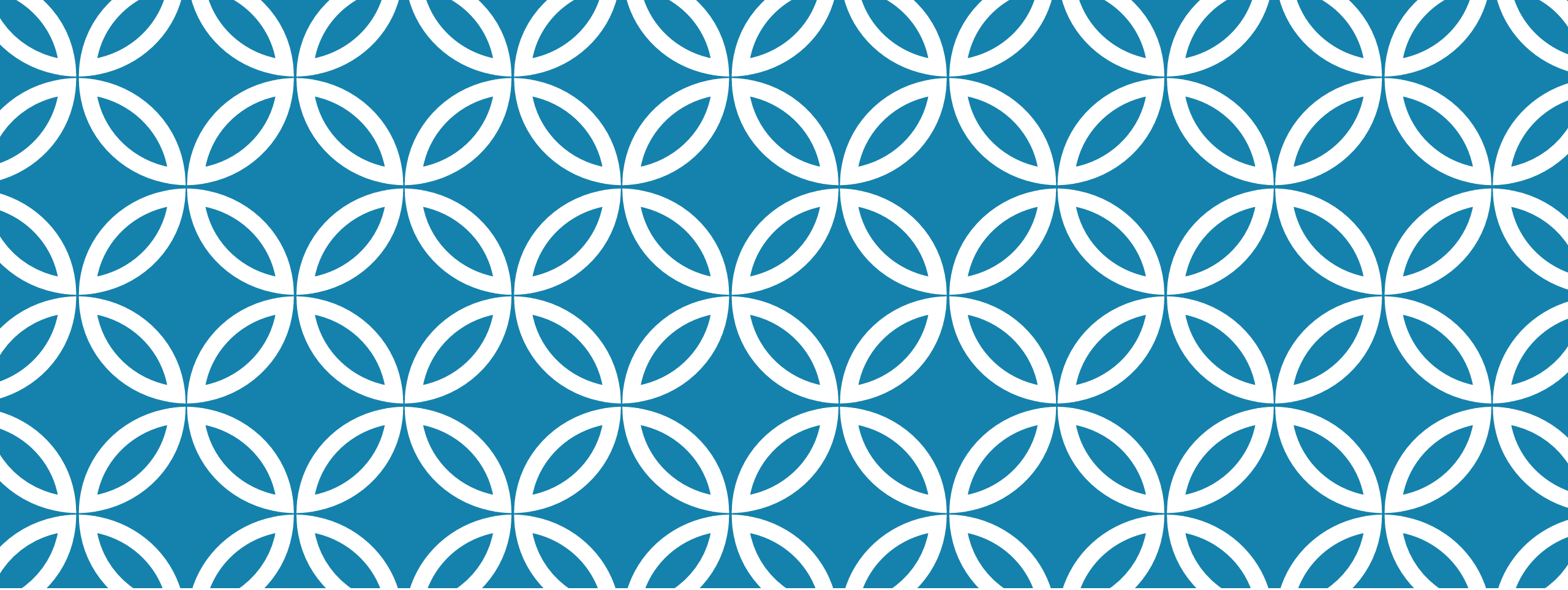


ANTIMICROBIAL STEWARDSHIP

Bethan Thomas
January 2022

PLAN

- What is antimicrobial Stewardship (AMS)?
- Why is it important?
- Antimicrobial resistance
- C.difficile
- Considerations for Antimicrobial Prescribing

WHAT IS ANTIMICROBIAL STEWARDSHIP?

'an organisational or healthcare-system-wide approach to promoting and monitoring judicious use of antimicrobials to preserve their future effectiveness'.

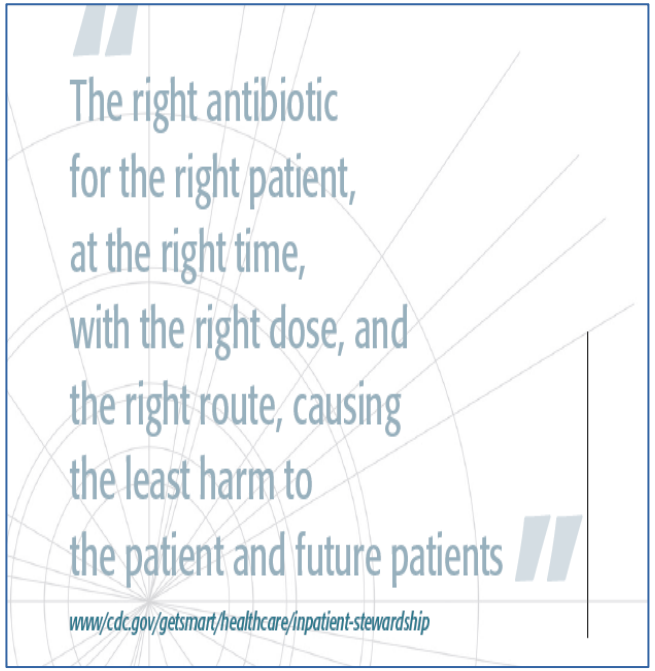
NICE Guideline August 2015

WHAT IS ANTIMICROBIAL STEWARDSHIP?

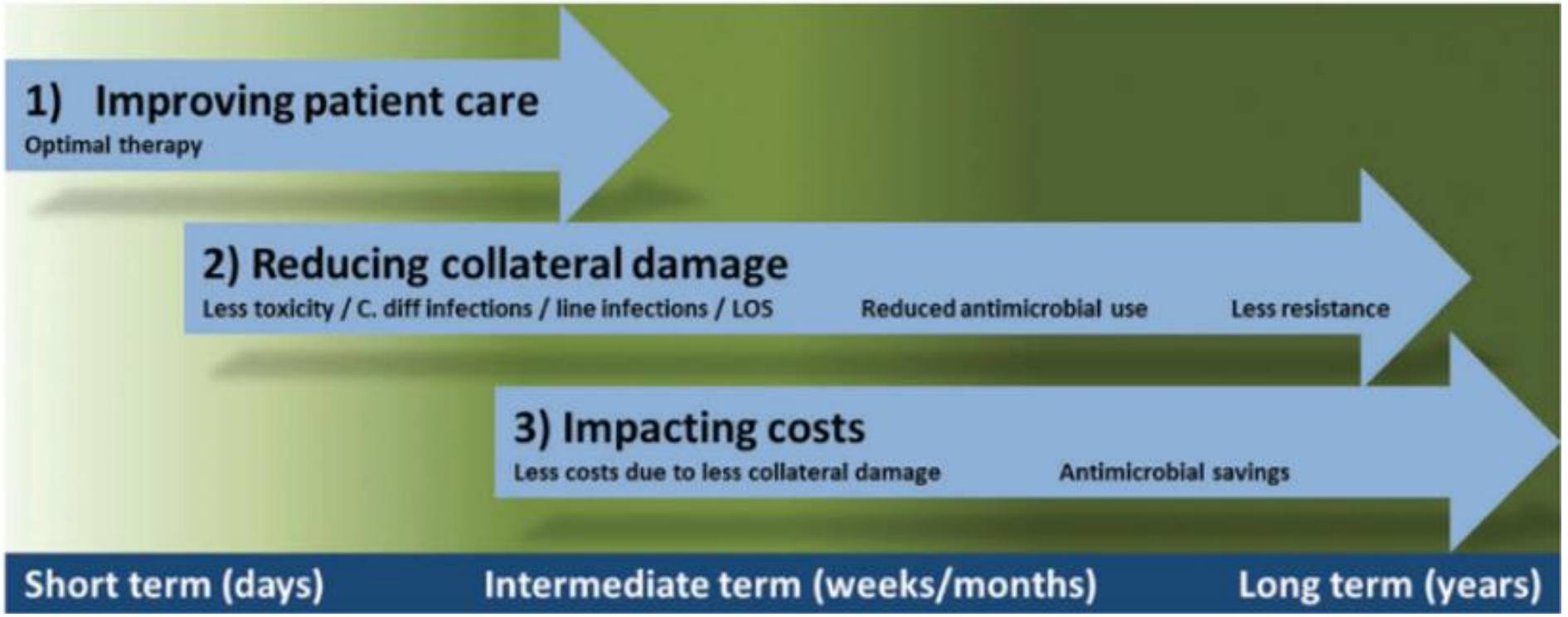
"Prudent prescribing is **not to prescribe as few antibiotics as possible** but to identify that small group of patients who really need antibiotic treatment and then explain, reassure and educate the large group of patients who don't."

