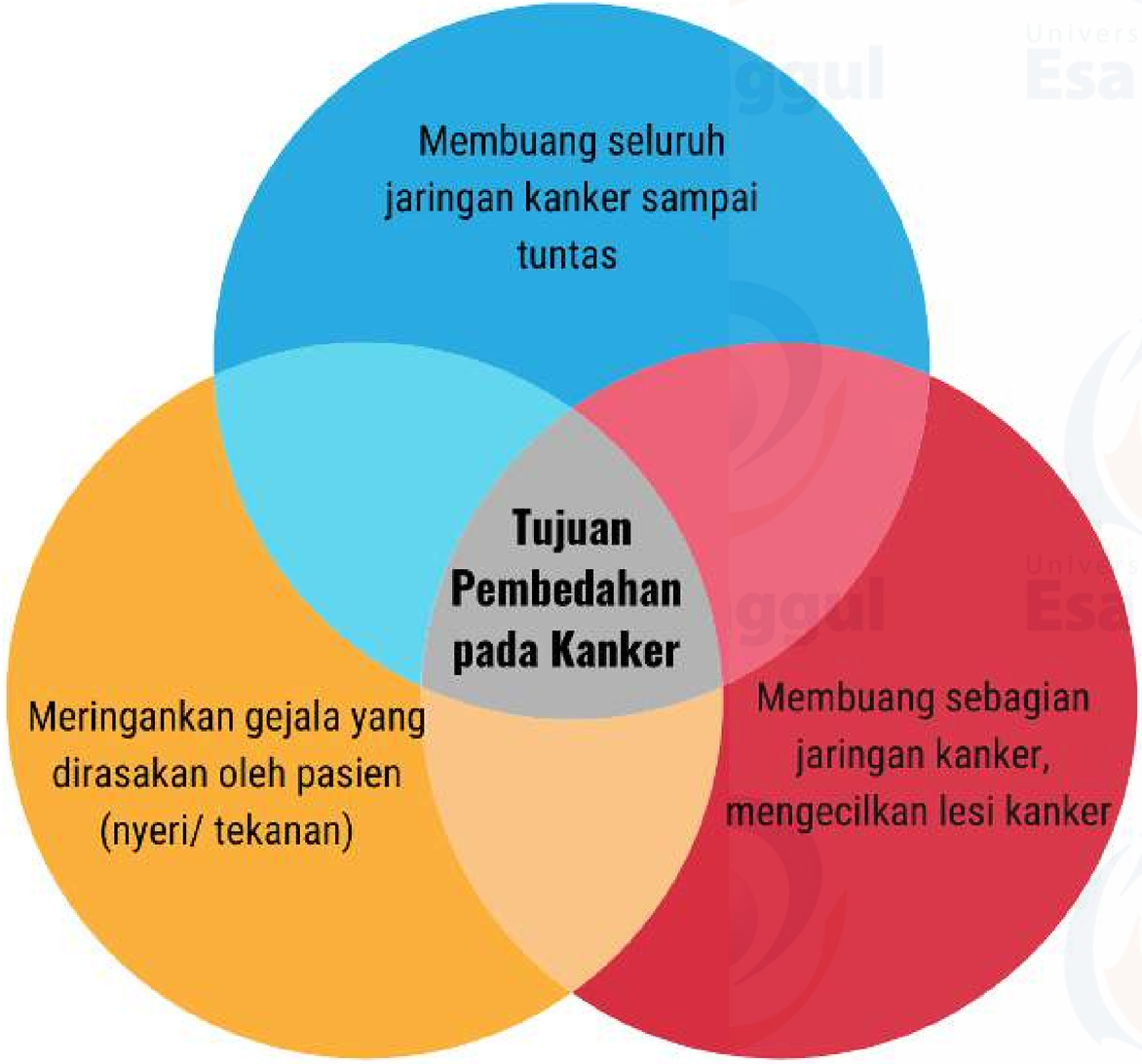
Terapi Gen

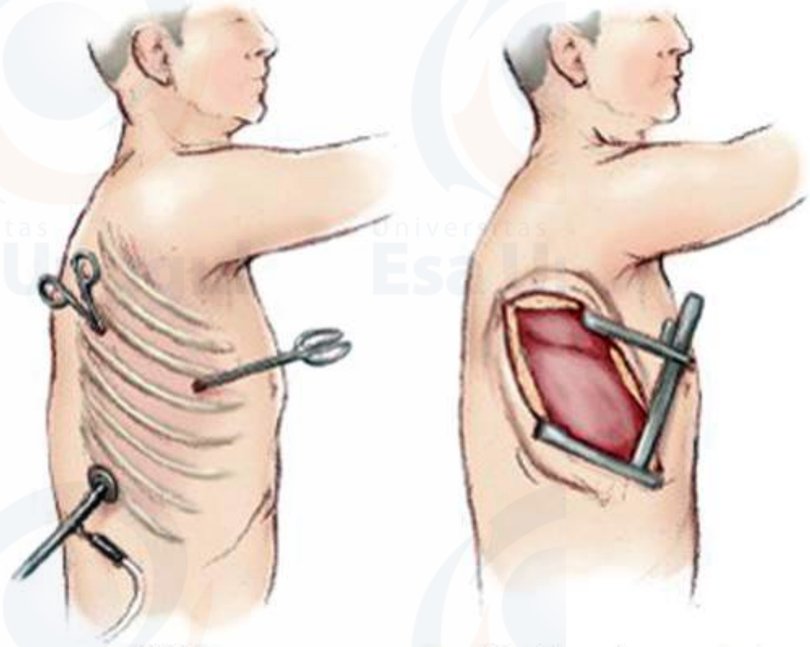
Terapi gen adalah penyisipan gen normal (sehat) dari genom yang rusak (sel kanker), dengan tujuan memperbaiki sel kanker tersebut.

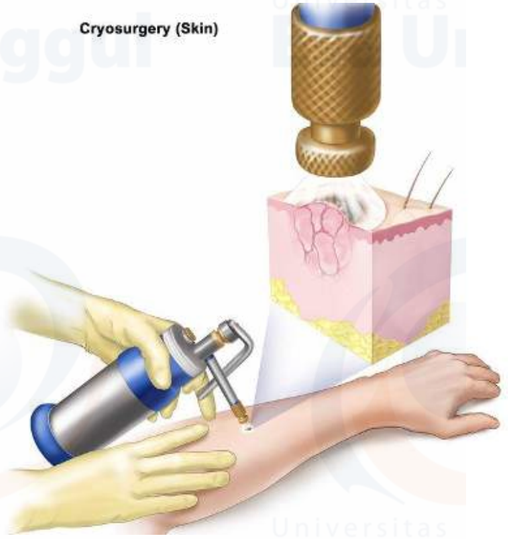
Terapi Hormon

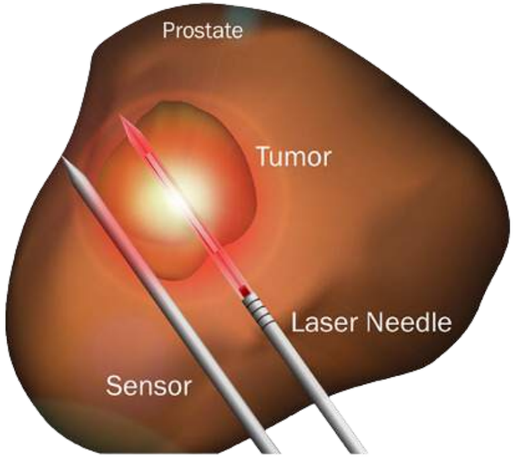
Hormon tertentu memiliki peran dalam perkembangan sel kanker. Terapi hormon digunakan untuk meminimalisir pertumbuhan sel kanker.

Conventional:
Surgery - Local









Conventional:
Surgery - Local

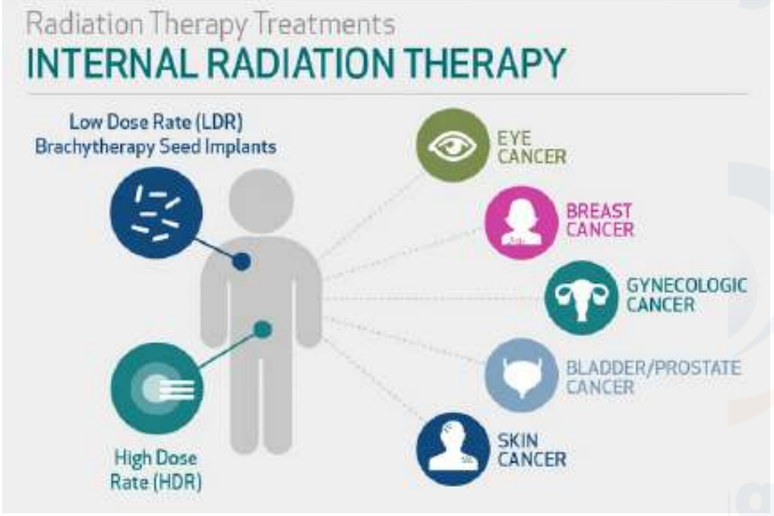
- Keuntungan: meningkatkan efektivitas dari terapi lainnya (kemoterapi dan radiasi), meningkatkan angka kelangsungan hidup pasien, terutama untuk pasien dengan stadium awal.

