Workshop on the role of the nurse and pharmacist in supporting AMS in the Gulf, Middle East & North Africa

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Disclosures

Prof Philip HOWARD

- No disclosures

Dr Nesrine RIZK

- No disclosures

What we have covered in the other workshops

- AMS interventions: pre-authorisation & prospective audit & feedback, IVOS, PK monitoring & feedback, short vs long courses
- Low hanging fruit: AMS priorities
- Guidelines: develop, implement & evaluate & post-prescription review
- Antibiotic prescribing metrics: quaLity & quantity

What can pharmacists and nurses deliver?

Aims & objectives of workshop

- Aim of this workshop are to explore the roles of pharmacists & nurses in supporting AMS:
- At the end of the workshop, delegates should be able to:
  - Describe how ward or IPC nurses can support AMS
  - List AMS activities that clinical or dispensary based pharmacists can deliver
  - Identify roles for a pharmacist in an AMS team

Who are we?

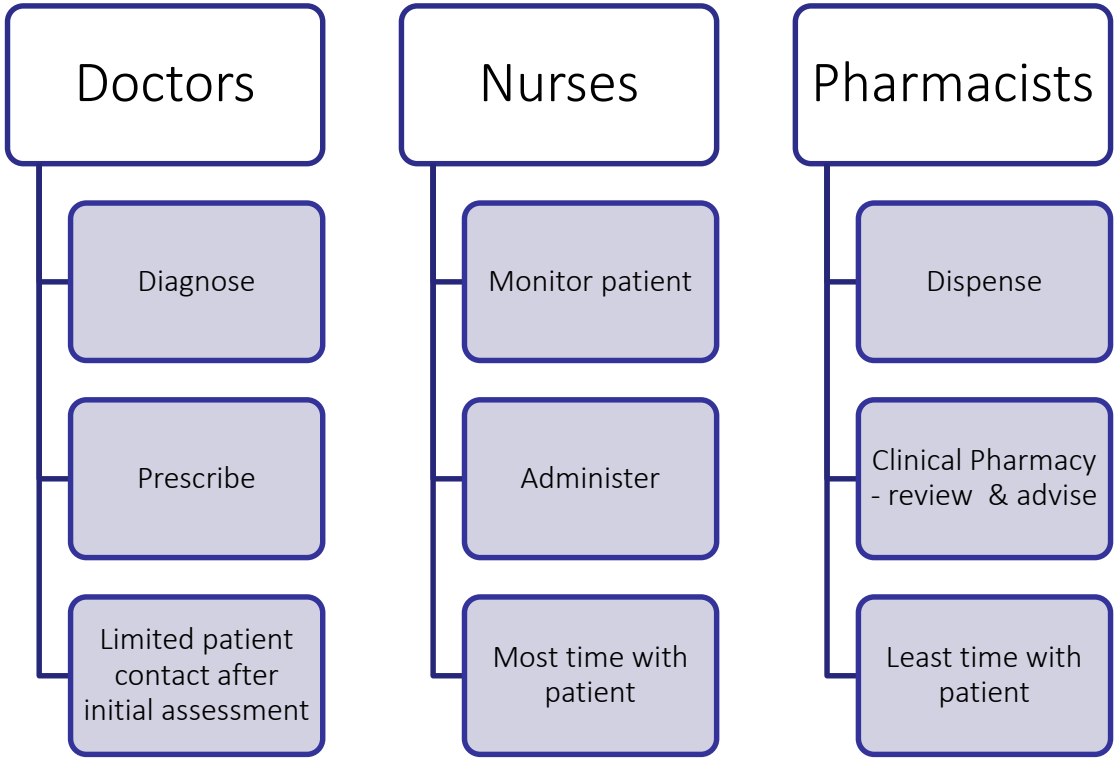
Hands up if you are:

- Doctor
  - Infectious diseases
  - Microbiologist
  - Intensivist
  - Other
- Nurse
  - IPC nurse
  - Ward based nurse
- Pharmacist
  - AMS pharmacist
  - Clinical pharmacist
  - Other

What AMS resource do you have?

- Very low: no or low numbers of IPC nurse(s) AND no AMS / ward pharmacists?
- Low: many IPC nurses BUT no AMS / ward (clinical) pharmacists?
- Medium: many IPC nurses, BUT some clinical (ward-based) pharmacists and a single AMS pharmacist?
- High: high numbers of clinical (ward-based) pharmacists and 1 or more AMS pharmacists AND many IPC nurses?

Traditional healthcare roles



What is antimicrobial stewardship?