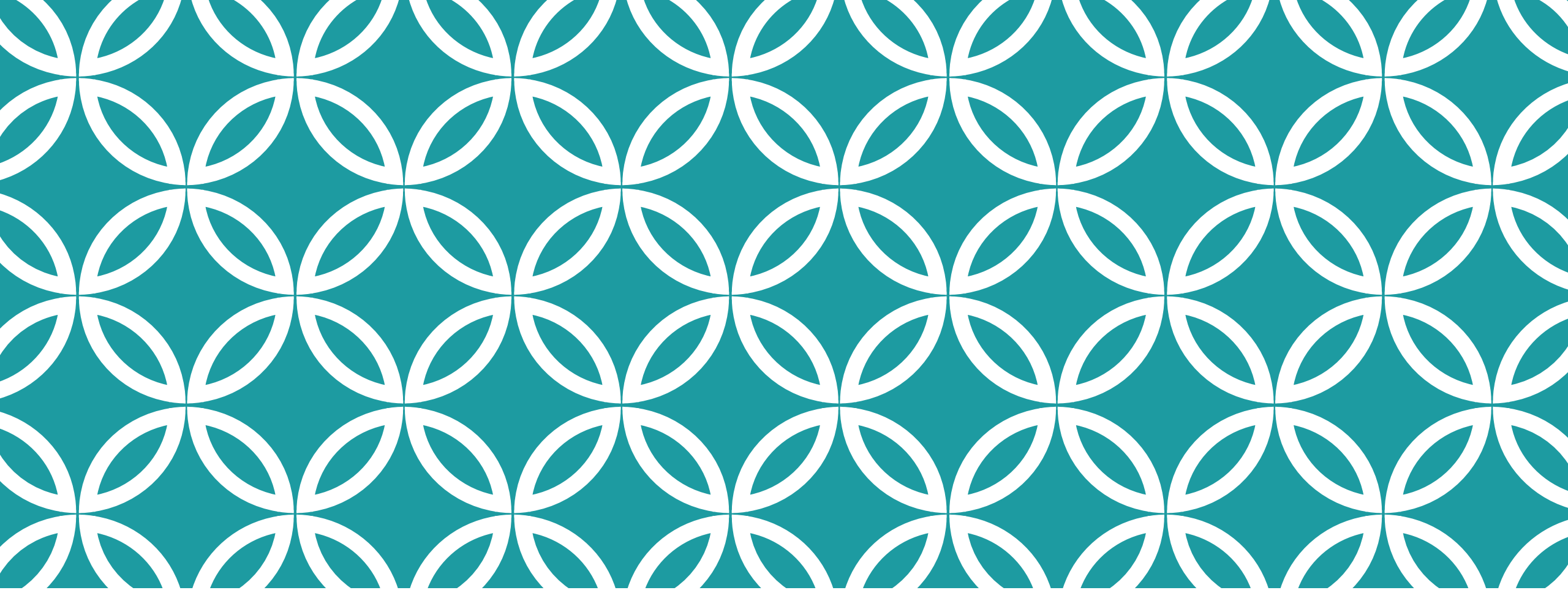
British Journal of General Practice 2009, 50:567

Approximately 30% of hospital inpatients receive antibiotics
Up to 50% of all antibiotic use in hospitals can be inappropriate
Up to a 1/3 of all surgical prophylaxis is inappropriate



WHY IS AMS IMPORTANT?





ANTIMICROBIAL RESISTANCE

Drug-resistant superbug spreading in hospitals

James Gallagher
Health and science correspondent, BBC News

Scientists are "extremely concerned" by a bacterium resistant to antibiotics of last resort.

BBC | Sign in | News | Sport | Weather | iPlayer | Sounds

NEWS

Home | UK | World | Business | Politics | Tech | Science | Health | Family & Education

Health

Antibiotic resistance plan to fight 'urgent' global threat

Drive to tackle rise of superbugs

Conor Macauley
BBC NI Agriculture & Environment Correspondent

It aims to tackle the problem of antimicrobial resistance, where superbugs become immune to the drugs.

job | Dating | Sign in | Search | UK edition

Sport | Culture | Lifestyle | More | The Guardian

UK politics | Environment | Education | Society | Science | Tech | Global development | Cities | Obituaries

'Antibiotic apocalypse': doctors sound alarm over drug resistance

Antibiotic resistance could spell end of modern medicine, says chief medic

Prof Dame Sally Davies says action is needed around the world to tackle 'hidden' problem that is already claiming lives

Antibiotic resistance as big a threat as climate change – chief medic

Dame Sally Davies calls for Extinction Rebellion-style campaign to raise awareness

Overuse of antibiotics 'risks return to dark ages of life-threatening surgery'

Warning comes as report shows 3 million common surgical procedures could be hazardous if infections become resistant to antibiotics

Antibiotic resistant superbugs 'will kill 90,000 Britons by 2050'

RESISTANCE

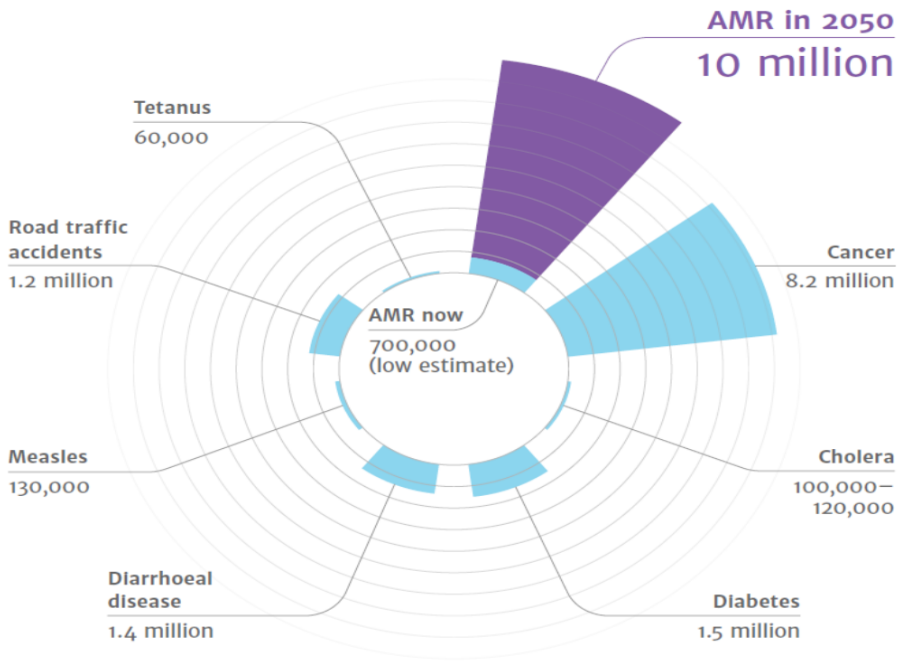
Resistance is a global health disaster that is already killing **700,000 people across the globe each year**

The WHO have declared that AMR is one of the **top 10 global health** threats facing humanity.

Predicted that by 2050 10 million deaths will be attributed to AMR **every year**

AMR is described as the slow moving pandemic

DEATHS ATTRIBUTABLE TO AMR EVERY YEAR



Sources:
Diabetes: www.whi.int/mediacentre/factsheets/fs312/en/ Cancer: www.whi.int/mediacentre/factsheets/fs297/en/
Cholera: www.whi.int/mediacentre/factsheets/fs107/en/ Diarrhoeal disease: www.sciencedirect.com/science/article/pii/S0140673612617280
Measles: www.sciencedirect.com/science/article/pii/S0140673612617280 Road traffic accidents: www.whi.int/mediacentre/factsheets/fs358/en/
Tetanus: www.sciencedirect.com/science/article/pii/S0140673612617280

Review on Antimicrobial Resistance

IF NOT TACKLED, RISING AMR COULD HAVE A DEVASTATING IMPACT

By 2050, the death toll could be a staggering
one person every three seconds
if AMR is not tackled now.

Source: Review's own analysis.

Review on Antimicrobial Resistance

Antibiotics

Antibiotic resistance could spell end of modern medicine, says chief medic

Prof Dame Sally Davies says action is needed around the world to tackle 'hidden' problem that is already claiming lives