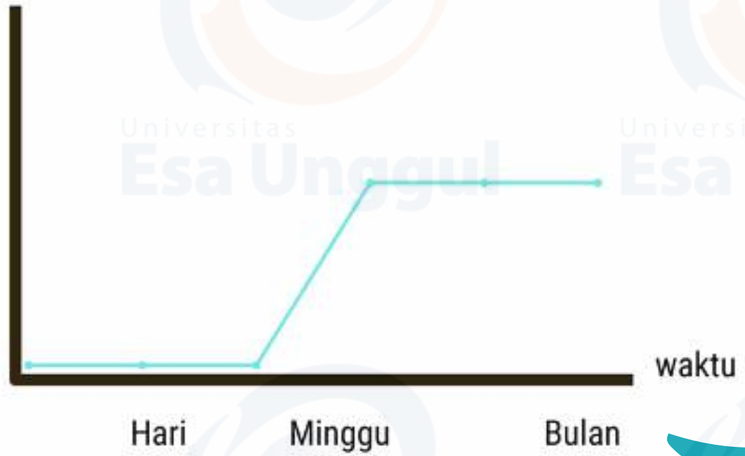
*data hasil penelitian mengenai overall survival rate (angka kelangsungan hidup) setelah pembedahan berdasarkan stadium adalah; stadium 1 (84%), stadium II (71%), III (36%), IV (28%).
**data hasil penelitian pada kanker paru menyatakan bahwa angka kelangsungan hidup pasien yang dilakukan pembedahan sebelum kemoterapi/ radiasi dua kali lebih tinggi dibandingkan dengan yagn tidak mendapatkan terapi pembedahan (OS: 44,8 vs 21,2, p = 0,048)

- Resiko: nyeri setelah pembedahan, resiko infeksi

Conventional:
Radiation - Local and systemic

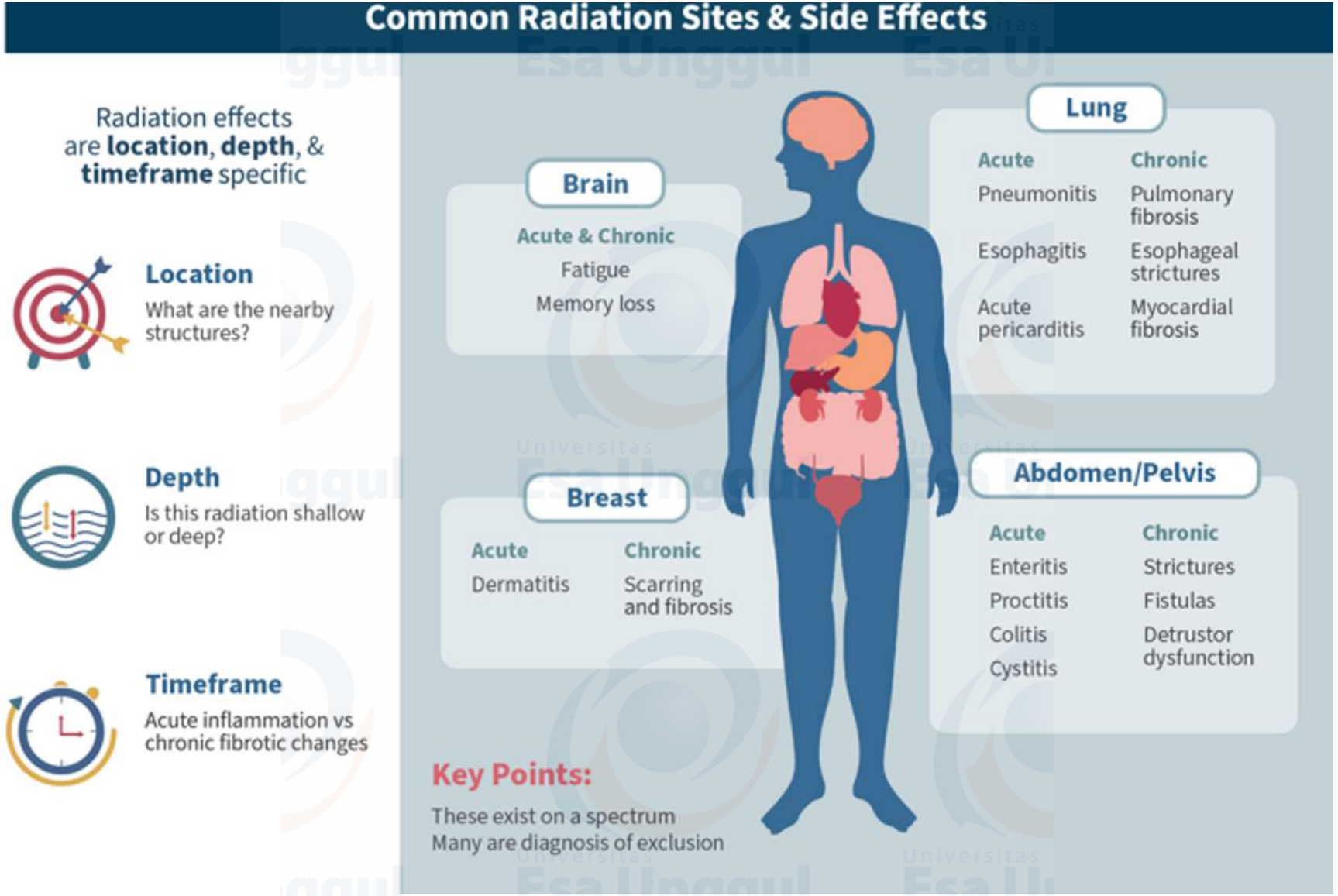
"Terapi radiasi untuk kanker dengan menggunakan dosis tinggi radiasi (sinar x-ray) untuk membunuh atau memperkecil ukuran tumor"



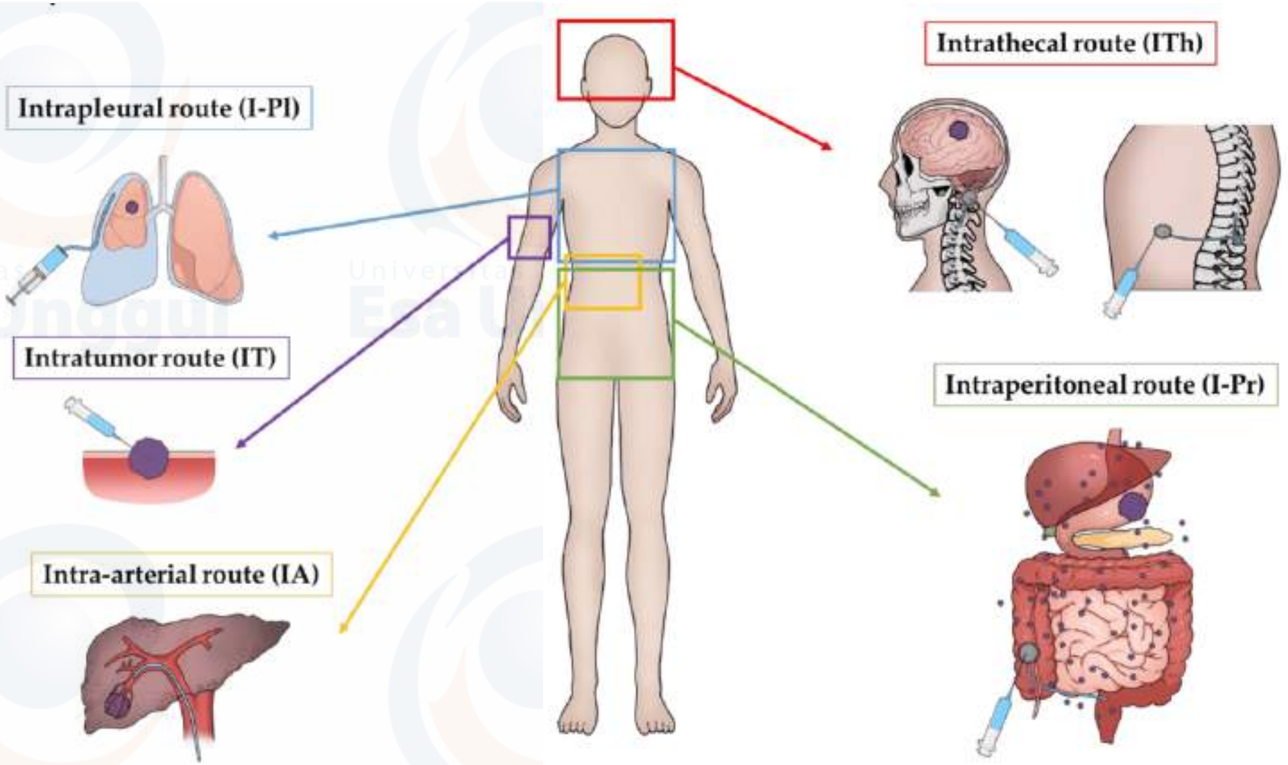


"Pemberian dosis tinggi radiasi dapat menghambat atau menghentikan pertumbuhan sel kanker dengan merusak DNA sel. DNA sel kanker yang rusak dan tidak dapat diperbaiki menyebabkan kematian sel kanker"