Patient	• Optimise AB Rx to improve outcome & ensure patient safety • Limit AMR emergence
Multidisciplinary	• Team: physician, pharmacist, nurse • Optimise patients AB Rx
Hospital	• One or more teams • Co-ordinated by AMS committee
Community	• Primary care clinics, general practice(s), long-term care homes • Animal health: Farm or farms
National	• Using regulation & legislation to define access to AB • who can Rx AB
Global	• Co-ordinate national action plans, regional networks

Mendelson. Nature May-17. AMR has a language problem

UK AMS Structure & Governance 2015: Start Smart then Focus

Accountability at hospital executive / board level

- Drug & Therapeutics Committee, IPC & AMS teams

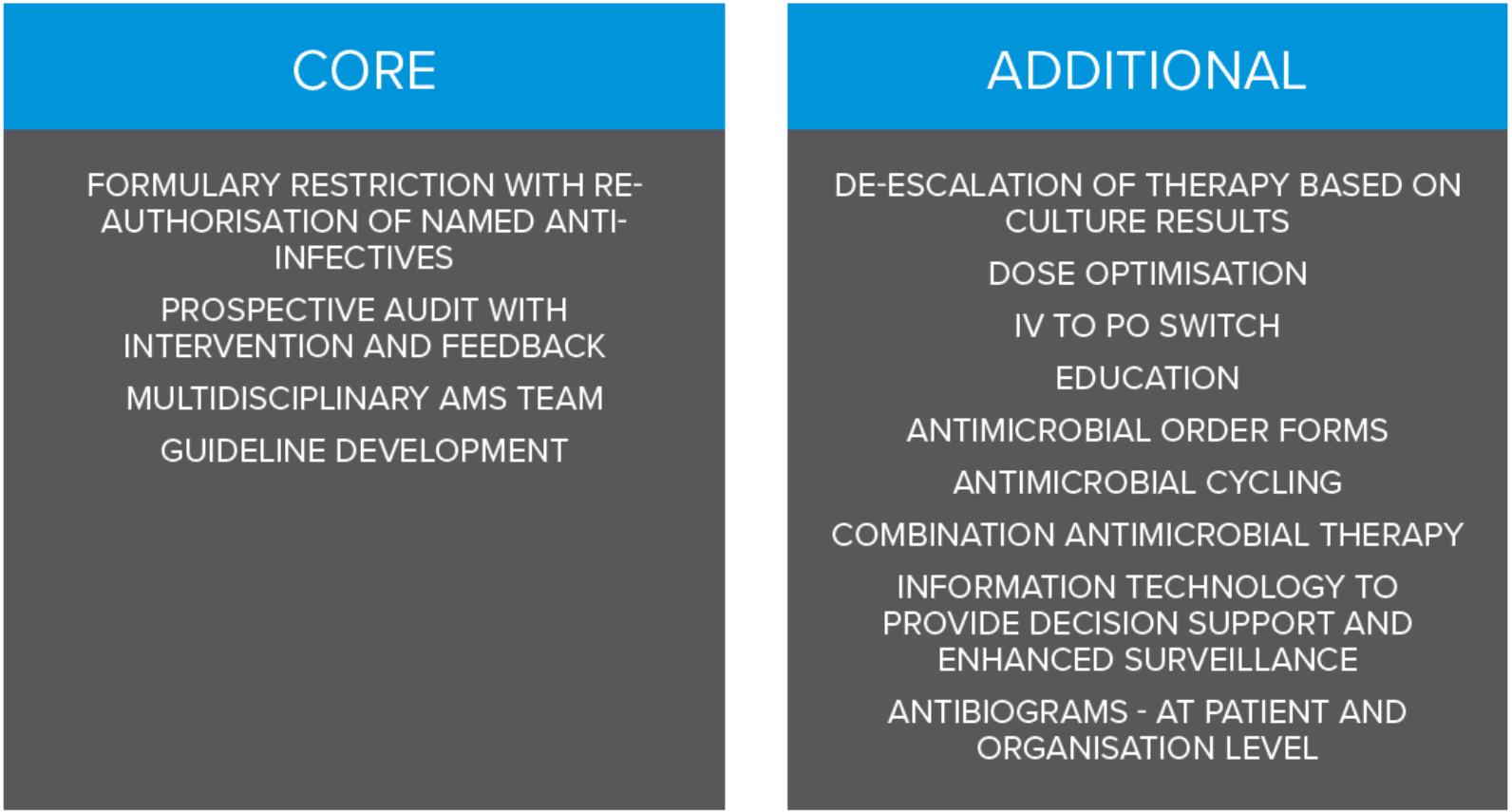
Dedicated resource

- core team of ID or micro doctor and clinical pharmacist

AMS Committee - Core team plus

- Acute care physician, surgeon, anaesthetist, paediatrician
- Senior (chief) pharmacist, senior nurse
- Primary care rep (whole health economy approach).
- Lead IPC doctor & IPC Nurse, Sepsis lead