4,232

Press Association

Friday 13 October 2017 08.41 BST

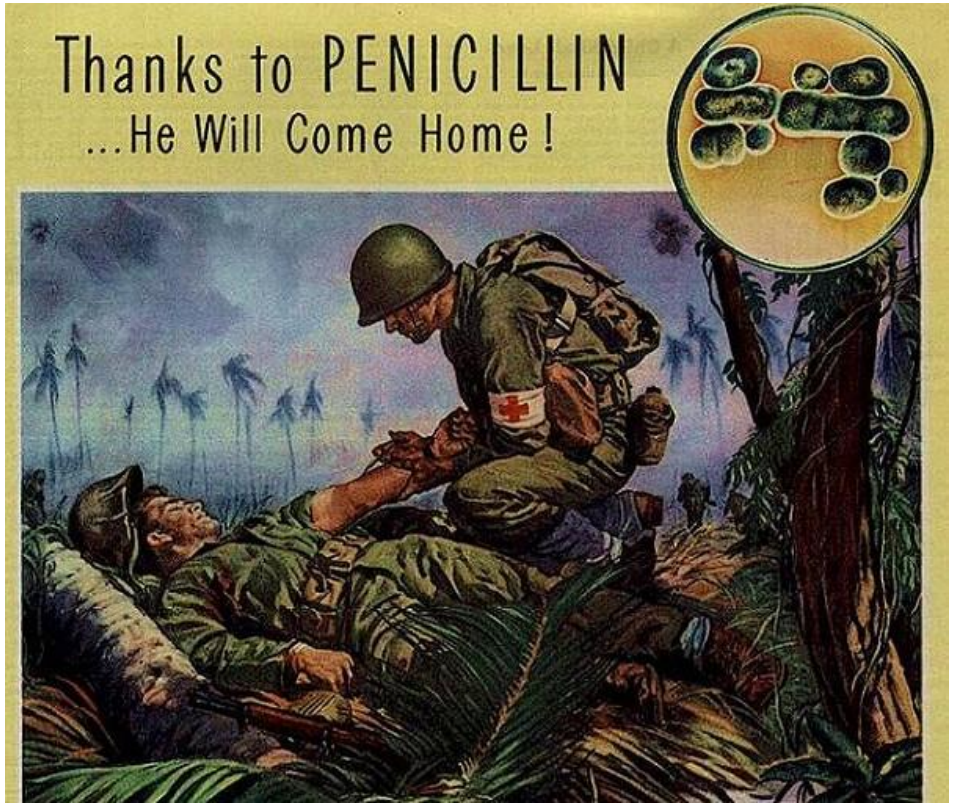
On **December 1945;**

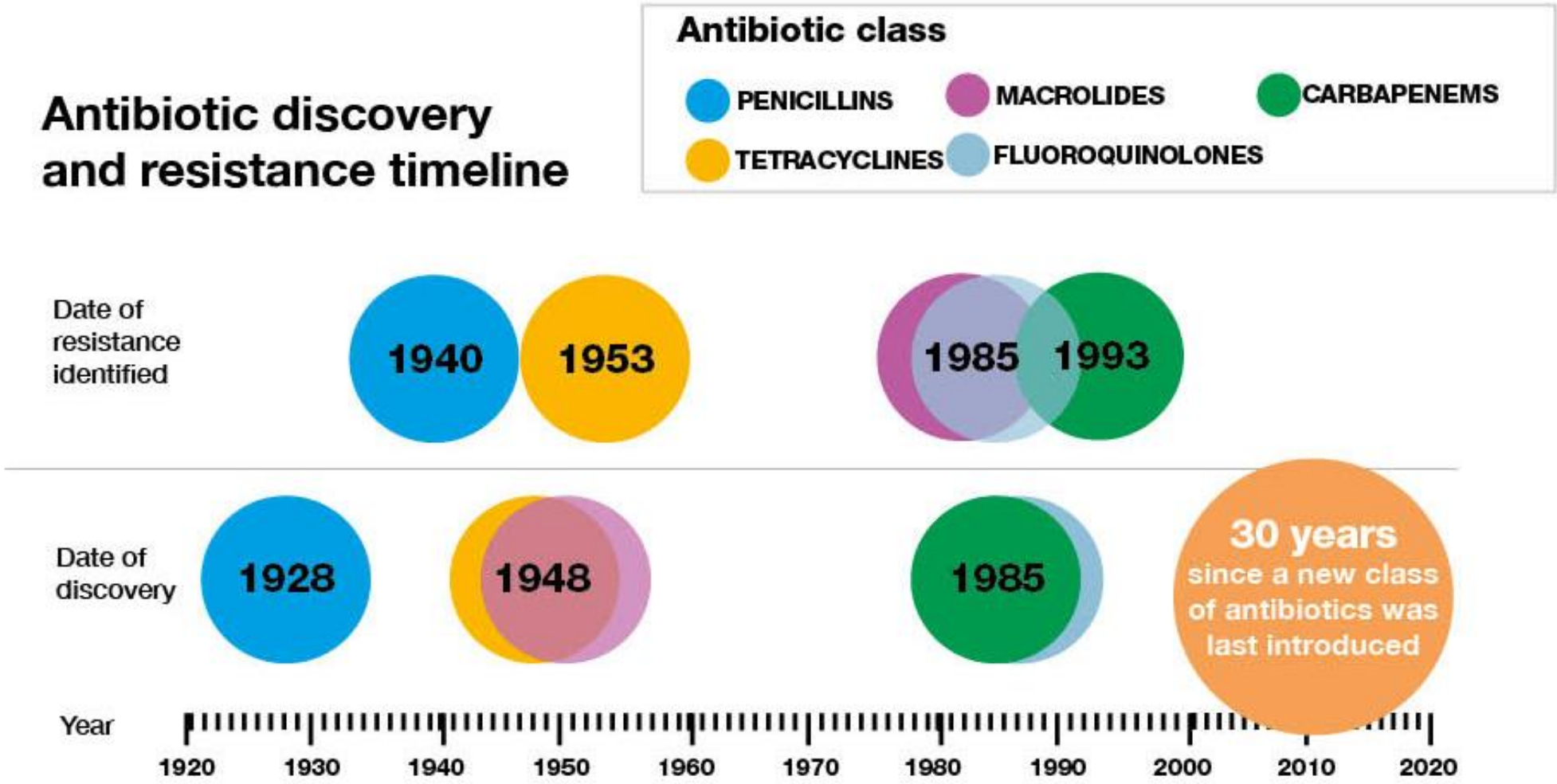
Alexander Fleming could already see the future of antibiotic misuse.

" There is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant."

1942 Penicillin ushers the antimicrobial era

1947 *Staphylococcus aureus* shows resistance against penicillin

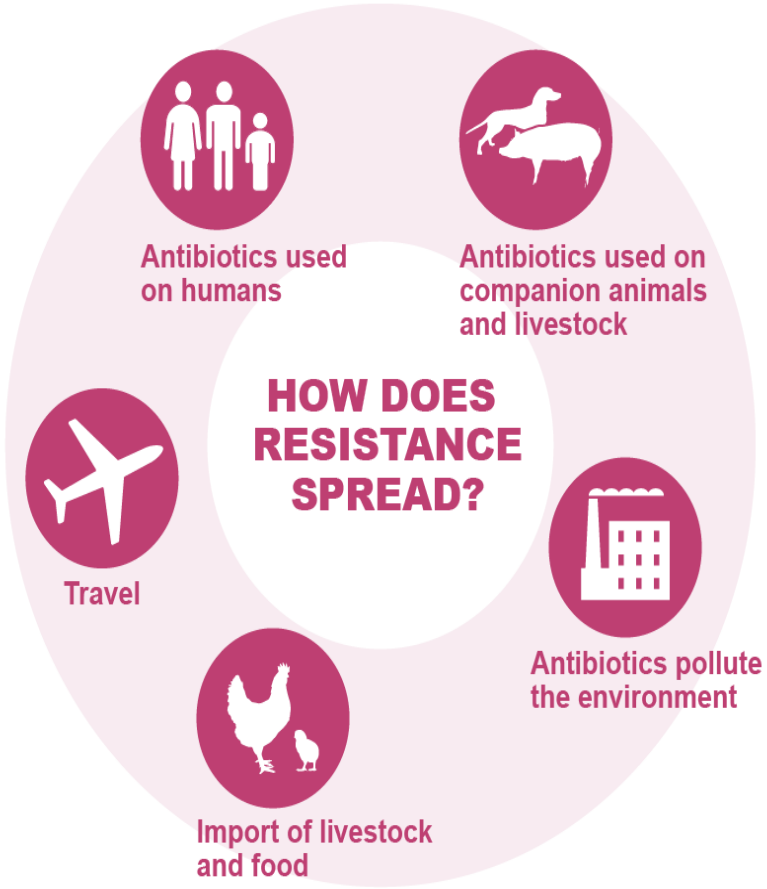




PHE GUIDANCE, HEALTH MATTERS: ANTIMICROBIAL RESISTANCE

ANTIBIOTIC RESISTANCE

(antimicrobial resistance)

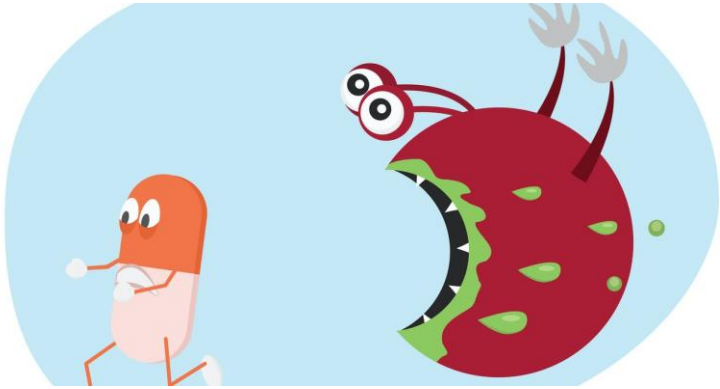


NATIONAL INSTITUTE FOR HEALTH AND WELFARE

Source: THL 2018

ANTIBIOTIC RESISTANCE AT PATIENT LEVEL

- Resistant bacteria persist up to 6 months or more
- Patients colonised by resistant bacteria more likely to develop an infection with these resistant bacteria than with susceptible variants of the same bacteria
- Antibiotic-resistant bacteria can spread to another person



RESISTANT INFECTIONS

Delay in appropriate antibiotic therapy

- Worse patient outcomes
- Death

Increased hospital length of stay

Alternative antibiotics need to be used

- Increased likelihood of adverse effects
- Cost implications
- Oral antibiotics may not be available

ANTIBIOTIC RESISTANCE RATES IN BLOOD CULTURES

Co-amoxiclav resistance

E-coli **: 48%** in Swansea

(approaching 60% in UHW)

Klesbsiella: **30%** in Swansea

(around 50% in Newport)

Tazocin resistance

E-coli bacteraemias **: 13.5%** in Swansea

(approaching 34% in Wrexham hospital)

Klesbsiella bactaraemias: **26%** in Swansea

(around 50% in Newport)