Conventional:
Radiation - Local and systemic



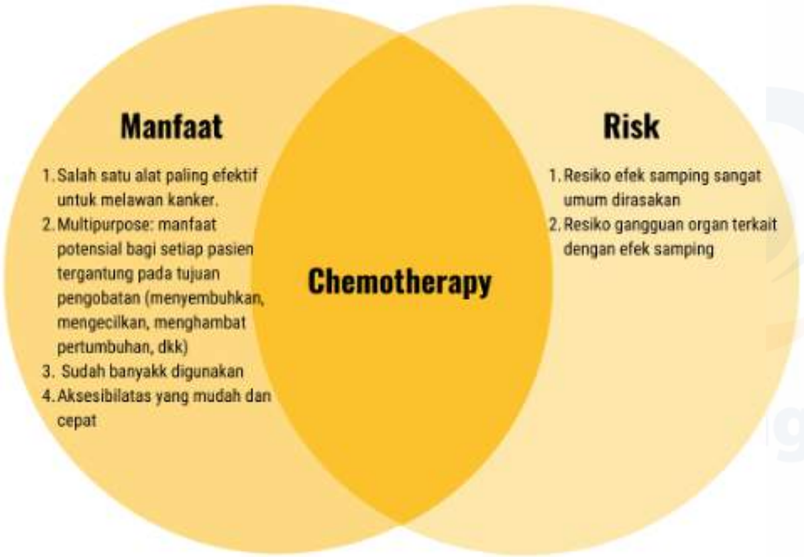
Conventional:
Chemotherapy - systemic

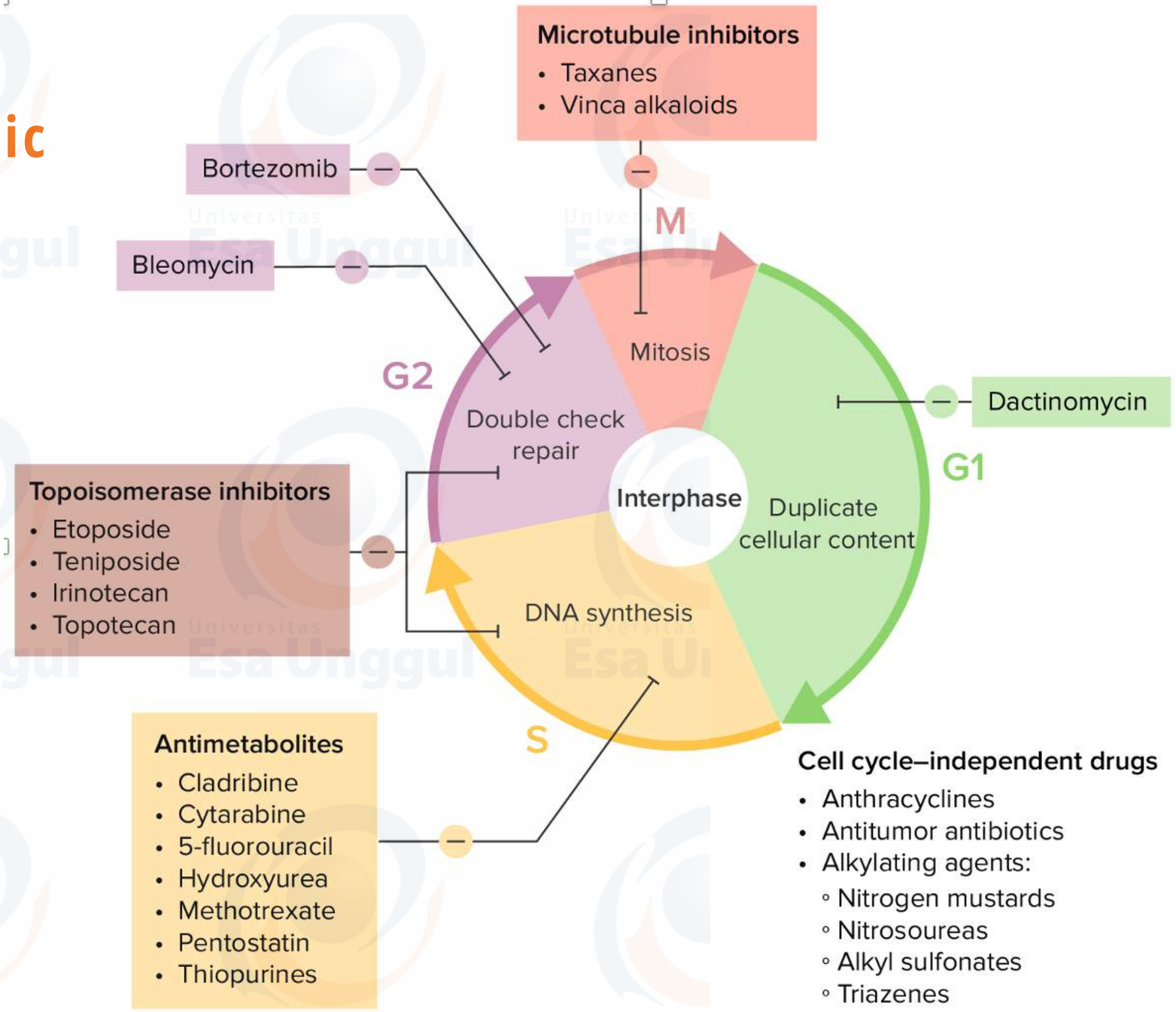


- **Kemoterapi Neoadjuvant**: pemberian kemoterapi sebelum terapi pembedahan atau terapi radiasi diberikan dengan tujuan untuk memperkecil tumor.
- **Kemoterapi Adjuvant:** pemberian kemoterapi setelah terapi pembedahan maupun terapi radiasi, dengan tujuan menyempurnakan terapi sebelumnya (menghancurkan sisa-sisa sel kanker yang masih ada setelah terapi sebelumnya)
- **Kemoterapi Kurativ**: Membunuh sel kanker yang kembali muncul atau menyebar ke bagian tubuh lainnya.
- **Kemoterapi paliatif:** Kemoterapi yang ditujukan untuk meringankan gejala ataupun menjaga kondisi klinis pasien, diberikan pada pasien kanker dengan stadium akhir.

“Kemoterapi (juga disebut kemo) adalah jenis pengobatan kanker yang menggunakan obat-obatan untuk menghentikan pembelahan sel kanker maupun membunuh sel kanker”

Conventional:
Chemotherapy - systemic





Cell cycle–independent drugs

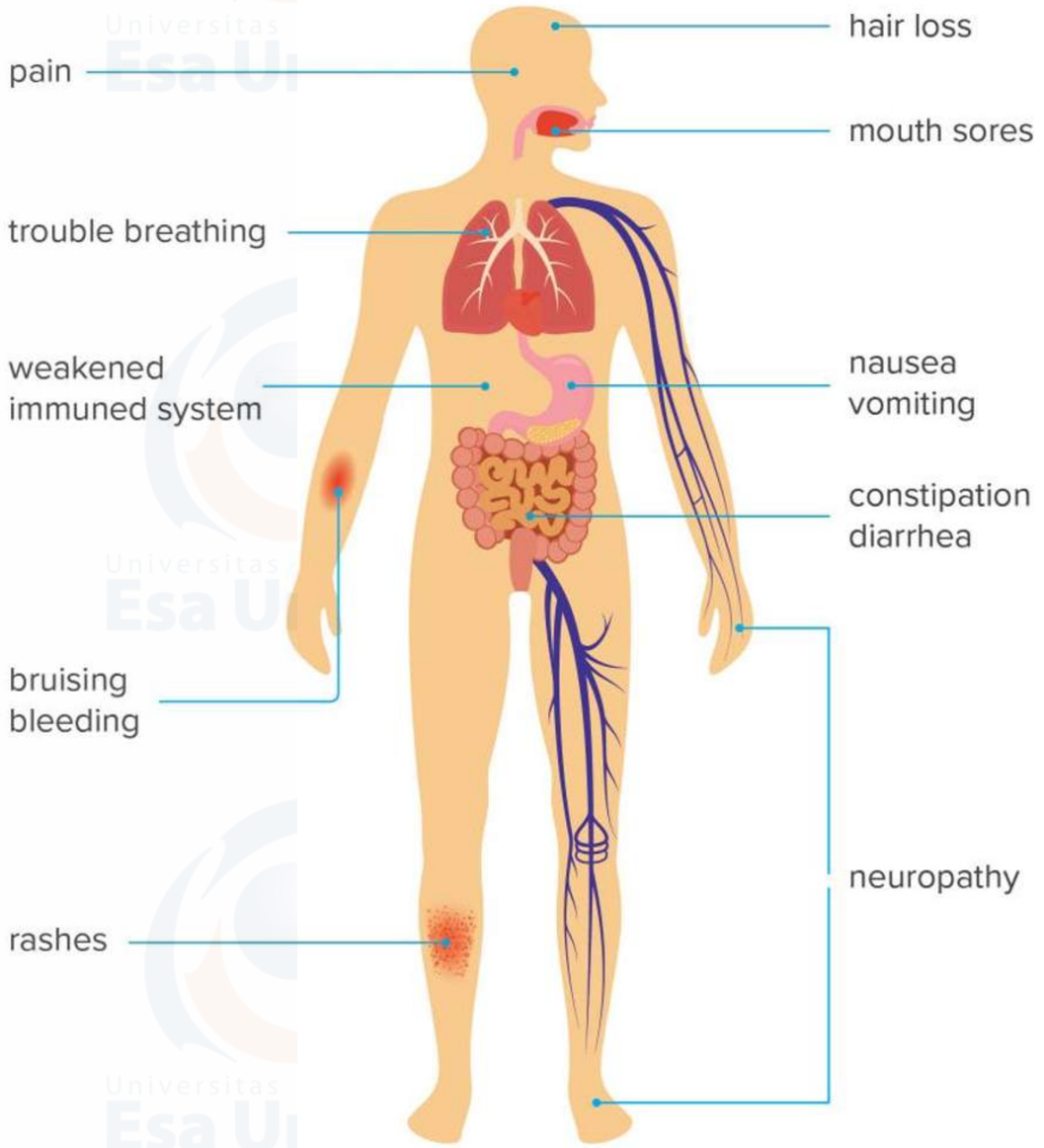
- Anthracyclines
- Antitumor antibiotics
- Alkylating agents:
  - Nitrogen mustards
  - Nitrosoureas
  - Alkyl sulfonates
  - Triazenes
  - Ethyleneimines and methylmelamines
  - Platinum compounds