AMS Strategies



Pharmacists & Nurses already play key AMS roles in hospital

Advance Access published December 18, 2014
Journal of Antimicrobial Chemotherapy

An international cross-sectional survey of antimicrobial stewardship programmes in hospitals

P. Howard[1]*, C. Pulcini[2,3], G. Levy Hara[4], R. M. West[5], I. M. Gould[6], S. Harbarth[7] and D. Nathwani[8] on behalf of the ESCMID Study Group for Antimicrobial Policies (ESGAP) and ISC Group on Antimicrobial Stewardship

Table 3. Average AMS programme resource hours per week, $n=337$

	Africa ($n=12$)	Asia ($n=25$)	Europe ($n=190$)	North America ($n=49$)	Oceania ($n=14$)	South and Central America ($n=44$)	Mean
Antimicrobial or infectious diseases pharmacist ($n=320$)	6	13	18	32	17	9	18
Infectious diseases doctor ($n=284$)	3	8	8	15	6	12	10
Medical microbiologist ($n=308$)	8	6	11	5	1	7	9
Infection control staff ($n=220$)	9	9	8	6	1	8	8
Nurse ($n=199$)	8	7	3	4	0	14	6
Administrative support ($n=202$)	4	6	2	6	2	7	4
Data analyst ($n=201$)	5	2	3	9	2	5	4
Other pharmacist ($n=199$)	8	3	2	7	0	9	4
Doctors in training ($n=188$)	5	3	3	5	8	4	4
Other medical specialty ($n=199$)	5	5	2	1	0	8	3
Pharmacy technician ($n=188$)	4	2	2	1	0	8	3
Scientist or laboratory staff ($n=179$)	7	3	1	2	0	7	3
Surgeon ($n=201$)	4	5	1	1	0	3	2

Country	FTE / 1000bed	Staff type per 1000 acute care beds (Pulcini CMI 2017, Greene ICHE 2020, Maeda 2019 JInfChemother)
Australia	4	At least 100 hours (3 FTE) of senior pharmacist and 35 hours (1 FTE) of lead clinician time per week
Canada	4.9	Physician: 1.0 FTE, Pharmacist: 3.0 FTE, Project/Programme Admin & Coordination Support: 0.5 FTE & Data Analyst: 0.4 FTE
Austria & Germany	2	At least one ID physician(or clinician with ID training) and an experienced clinical pharmacist/hospital pharmacist, plus a specialist in microbiology.
France	6.7	3.6 FTE infection specialists (medical doctors, ideally ID) 2.5 FTE pharmacists, 0.6 FTE microbiologists
Netherlands	3	Hospital <300 beds: 1.25 FTE, Hospital 300-750 beds: 2.14 FTE Hospital >750 beds: 3.0 FTE per year
USA	4	Hospital >1000 beds. 1 FTE physician, 3 FTE pharmacists
Japan	2.4	>500 beds 0.8 FTE physician, 1.6 pharmacist

Only recommendations for nursing are for infection prevention 0.4-1 FTE/100 beds

Is there evidence for AMS?

Schuts meta-analysis: strong evidence[1]