1 Prevent infections by regularly washing your hands and keeping up to date with vaccinations

2 Prevent food-borne infections by washing fruits and vegetables and cooking food properly

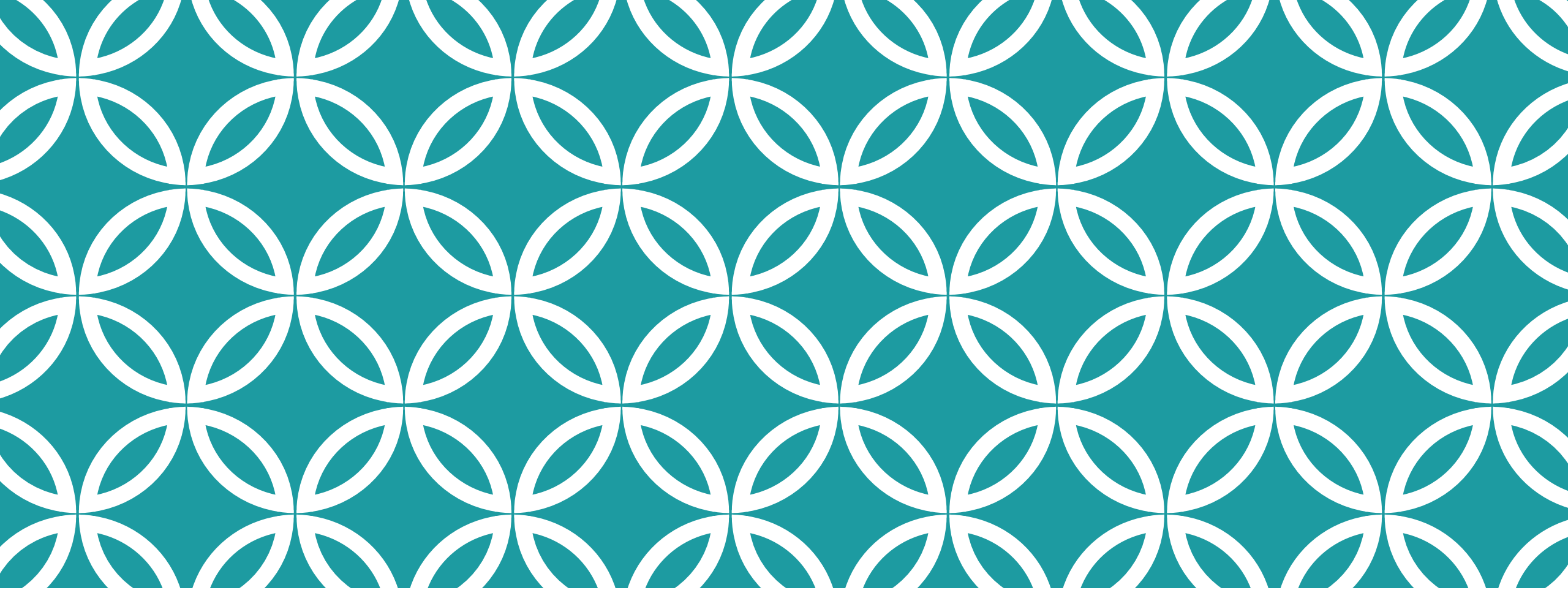
3 Understand that antibiotics only work against bacteria. They do not work for colds and flus which are caused by viruses

4 Don't pressure your health professional for antibiotics if they say you don't need them, ask about other ways to relieve your symptoms

5 Only take antibiotics when they are prescribed for you, don't use or share leftover antibiotics

6 Follow your health professional's instructions when you are prescribed antibiotics

CURRENT RESEARCH IN THIS FIELD



C. *DIFFICILE*

WHAT IS *C. DIFFICILE*?

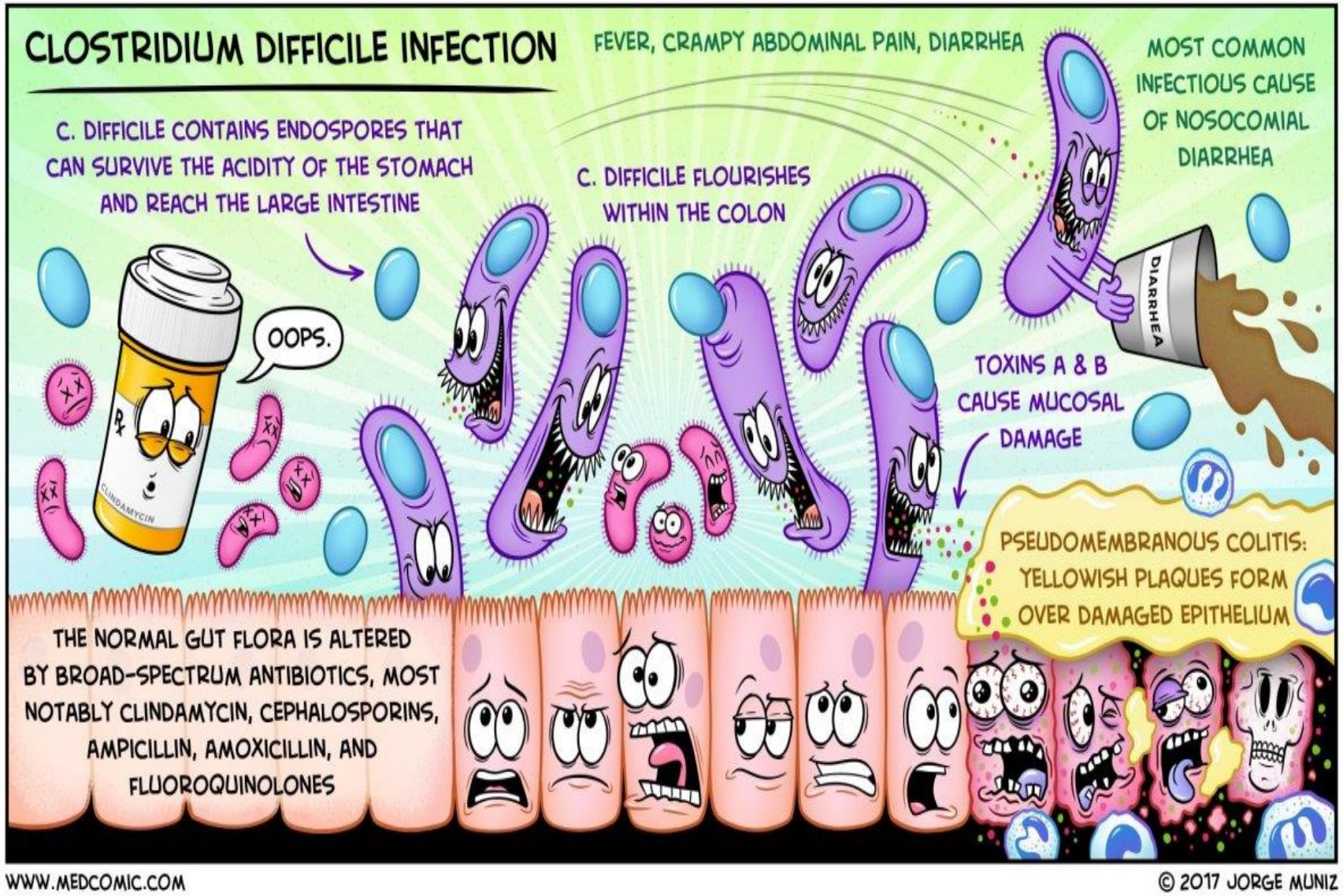
Clostridium difficile (C. *difficile*) is a gram-positive, spore-forming, anaerobic bacillus found in the gut. It can be found in healthy people, where it causes no symptoms

C. *difficile* causes disease when the normal bacteria in the gut are disadvantaged, usually by someone taking antibiotics.

C. *difficile* diarrhoea is caused by toxins produced by certain strains which attacks the intestines causing mild to severe disease.

C. *difficile* can lead to serious infections of the intestines with severe inflammation of the bowel (pseudomembranous colitis).

You can become infected with C. difficile if you ingest the bacterium (through contact with a contaminated environment or person).


CLOSTRIDIUM DIFFICILE INFECTION
FEVER, CRAMPY ABDOMINAL PAIN, DIARRHEA
MOST COMMON INFECTIOUS CAUSE OF NOSOCOMIAL DIARRHEA
C. DIFFICILE CONTAINS ENDOSPORES THAT CAN SURVIVE THE ACIDITY OF THE STOMACH AND REACH THE LARGE INTESTINE
C. DIFFICILE FLOURISHES WITHIN THE COLON
OOPS.
CLINDAMYCIN
DIARRHEA
TOXINS A & B CAUSE MUCOSAL DAMAGE
PSEUDOMEMBRANOUS COLITIS: YELLOWISH PLAQUES FORM OVER DAMAGED EPITHELIUM
THE NORMAL GUT FLORA IS ALTERED BY BROAD-SPECTRUM ANTIBIOTICS, MOST NOTABLY CLINDAMYCIN, CEPHALOSPORINS, AMPICILLIN, AMOXICILLIN, AND FLUOROQUINOLONES
WWW.MEDCOMIC.COM
© 2017 JORGE MUNIZ

CLOSTRIDIUM *DIFFICLE (NEW NAME=* ***CLOSTRIDIOIDES DIFFICILE)***

Infections usually a result of health care interventions (Health-Care Acquired Infection)

Strong links to prior antibiotic therapy:

- Any antibiotic may increase risk
- Risks additive with multiple antibiotics and longer courses
- Risk varies between agents
- Broad spectrum higher risk than narrow spectrum

- May be preventable in some cases if more appropriate antibiotics used

High Risk (broad-spectrum)	Low Risk (narrow-spectrum)
Quinolones e.g. ciprofloxacin, ofloxacin, levofloxacin	Clarithromycin
Clindamycin	Erythromycin
3rd generation Cephalosporins e.g. cefotaxime, ceftazidime, Ceftriaxone	Amoxicillin
2nd generation Cephalosporins e.g. cefuroxime, cefaclor	Rifampicin
Co-amoxiclav	Doxycycline*
Co-trimoxazole	Glycopeptides e.g. vancomycin, teicoplanin
1st generation Cephalosporins e.g Cefalexin	Metronidazole
Carbapenems e.g. meropenem, imipenem, ertapenem	Benzyl penicillin / Penicillin V
Aminoglycosides e.g gentamicin, tobramycin, amikacin	Flucloxacillin
Piperacillin and Tazobactam	Nitrofurantoin
	Trimethoprim

*Doxycycline was the only antibiotic found to have no association with *C.difficile* infections in the 3 meta-analysis reviewed by NICE

RISK FACTORS

- Increased age (>65 years)
- Antibiotic treatment
- Prolonged hospitalisation or residence in nursing home
- History of CDI
- Exposure of other cases
- Current use of PPIs or other acid-suppressive drugs
- Underlying co-morbidities i.e CKD, Ca, immunospression.