Conventional:
Chemotherapy - systemic

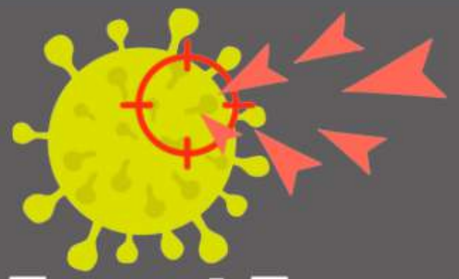
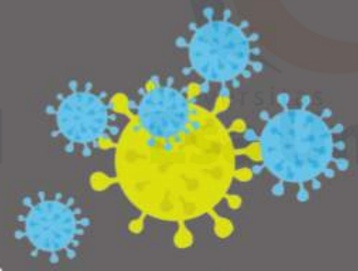
ACTC
Advanced Cancer Treatment Centers

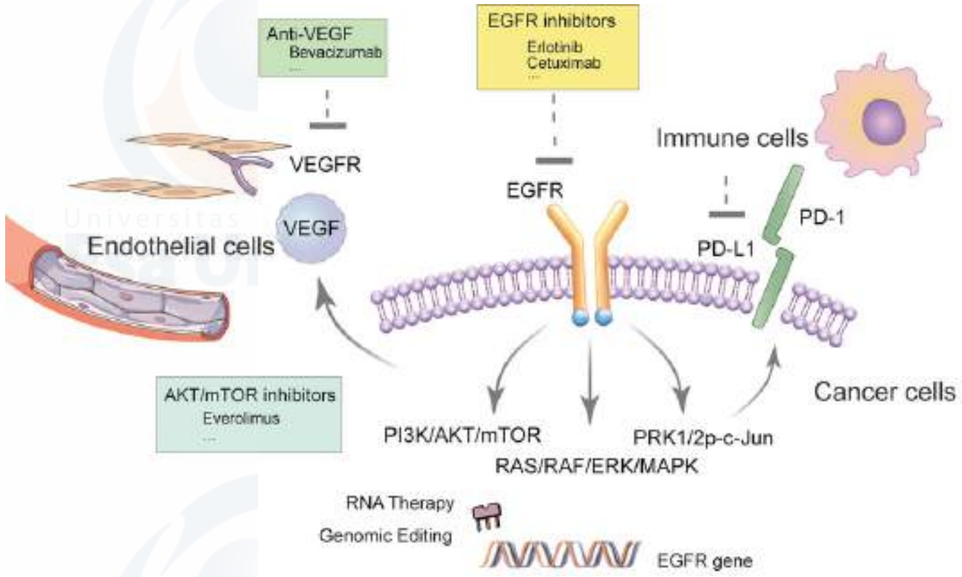
Do's & Don'ts for Post - Chemotherapy Care

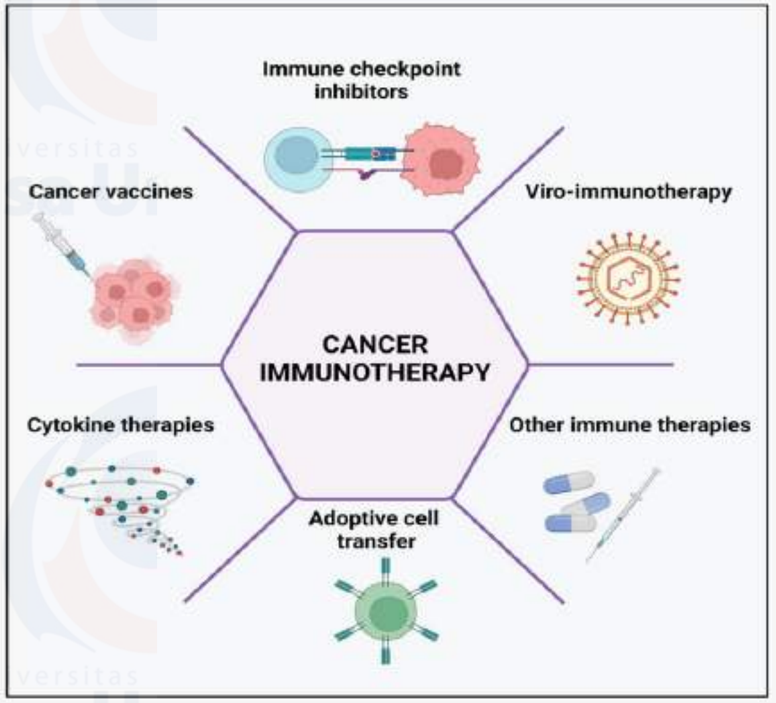
DO	DON'T
Eat healthy & stay hydrated	Neglect self-care
Exercise regularly	Over-exert
Get enough rest	Ignore symptoms or side-effects
Manage stress	Isolate yourself
Practice hygiene	Ignore mental & emotional health
Ensure follow-up visits	Smoke or use tobacco



Modern Therapy

Terapi Target	Imunoterapi
	
BEKERJA MENEMPEL PADA MOLEKUL TARGET YANG BERPERAN DALAM PERTUMBUHAN SEL KANKER	MENGGUNAKAN SISTEM IMUN UNTUK MELAWAN KANKER
• SPESIFIK • TOKSISITAS LEBIH RENDAH • MEMERLUKAN PEMERIKSAAN GENETIK • SEBAGIAN DICOVER OLEH BPJS	• SPESIFIK • TOKSISITAS LEBIH RENDAH • SEBAGIAN MEMERLUKAN PEMERIKSAAN GENETIK • BELUM DICOVER OLEH BPJS





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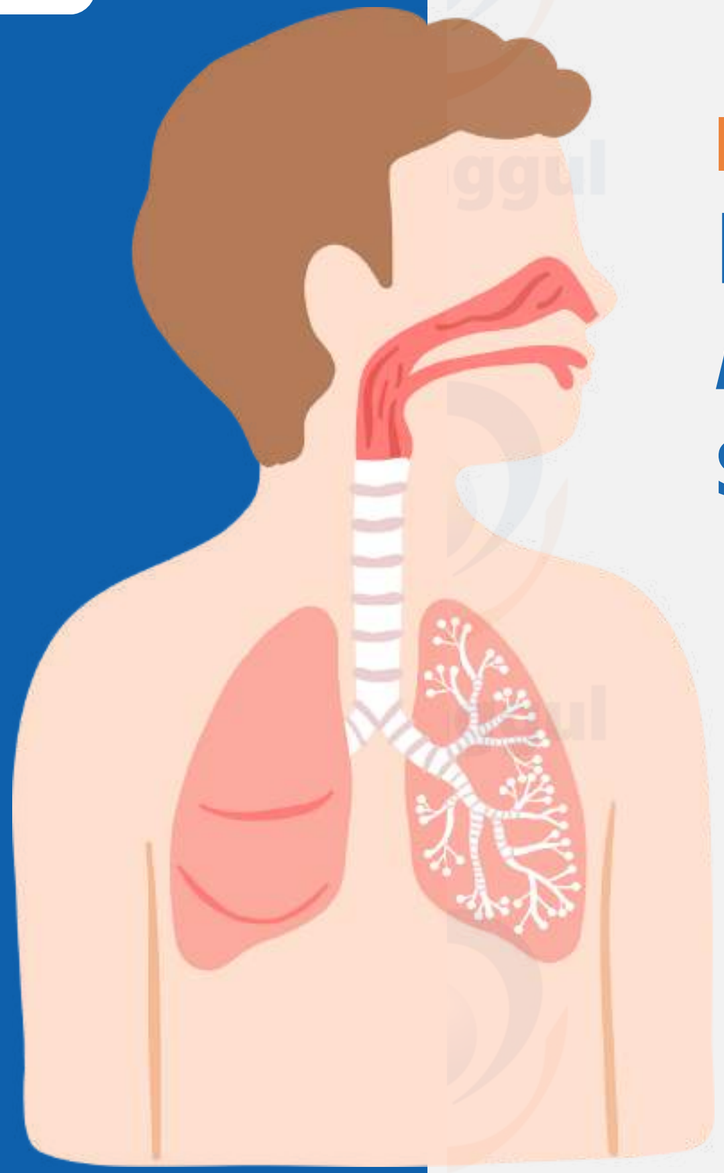
Rise your hand!

any question?