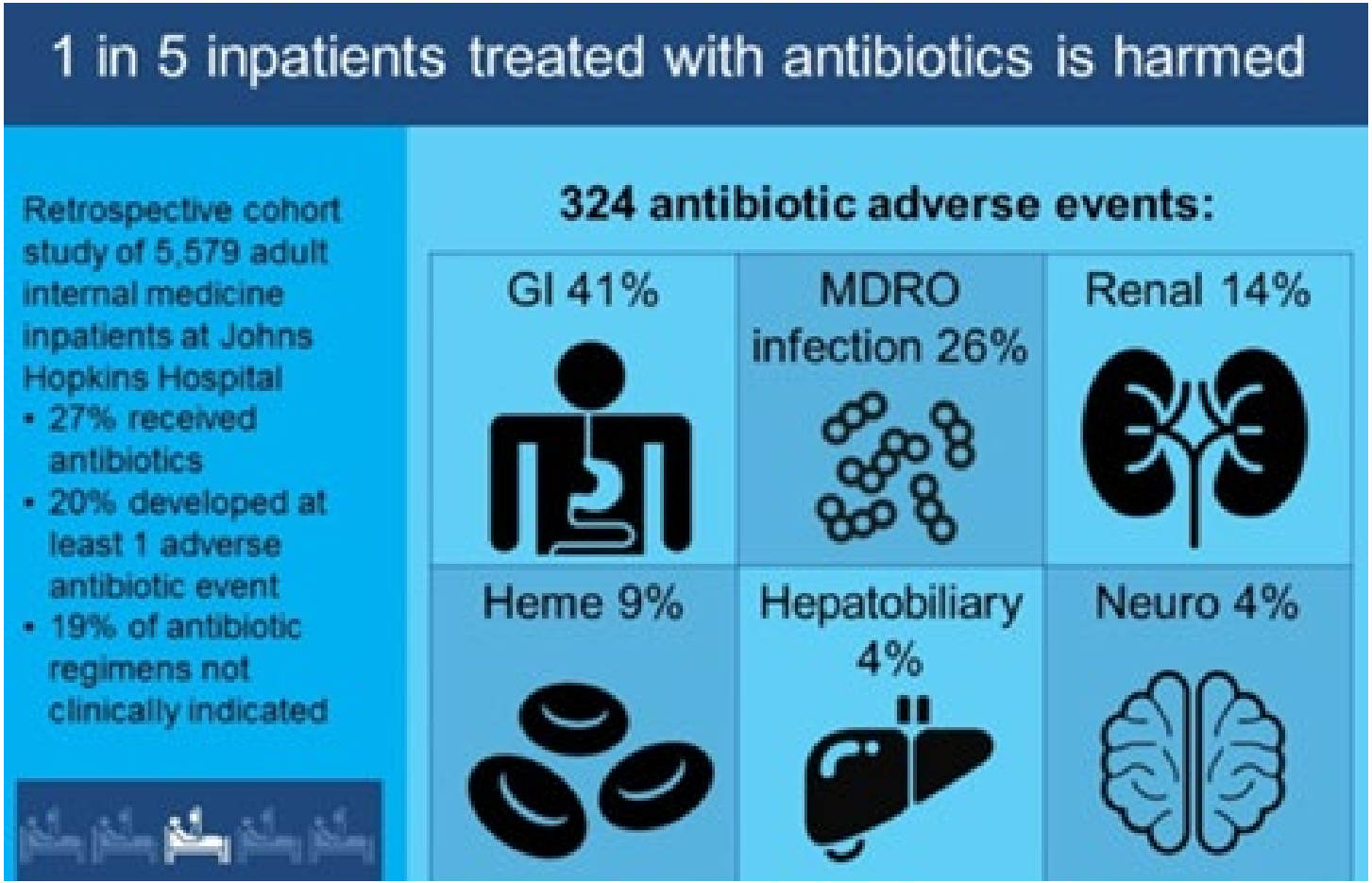
- ↓ mortality: empirical guideline adherence (35%↓ RRR), de-escalation based on C&S (66%↓ RRR), bedside consultation for *S.aureus* bacteraemia)
- IV to oral switch = ↓Length of stay + ↓$$$$, ↑cure
- Therapeutic Drug Monitoring: ↓ nephrotoxicity
- restricted antibiotics: ↓ use (but ↑ non-restricted) + ↓AMR

Taconelli (Baur) – meta-analysis of AMS on AMR

- ↓AMR G+ve -43% (MRSA -49%), G-ve -28% (CRE -48%)

AMR: antimicrobial resistance; CRE: Carbapenem-resistant Enterobacteriaceae; C&S: culturing and samples; IV: intravenous; LOS: length of stay; MRSA: methicillin-resistant Staphylococcus aureus; TDM: therapeutic drug monitoring

Schuts EC, et al. Lancet Infect Dis 2016; 16(7): 847-56. Baur, Lancet Infect Dis 2017 17(9): 990-1001