ACID SUPPRESSION

Often patients have no clear indication for prescription

Review all patients receiving PPIs/H_2-antagonists on admission

If receiving antibiotics-aim to withhold if possible

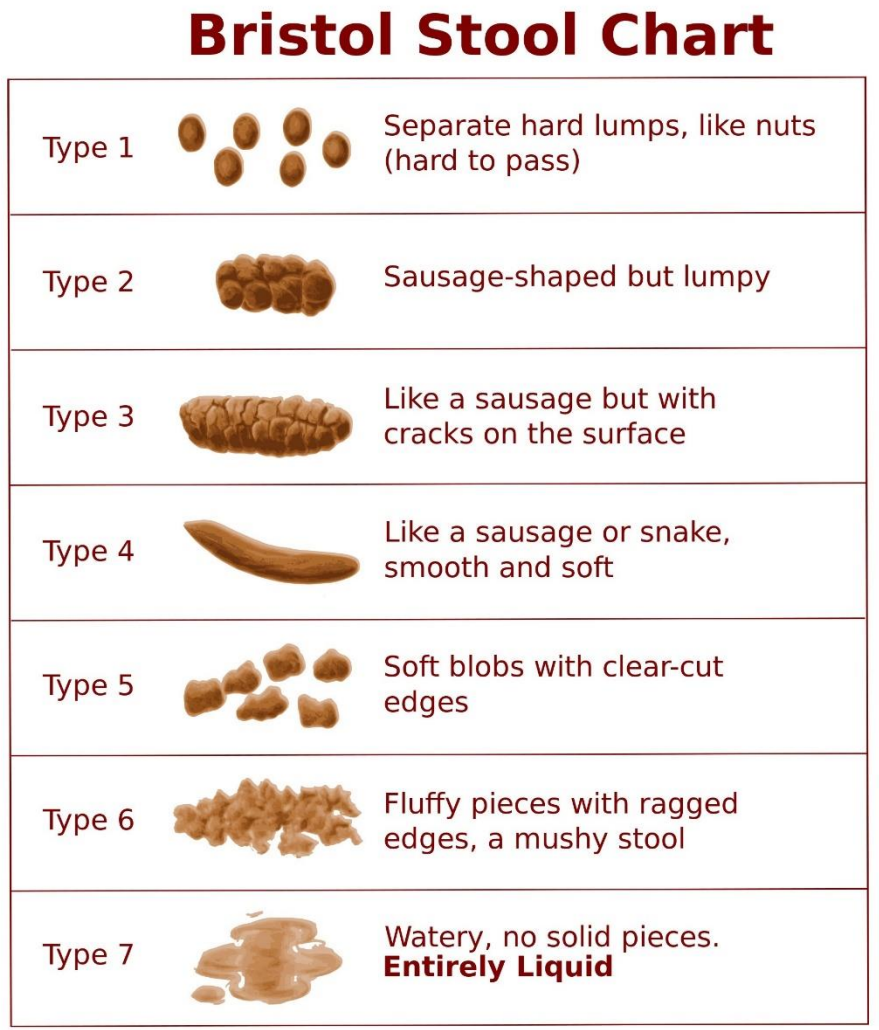
Prescribe PRN Peptac for rebound dyspepsia

Conditions where they should not be stopped:

- Barrett's oesophagus
- Recent GU/DU
- Benign oesophageal stricture
- Patients with GORD who also receive aspirin

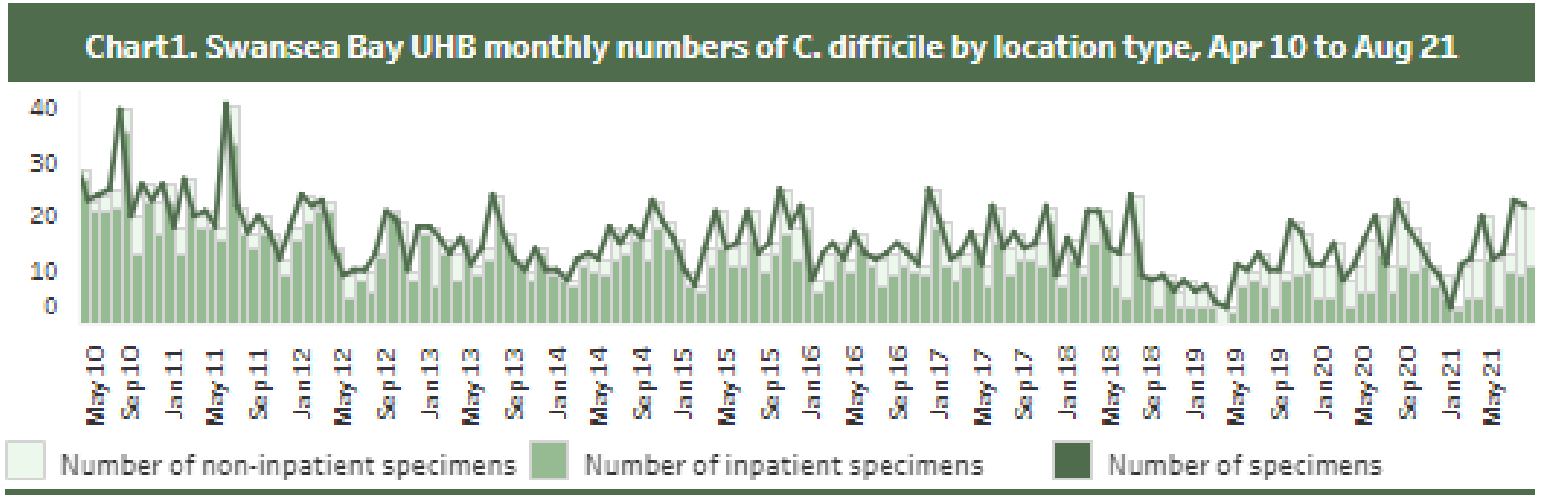
HOW TO DIAGNOSE *C.DIFFICILE*

- Symptoms (Bristol stool chart type 5-7 stools)
- Collect stool sample for PCR testing
- NEWS scoring
- FBC, U&E's
- Look for signs of colitis (abdominal examination or radiological)



Higher than same period of previous FY

	C. difficile	
	Number of Specimens	Summary FY Rate
Aneurin Bevan UHB	101	40.28
Betsi Cadwaladr UHB	93	31.54
Cardiff and Vale UHB	62	29.32
Cwm Taf Morgannwg UHB	71	37.65
Hywel Dda UHB	63	38.56
Powys THB	5	8.97
Swansea Bay UHB	90	54.92
Velindre NHST	2	
Wales	487	36.85



Financial Year	Total number of samples	Number of inpatient specimens	Number of non-inpatient specimens	Proportion of non-inpatient cases
2021/2022 (to date)	90	45	45	50%
2020/2021	160	88	72	45%
2019/2020	138	78	60	43%
2018/2019	129	77	52	40%
2017/2018	189	142	47	25%
2016/2017	175	129	46	26%
2015/2016	200	148	52	26%

CASE STUDY

85 year old female Mrs R presents with a 3 day history of profuse offensive diarrhoea (type 5-7). No previous history of diarrhoea.

Recent discharge from hospital following admission for Urosepsis (treated with 7 days of Tazocin).

PMHx; hypertension and gastritis

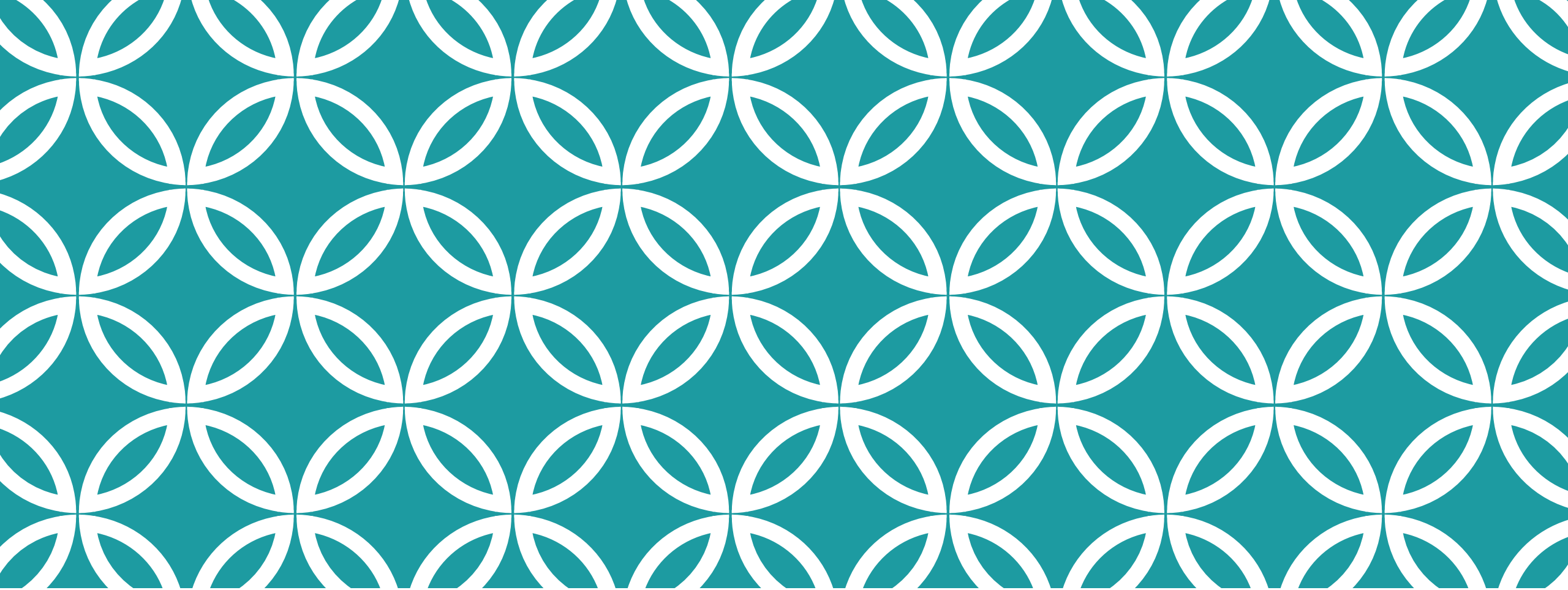
PDHx: omeprazole 20mg OD, simvastatin 40mg nocte, indapamide 2.5 mg OD