PSF402

Human Immunodeficiency Virus-Acquired immunodeficiency syndrome

Sesi Ke 10

Topik Sesuai RPS:
Prinsip pemilihan antibiotik untuk HIV/AIDS

Dosen Pengampu:

apt. Nadiya Nurul Afifah, M.Farm.Klin

NID:

223080974

E-mail:

nadiya.nurul@esaunggul.ac.id / +62 856 977 44470

Topik Sebelum UAS

Sesi 9

PBL 1 lanjutan

Sesi 9

Infeksi Saluran Semih

Sesi 10

Infeksi HIV/AIDS

Sesi 11

Modalitas Terapi Kanker

Sesi 12

Farmakoterapi Kanker Payudara

Sesi 6

Farmakoterapi Kanker Paru

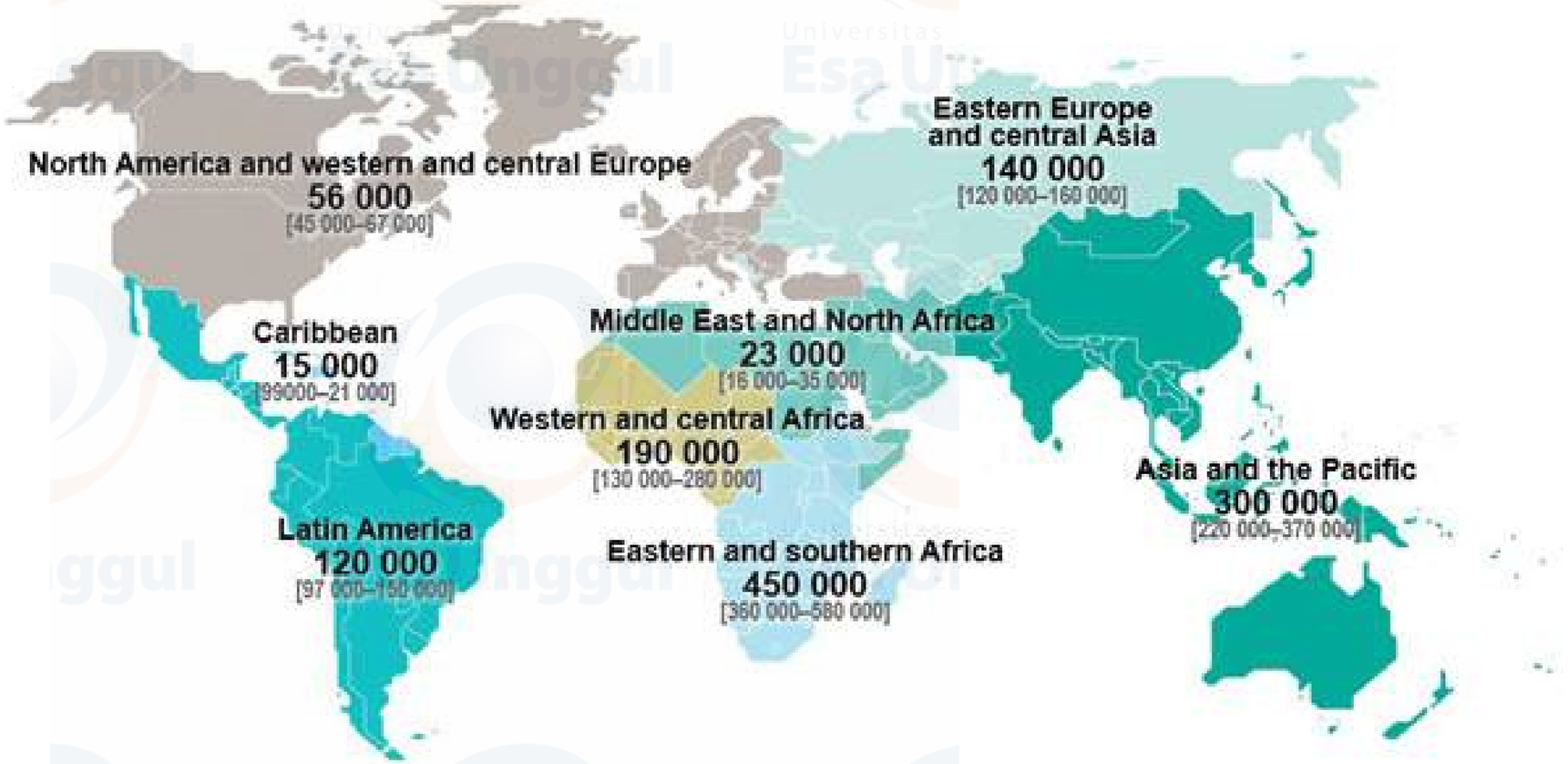
Sesi 7

PBL 2

Ujian Tengah Semester

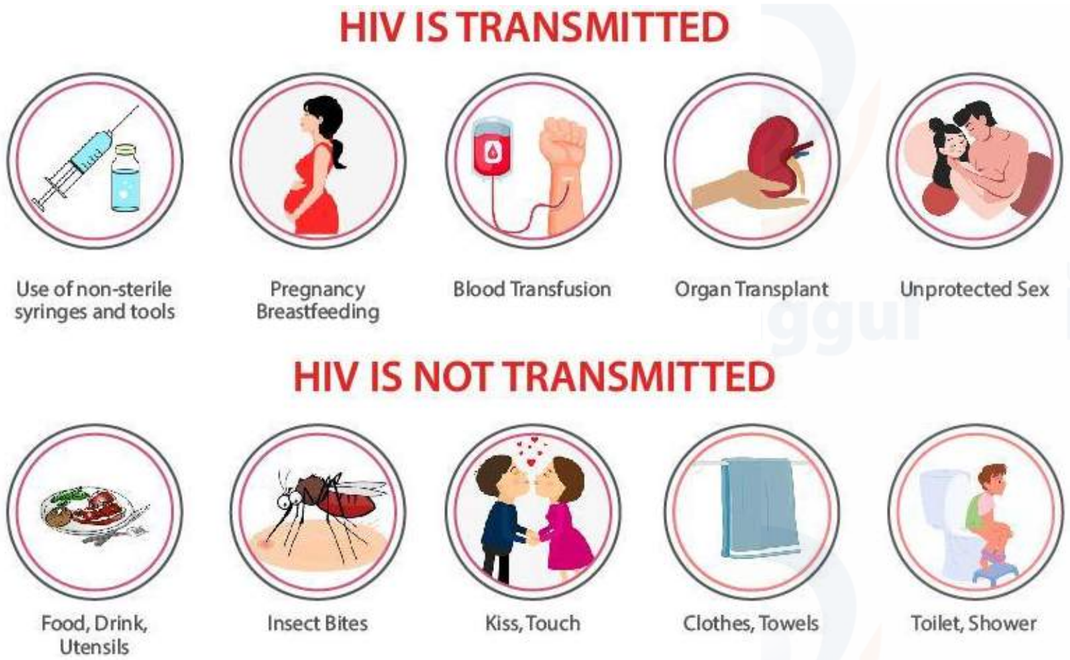
HIV FACTs

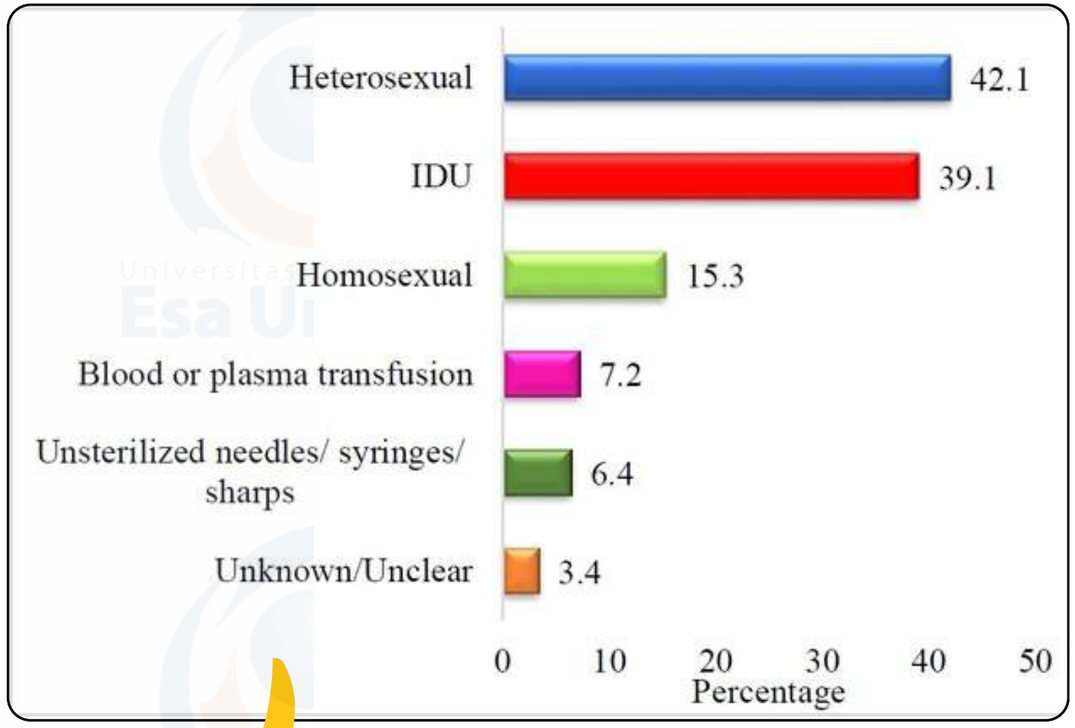
Estimated number of adults and children newly infected with HIV | 2023