OTC lopermaide 2mg QDS PRN over the last 48 hours

1. What would be your clinical suspicion? What tests would you perform?

2. What risk factors does the patient have for this infection?

3. What medications should be reviewed following diagnosis of this infection?



CONSIDERATIONS FOR ANTIMICROBIAL PRESCRIBING


Antibiotic stewardship
Enhancing infection prevention and control
Controlling the source of infection
Prescribing antibiotics when they are truly needed
Prescribing appropriate antibiotic(s) with adequate dosages
Using the shortest duration of antibiotics based on evidence
Reassessing treatment when culture results are available
Supporting surveillance of AMR and HAIs and monitoring of antibiotic consumption
Educating staff
Supporting an interdisciplinary approach

INAPPROPRIATE USE OF ANTIBIOTICS?

Prescribing antibiotics unnecessarily

Delaying antibiotic treatment unnecessarily in critically ill patients

Using broad spectrum antibiotics too generously or narrow-spectrum antibiotics incorrectly

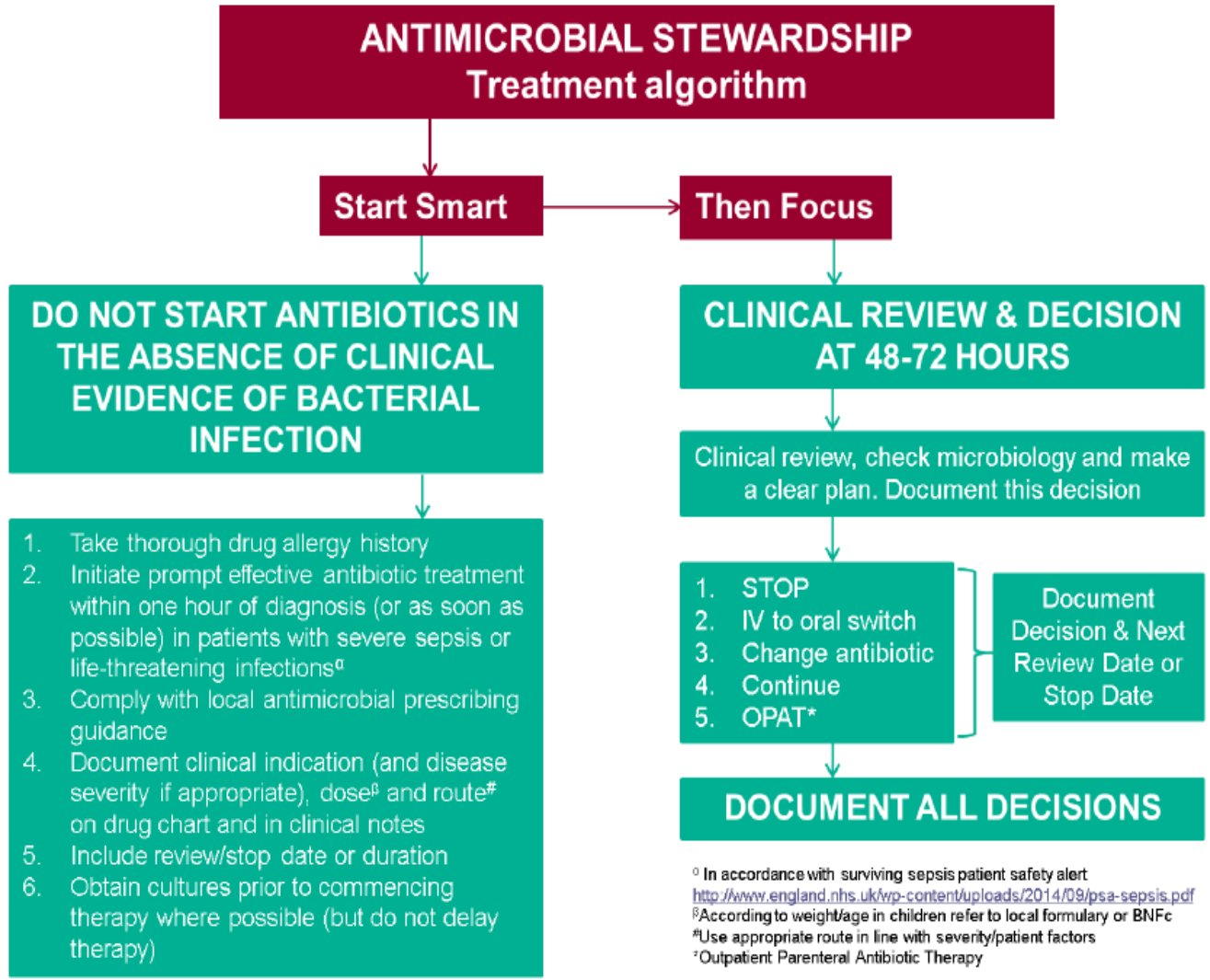
Inappropriately high or low doses in a specific patient

Too long or short courses

Not streamlining treatment after the culture results received

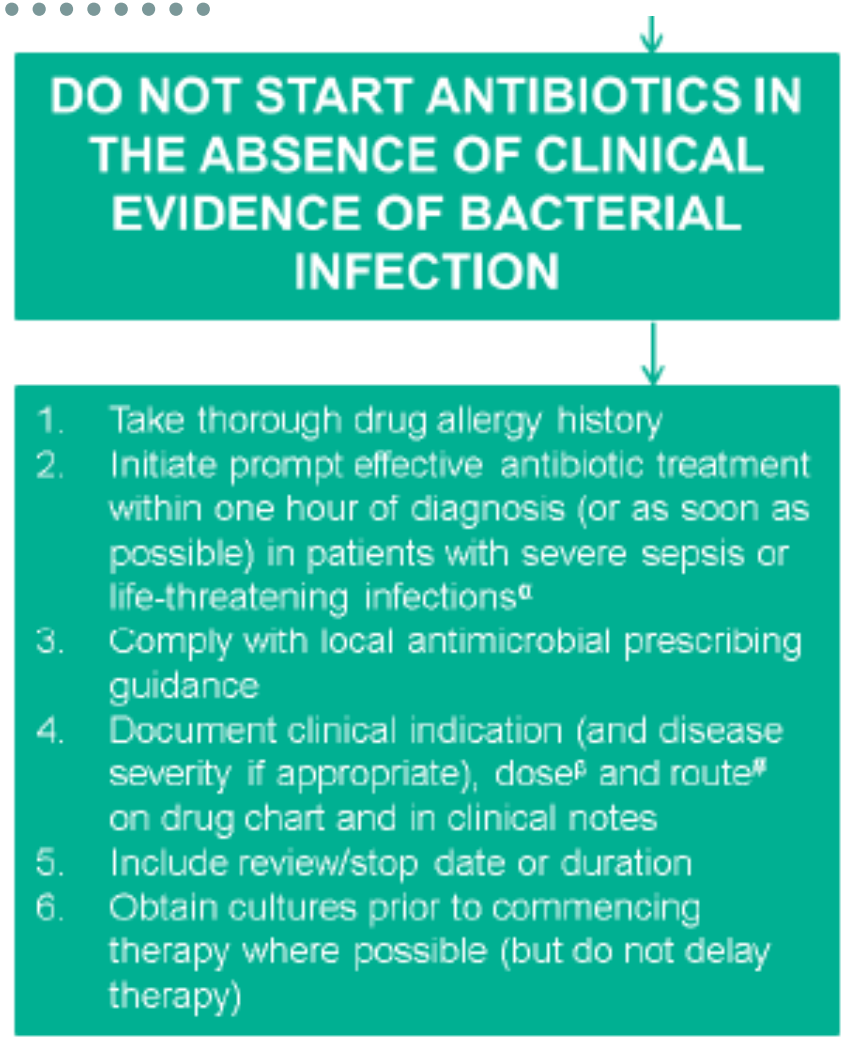
Omitting or delaying doses of antibiotics

Figure 1: Antimicrobial Stewardship (AMS) – Treatment algorithm



Advocating patient safety and auditing of antimicrobial stewardship in hospitals should be based around the principles stated in this AMS algorithm. Examples of audit tools are shared in Appendix 1

"START SMART……"


DO NOT START ANTIBIOTICS IN THE ABSENCE OF CLINICAL EVIDENCE OF BACTERIAL INFECTION
1. Take thorough drug allergy history
2. Initiate prompt effective antibiotic treatment within one hour of diagnosis (or as soon as possible) in patients with severe sepsis or life-threatening infections[α]
3. Comply with local antimicrobial prescribing guidance
4. Document clinical indication (and disease severity if appropriate), dose[β] and route[#] on drug chart and in clinical notes
5. Include review/stop date or duration
6. Obtain cultures prior to commencing therapy where possible (but do not delay therapy)

EMPIRICAL ANTIBIOTICS

When is empirical treatment indicated?