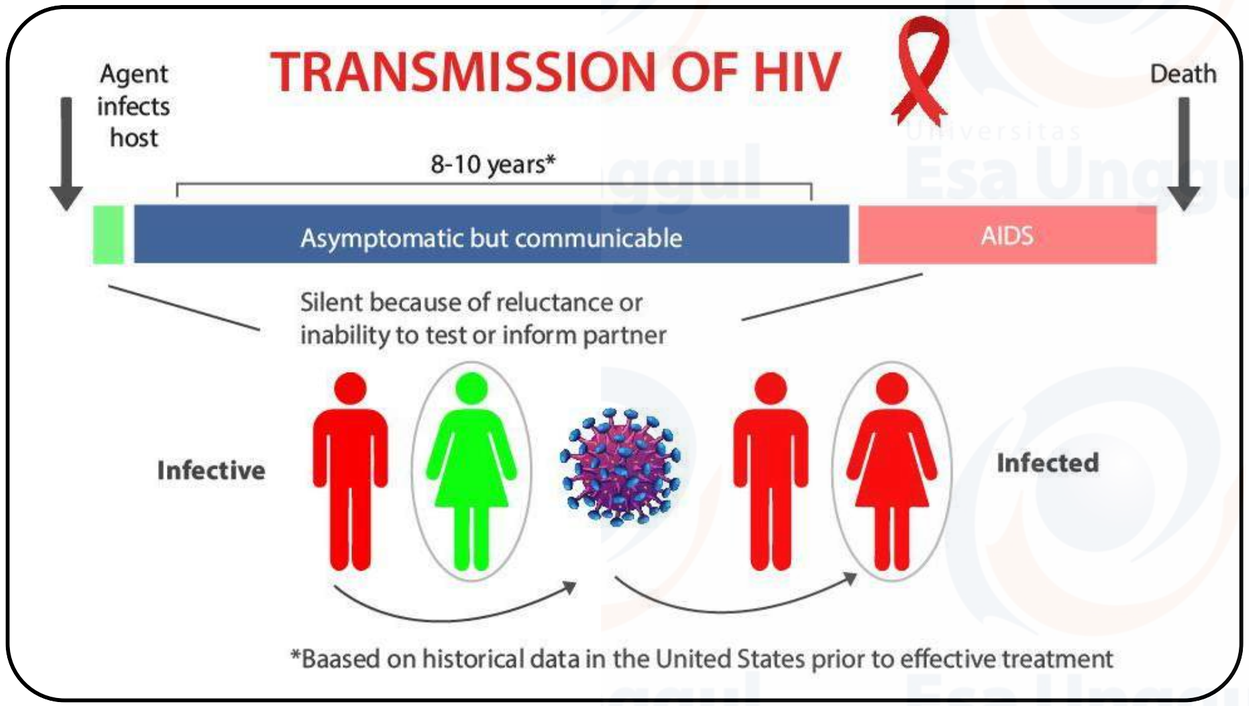


Total: 1.3 million [1.0 million–1.7 million]

UNAIDS


HIV IS TRANSMITTED
Use of non-sterile syringes and tools
Pregnancy Breastfeeding
Blood Transfusion
Organ Transplant
Unprotected Sex
HIV IS NOT TRANSMITTED
Food, Drink, Utensils
Insect Bites
Kiss, Touch
Clothes, Towels
Toilet, Shower


Heterosexual 42.1
IDU 39.1
Homosexual 15.3
Blood or plasma transfusion 7.2
Unsterilized needles/ syringes/ sharps 6.4
Unknown/Unclear 3.4
0 10 20 30 40 50
Percentage


TRANSMISSION OF HIV
Agent infects host
Death
8-10 years*
Asymptomatic but communicable
AIDS
Silent because of reluctance or inability to test or inform partner
Infective
Infected
*Baased on historical data in the United States prior to effective treatment

How HIV Infection Affects the Body

EVERYDAY HEALTH

WHAT ARE THE STAGES OF HIV?

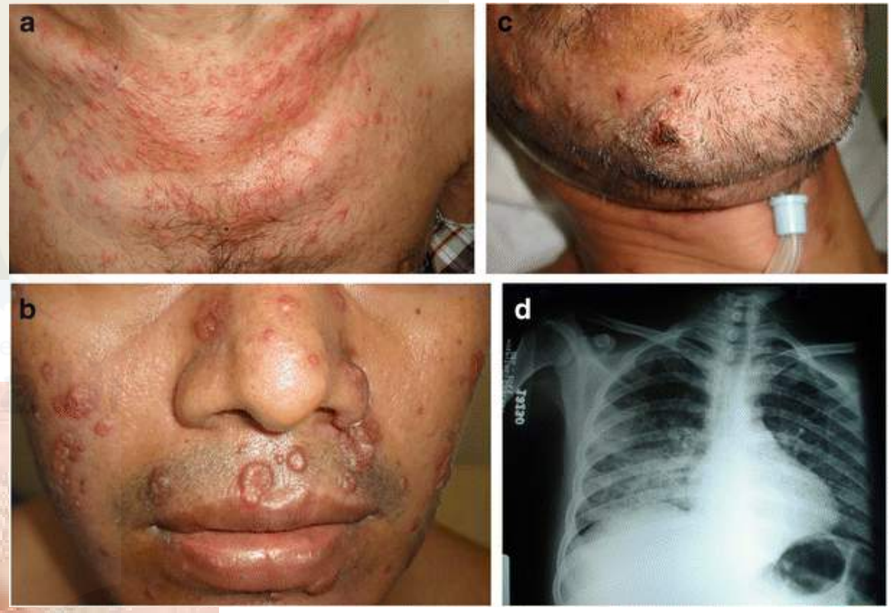
1 ACUTE HIV	2 CHRONIC HIV	3 AIDS
flu-like symptoms that occur days to weeks after contracting HIV	also known as the latent or asymptomatic stage; can last for several years	occurs when CD4 cell count falls below 200 cells/mm3; makes a person vulnerable to opportunistic infections and AIDS-defining conditions

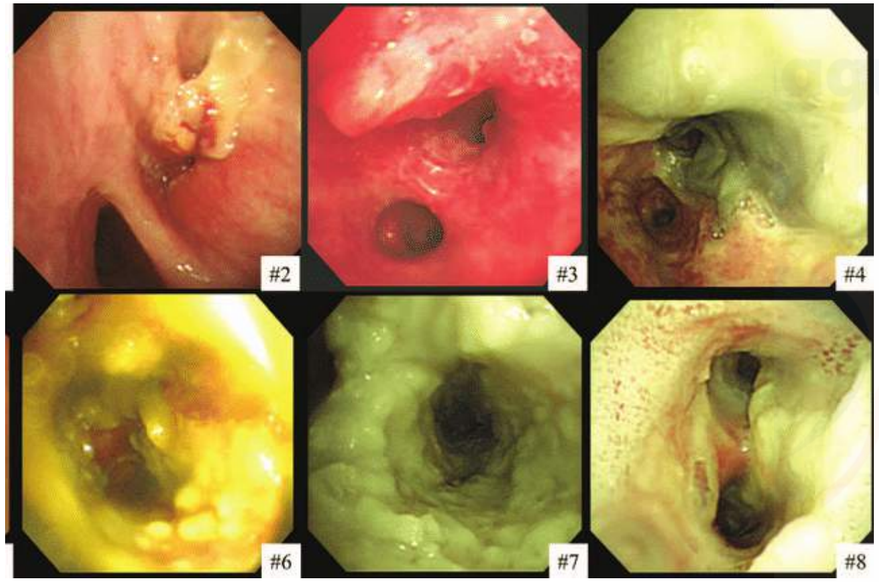
- **Stage I**
  - >500-600 cell/ul
  - No Sypmtom
- **Stage II**
  - 350-500 cell/ul
  - Minor Sypmtoms
- **Stage III**
  - 200-350 cell/ul
  - Major Symptoms
- **Stage IV**
  - <200 cell/ul
  - AIDS

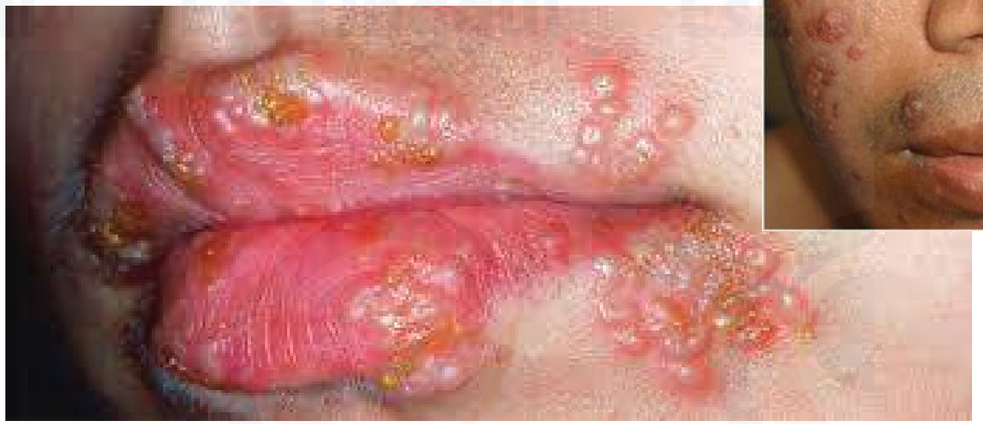
AIDS indicator conditions

Candidiasis of bronchi, trachea, or lungs
Candidiasis, esophageal
Cervical cancer, invasive
Coccidioidomycosis, disseminated or extrapulmonary
Cryptococcosis, extrapulmonary
Cryptosporidiosis, chronic intestinal (duration >1 month)
Cytomegalovirus disease (other than liver, spleen, or nodes)
Cytomegalovirus retinitis (with loss of vision)
Encephalopathy, HIV related
Herpes simplex: chronic ulcer(s) (duration >1 month); or bronchitis, pneumonitis, or esophagitis
Histoplasmosis, disseminated or extrapulmonary
Isosporiasis, chronic intestinal (duration >1 month)
Kaposi sarcoma
Lymphoma, Burkitt
Lymphoma, immunoblastic
Lymphoma, primary, for brain
Mycobacterium avium complex or *Mycobacterium kansasii*, disseminated or extrapulmonary
Mycobacterium tuberculosis, any site (pulmonary or extrapulmonary)
Mycobacterium, other species or unidentified species, disseminated or extrapulmonary
Pneumocystis jirovecii pneumonia
Pneumonia, recurrent
Progressive multifocal leukoencephalopathy
Salmonella septicemia, recurrent

Toxoplasmosis of brain
Wasting syndrome due to HIV

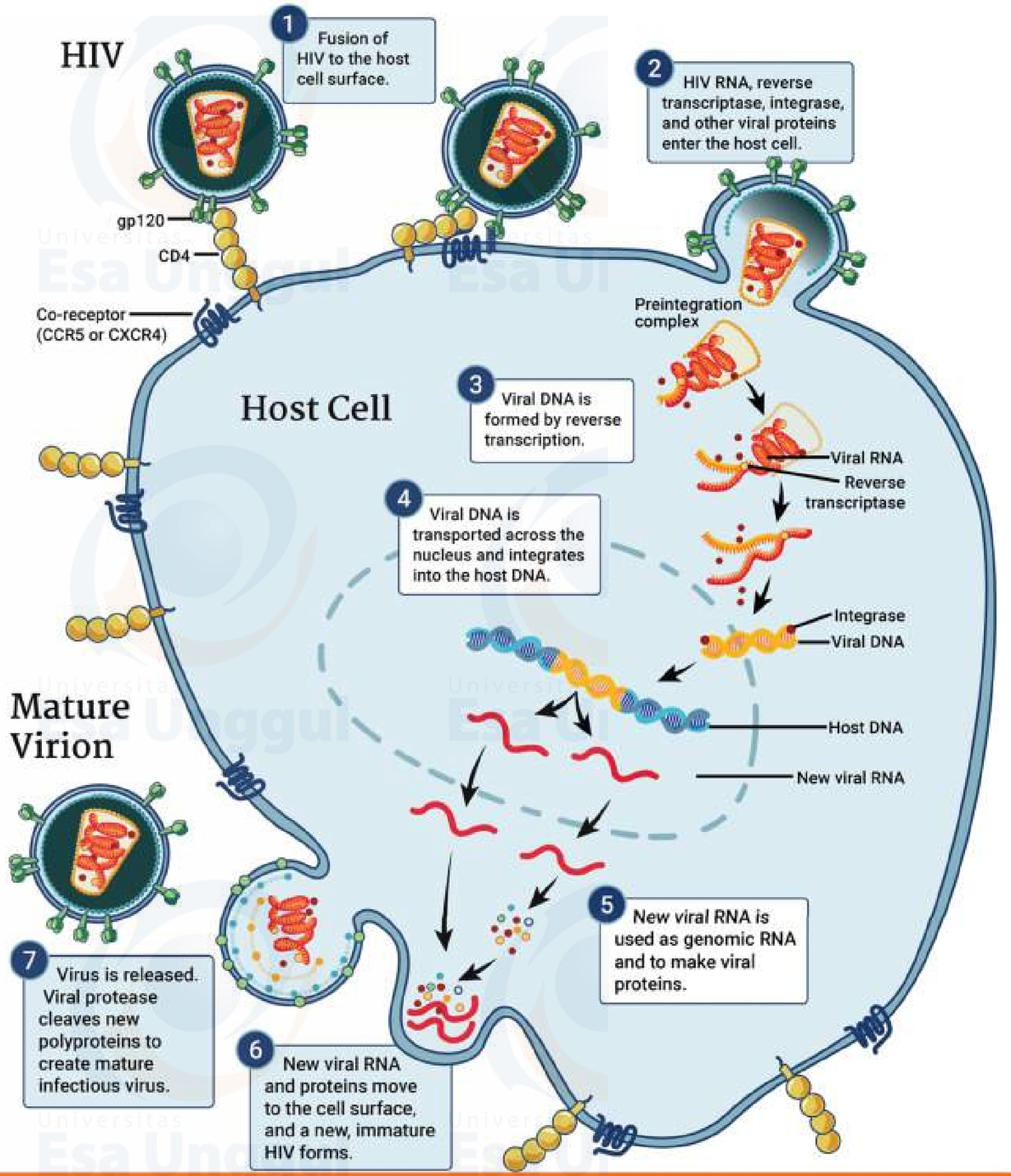




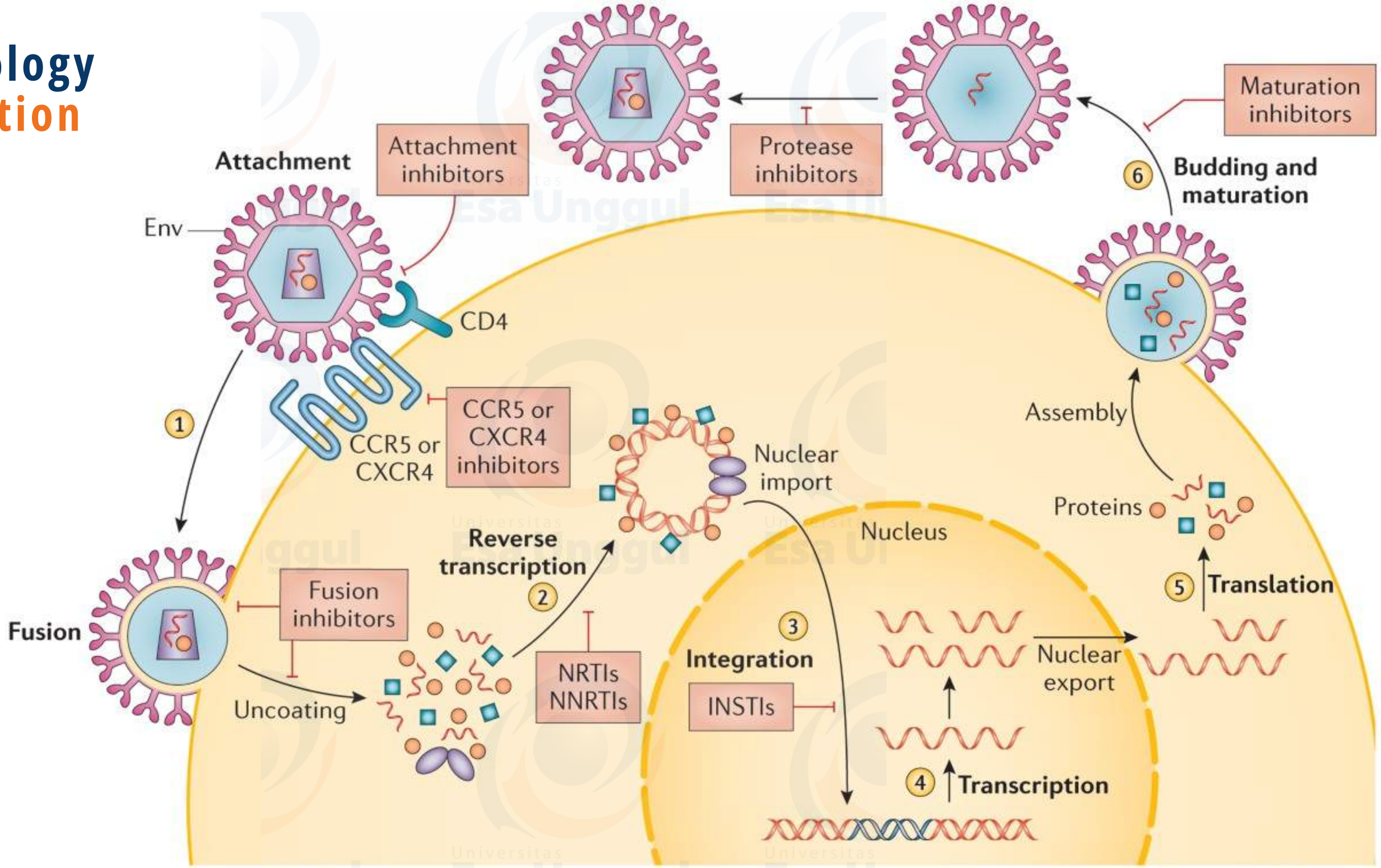


Step of Infection

- Fusion
- Entering the host cell
- RNA - to DNA
- DNA enters the nucleus
- DNA - to RNA
- New viral created
- New viral released