- When pathogen and/or antibiotic sensitivities are uncertain (best guess)

What two main factors determine how effective empirical treatment will be?

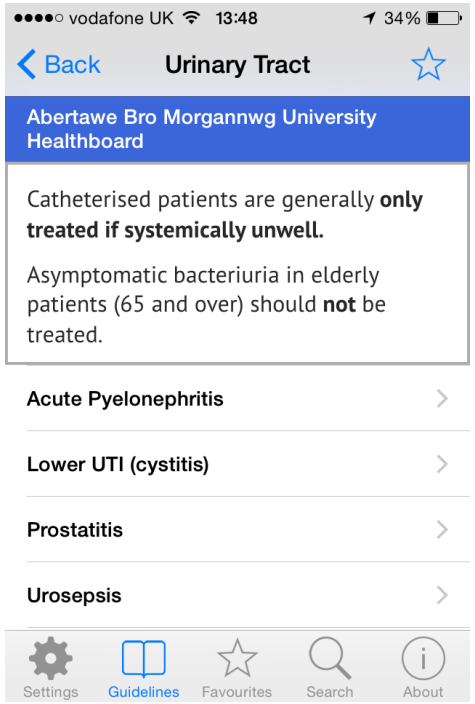
- Local pathogen epidemiology data
- Local antibiotic sensitivity data

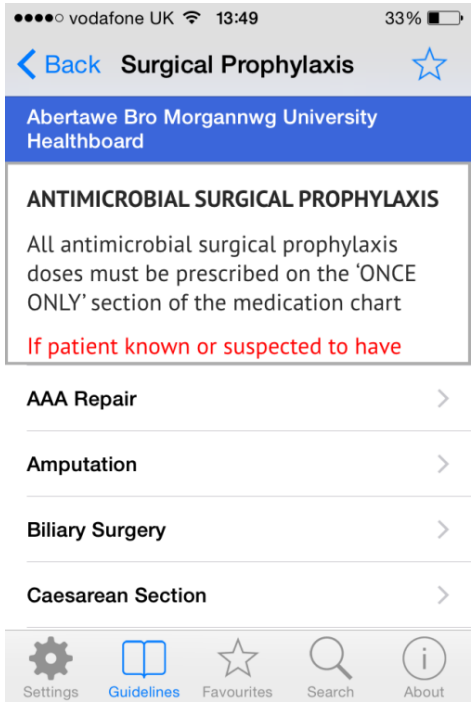
How should empirical therapy evolve when following best practice?

- Streamline to narrow-spectrum antibiotic when sensitivities are available
- Don’t use a sledgehammer to crack a nut!!

GUIDELINES


MicroGuide


vodafone UK 13:48 34%
Back
Urinary Tract
Abertawe Bro Morgannwg University Healthboard
Catheterised patients are generally only treated if systemically unwell.
Asymptomatic bacteriuria in elderly patients (65 and over) should not be treated.
Acute Pyelonephritis
Lower UTI (cystitis)
Prostatitis
Urosepsis
Settings
Guidelines
Favourites
Search
About

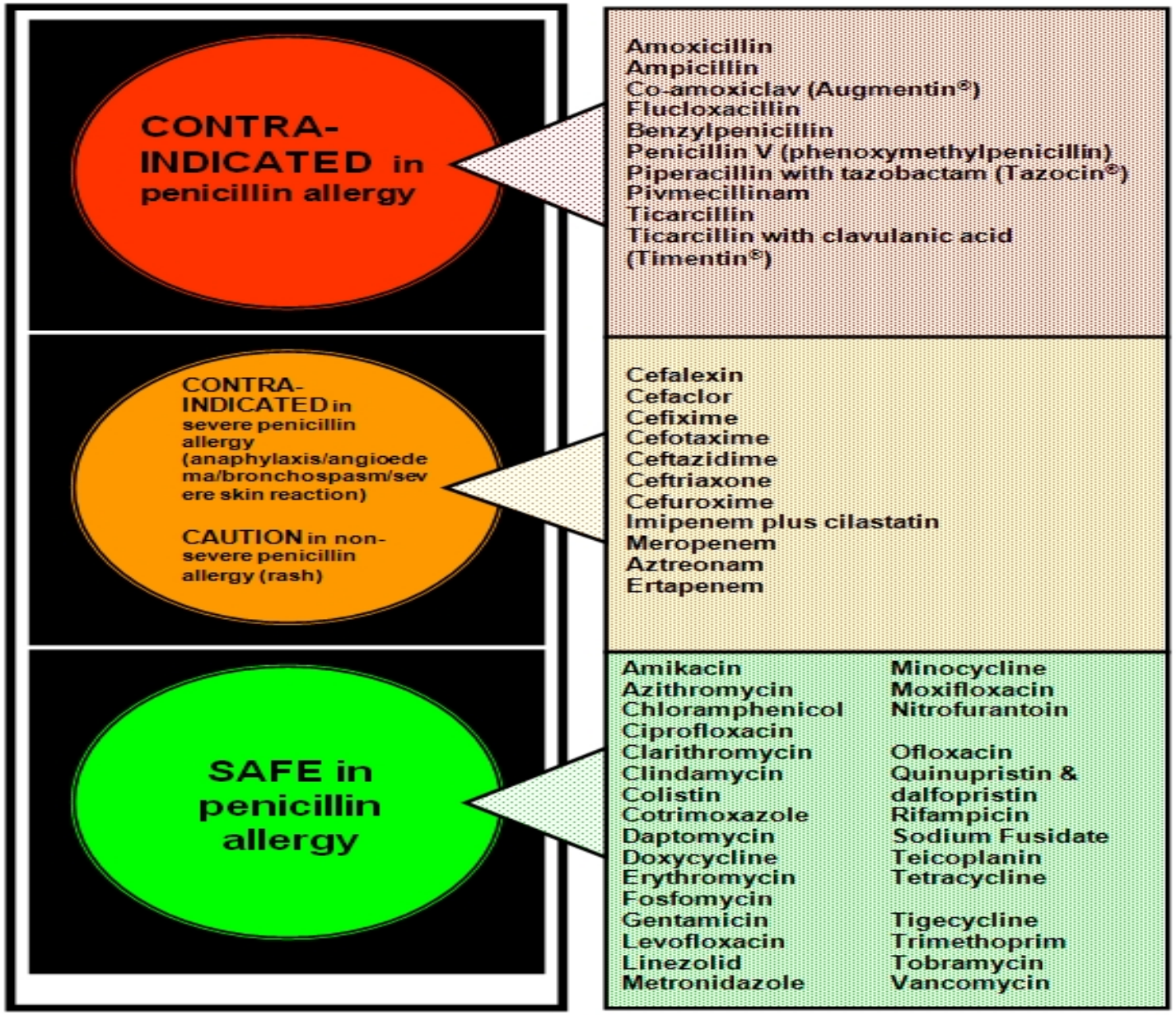

vodafone UK 13:49 33%
Back
Surgical Prophylaxis
Abertawe Bro Morgannwg University Healthboard
ANTIMICROBIAL SURGICAL PROPHYLAXIS
All antimicrobial surgical prophylaxis doses must be prescribed on the 'ONCE ONLY' section of the medication chart
If patient known or suspected to have
AAA Repair
Amputation
Biliary Surgery
Caesarean Section
Settings
Guidelines
Favourites
Search
About