Pharmacology
Site of Action



Nature Reviews | Disease Primers

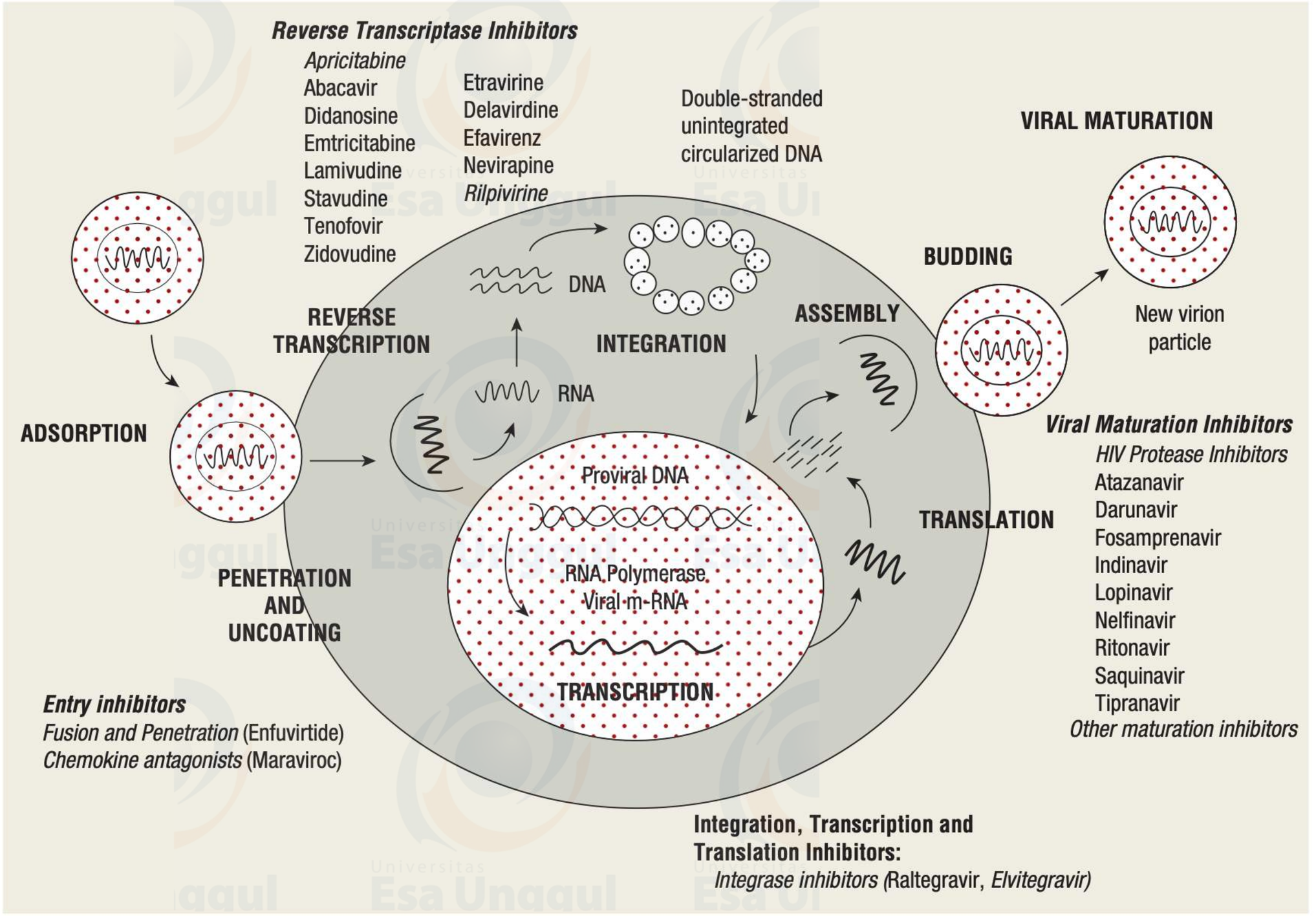

Reverse Transcriptase Inhibitors
Apricitabine
Abacavir
Didanosine
Emtricitabine
Lamivudine
Stavudine
Tenofovir
Zidovudine
Etravirine
Delavirdine
Efavirenz
Nevirapine
Rilpivirine
Double-stranded unintegrated circularized DNA
VIRAL MATURATION
BUDDING
New virion particle
DNA
REVERSE TRANSCRIPTION
INTEGRATION
ASSEMBLY
RNA
ADSORPTION
Proviral DNA
TRANSLATION
Viral Maturation Inhibitors
HIV Protease Inhibitors
Atazanavir
Darunavir
Fosamprenavir
Indinavir
Lopinavir
Nelfinavir
Ritonavir
Saquinavir
Tipranavir
Other maturation inhibitors
RNA Polymerase
Viral-m-RNA
PENETRATION AND UNCOATING
TRANSCRIPTION
Entry inhibitors
Fusion and Penetration (Enfuvirtide)
Chemokine antagonists (Maraviroc)
Integration, Transcription and Translation Inhibitors:
Integrase inhibitors (Raltegravir, Elvitegravir)

TABLE 134-4 Treatment of Human Immunodeficiency Virus Infection: Antiretroviral Regimens Recommended in Antiretroviral-Naïve Persons

	Preferred Regimens	Limitation
NNRTI based	Efavirenz + tenofovir + emtricitabine (AI)	Not in first trimester of pregnancy or in women without adequate contraception
PI based	Darunavir + ritonavir + tenofovir + emtricitabine (AI)	Caution in HCV–HBV co-infection, rash
	Atazanavir + ritonavir + tenofovir + emtricitabine (AI)	Not with high doses of proton-pump-inhibitors, rash
	Raltegravir + tenofovir + emtricitabine (AI)	Twice daily (not once daily)
Alternative regimens (some potential disadvantages versus preferred regimens)		
	Efavirenz + (abacavir or zidovudine) + lamivudine (BI)	Possible reduced efficacy for high viral loads (abacavir), more subcutaneous fat loss (zidovudine)
	Nevirapine + zidovudine + lamivudine (BI)	Not in moderate to severe hepatic disease or in women with CD4 >250 cells/mm^3 or men with CD4 >450 cells/mm^3
PI based	Atazanavir-ritonavir + (abacavir or zidovudine) + lamivudine (BI)	See above
	Lopinavir-ritonavir (once or twice daily) either with (abacavir or zidovudine) + lamivudine or (tenofovir+ emtricitabine) (BI)	Gastrointestinal intolerance, lipids
	Fosamprenavir/ritonavir (once or twice daily) either with (abacavir or zidovudine) + lamivudine or (tenofovir + emtricitabine) (BI)	Rash
	Saquinavir-ritonavir (twice daily) + tenofovir + emtricitabine (BI)	High number of pills/complexity

TABLE 134-5 Selected Pharmacologic Characteristics of Antiretroviral Compounds

Drug	F (%)	$t_{1/2}$(h)[a]	Adult Dose[b] (doses/day)	Plasma C_{max}/C_{min}(μM)	Distinguishing Adverse Effect
Integrase inhibitors (InSTI)					
Raltegravir	?	9	400 mg (2)	1.74/0.22	Increased creatine kinase
Nucleoside (Nucleotide) reverse transcriptase inhibitors (NRTIs)					
Abacavir	83	1.5/20	300 mg (2)	5.2/0.03	Hypersensitivity
			or		
			600 mg (1)	7.4[c]	
Didanosine	42	1.4/24	200 mg (2)	2.8/0.03	Peripheral neuropathy, pancreatitis
			or		
			400 mg (1)	5.6[c]	
Emtricitabine	93	10/39	200 mg (1)	7.3/0.04	Pigmentation on soles and palms in non-whites
Lamivudine	86	5/22	150 mg (2)	6.3/1.6	Headache, pancreatitis (children)
			or		
			300 mg (1)	10.5/0.5	
Stavudine	86	1.4/7	40 mg (2)	2.4/0.04	Lipoatrophy, peripheral neuropathy
Tenofovir	40	17/150	300 mg (1)	1.04/0.4	Renal toxicity (proximal tubule)
Zidovudine	85	2/3.5	200 mg (3)	0.2	Anemia, neutropenia, myopathy
			or		
			300 mg (2)	3[c]	
Nonnucleoside reverse transcriptase inhibitors (NNRTIs)					
Delavirdine	85	5.8	400 mg (3)	35/14	Rash, elevated liver function tests
			or		
			600 mg (2)		
Efavirenz	43	48	600 mg (1)	12.9/5.6	Central nervous system disturbances and teratogenicity
Etravirine	?	41	200 mg (2)	1.69/0.86	Rash, nausea
Nevirapine	93	25	200 mg (2)[d]	22/14	Potentially serious rash and hepatotoxicity
Protease inhibitors (PIs)					
Amprenavir[e]	?	9	1,400 mg (2)[e]	9.5/0.7	Rash
	or		*or*		
Forsamprenavir[e]			1,400 mg (1)[e,f]	14.3/2.9	
Atazanavir	68	7	400 mg (1)	3.3/0.23	Unconjugated hyperbilirubinemia
			or		
			300 mg (1)[f]	6.2/0.9	
Darunavir	82	15	800 mg (1) or 600 mg (2)[f]	11.9/6.5	Hepatitis, rash
Indinavir	60	1.5	800 mg (3)	13/0.25	Nephrolithiasis
			or		
			400–800 mg (2)[f]		
Lopinavir[g]	?	5.5	800 mg (1) or 400 mg (2)	13.6/7.5	Hyperlipidemia/GI intolerance
Nelfinavir	?	2.6	750 mg (3)	5.3/1.76	Diarrhea
			or		
			1,250 mg (2)	7/1.2	
Ritonavir	60	3–5	600 mg (2)[d]	16/5	Gastrointestinal intolerance
			or		
			"Boosting doses"		
Saquinavir	4	3	1,000 mg (2)[f]	3.9/0.55	Mild nausea, bloating
Tipranavir	?	6	500 mg (2)[f]	77.6/35.6	Hepatoxocity, intracranial hemorrhage
Entry inhibitorsFusion inhibitor					
Enfuvirtide	84	3.8	90 mg (2)	1.1/0.73	Injection-site reactions
Co-receptor inhibitor					
Maraviroc	33	15	300 mg (2)	1.2/0.066	Hepatitis, allergic reaction

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