CASE STUDY 1

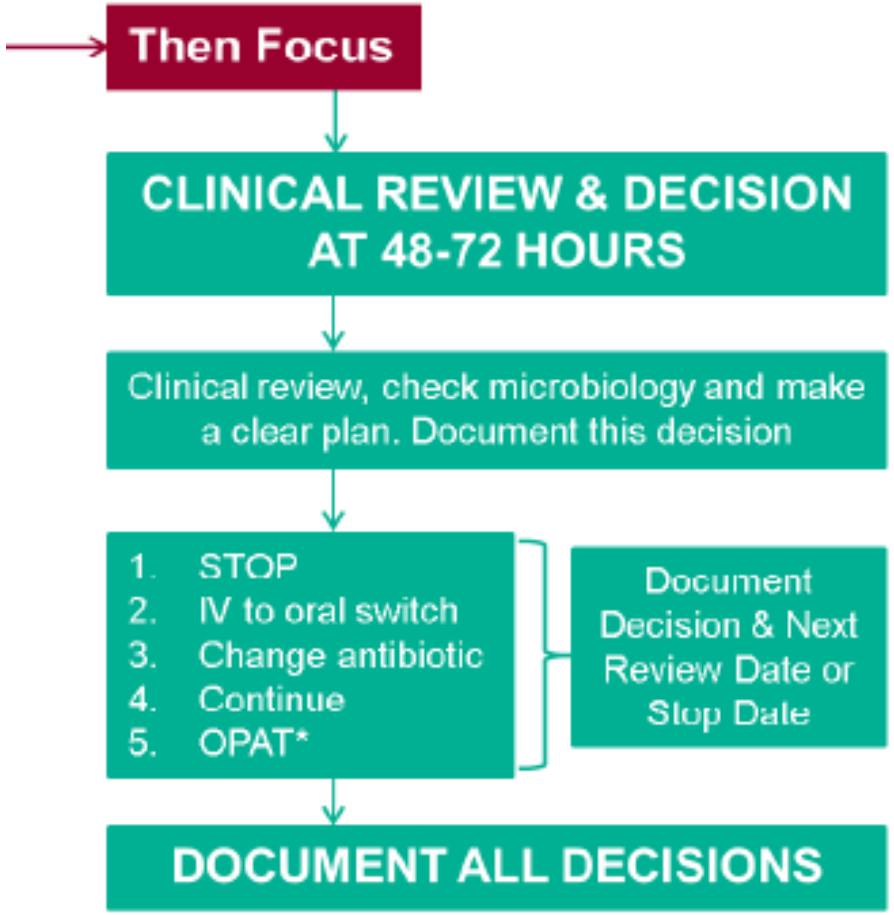
- Mr. Jones (75 years old) tells you that he is allergic to penicillin (rash). Which of these antibiotics are safe for you to prescribe for him?

- **Flucloxacillin**
- **Meropenem**
- **Co-amoxiclav**
- **Doxycycline**
- **Azithromycin**
- **Ciprofloxacin**
- **Amoxicillin**
- **Cefotaxime**
- **Clindamycin**
- **Piperacillin/tazobactam**

PENICILLIN ALLERGY



….THEN FOCUS”


Then Focus
CLINICAL REVIEW & DECISION AT 48-72 HOURS
Clinical review, check microbiology and make a clear plan. Document this decision
1. STOP
2. IV to oral switch
3. Change antibiotic
4. Continue
5. OPAT*
Document Decision & Next Review Date or Stop Date
DOCUMENT ALL DECISIONS

INTERPRETING C&S RESULTS

Timing

- In relation to symptoms/signs of infection
- Before antibiotic started?

Consider natural flora

Patient

- Are they unwell?
- Treat the patient, not the result
  - Exceptions:
    - Positive culture results from sites that are usually sterile
    - Skin flora usually contaminants unless the sample has been taken aseptically

COLONISATION & INFECTION

Infection

- Invasion of the body or a body part by a **pathogenic** organism, which multiplies and produces **harmful** effects on the body's tissues.

Colonisation

- the presence and multiplication of microorganisms without tissue invasion or damage

STERILE SITES IN THE HUMAN BODY

	Sterile	Normal Floral
Liver		
Skin		
Mucous Membranes		
Lungs		
Colon		
Blood		
Brain		
Middle and Inner ear		

STERILE SITES IN THE HUMAN BODY

	Sterile	Normal Floral
Liver	X	
Skin		X
Mucous Membranes		X
Lungs	X	
Colon		X
Blood	X	
Brain	X	
Middle and Inner ear	X	

CASE STUDY

1. Is *S. epidermis* Gram positive or Gram negative?

2. Where is *S. epidermis* it normally found?

3. Would you treat this infection?

4. What if the sample was from a joint aspirate?

MICROBIOLOGY

Name: *A. Flemming*	**Unit number:** *1234*	**DOB:** *6/5/51*
Consultant: *Mr Baker*		**Ward:** *Surgical*
Specimen: *Skin swab R hip*	**Tests required:** *Culture & sensitivity*	
Clinical details *Revision total hip replacement. Bone graft L Iliac Crest.*		
Current antibiotic therapy: *None*		
Doctor's name: *Smith*		**Date:** *10.9.2018*

MICROSCOPY

Staphylococcus epidermidis		
	Co-trimoxazole	S
	Ciprofloxacin	S
	Clindamycin	R
	Doxcycyline	S
	Gentamicin	S
	Erythromycin	R
	Flucloxacillin	S

IV TO ORAL SWITCH

Patients receiving IV antibiotics should be switched to oral antibiotics if they meet ALL the following inclusion criteria and NONE of the exclusion Criteria

Inclusion Criteria

- Clinical Improvement observed
- Oral Route not compromised (vomiting, malabsorption, NBM, swallowing difficulties, unconscious, severe diarrhoea)
- Markers showing a trend toward normal – temp >36˚C and <38˚C for the last 24 hours and blood pressure stable
- No more than one of the following – pulse more than 90beats/min, resp rate more than 20 breaths/min, WCC <4 or >12 x10^9/L
- Suitable preparation

IV TO ORAL SWITCH

Exclusion Criteria

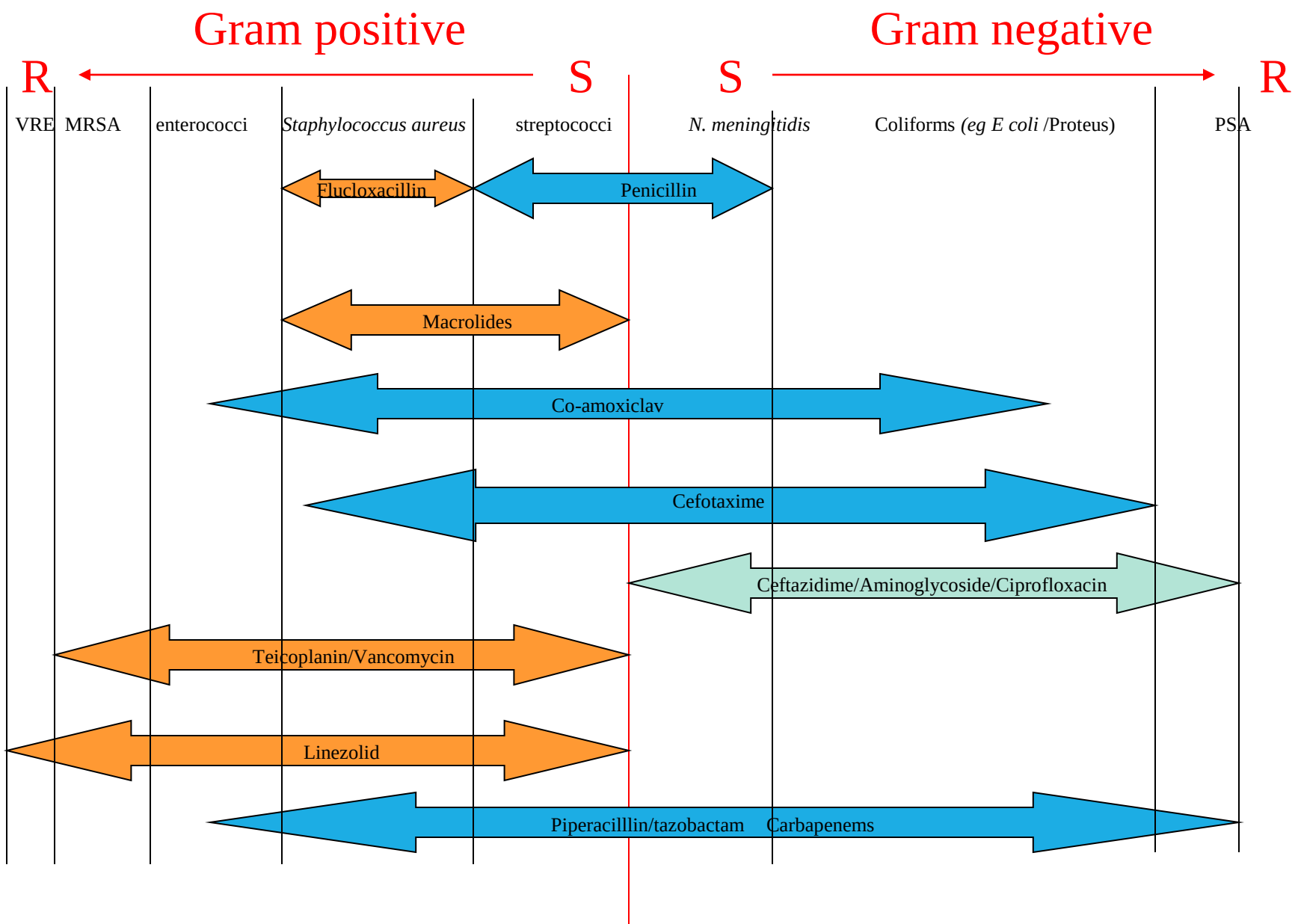
- Specific indication/deep-seated infection. Discuss with microbiology before switching patients with high risk/deep-seated infections.

- Deep seated infections that may require an initial two weeks of IV therapy – osteomyelitis, liver abscess, septic arthritis, empyema.

- High risk infections requiring prolonged IV therapy - meningitis/encephalitis, staphylococcus aureus bacteraemia, neutropenic sepsis, endocarditis, infected implants/prosthesis

A *pragmatic* junior doctor's guide to antibiotic spectra*

*some organisms have acquired resistance, spectra have been simplified; anaerobes/atypicals not included



SUMMARY

What you can do?

- Only use antibiotics when they are clinically indicated – prescribed in accordance to guideline/ or C+S results, at the correct dose for the shortest duration possible
- Always take a thorough drug allergy status and de-label allergies when possible
- Seek advice from microbiology for the more complex infections/ guidance on IV switches to oral if needed

THANK YOU

Any Questions?