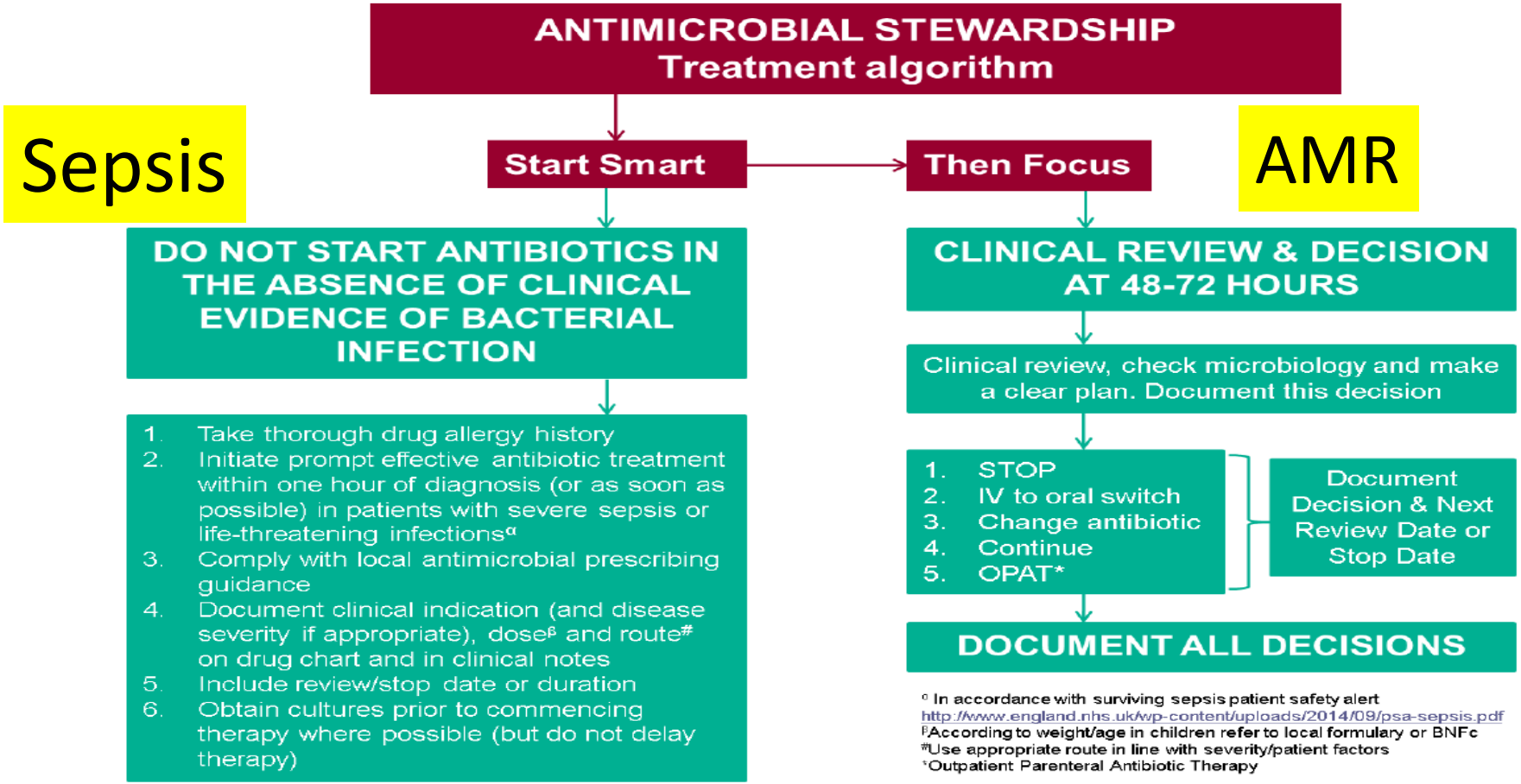


Leeds THT: 30% of 190,000 annual admissions get an antibiotic = 38,000 patients harmed per year

104 patients per day

Tamma JAMA 2017

Figure 1: Antimicrobial Stewardship (AMS) – Treatment algorithm



Regular audit & feedback of these processes are essential to drive improvement

What AMS roles do your nurses & pharmacists play depending on resources?

From your own hospitals experience what roles do they play?

Spend 7 minutes listing what works well & what are the barriers for different scenarios

1. **Very low**: no or low numbers of IPC nurse(s) AND no AMS / clinical (ward) pharmacists?
2. **Low**: many IPC nurses but no AMS / ward pharmacists?
3. **Medium**: many IPC nurses, but some clinical (ward-based) pharmacists and a single AMS pharmacist?
4. **High**: high numbers of clinical (ward-based) pharmacists and 1 or more AMS pharmacists AND many IPC nurses?

5 min max feedback on AMS roles of nurses & pharmacists play depending on resources?

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Nurses role in AMS

- Duration of treatment (ward rounds)
- Route of antimicrobial administration (IVOS)
- Timing of antimicrobial administration (1st dose)
- Appropriate sampling (eg urine)
- Therapeutic drug monitoring (taking bloods etc)
- Outpatient Antibiotic Therapy (OPAT)
- Education of nurses / ward rounds

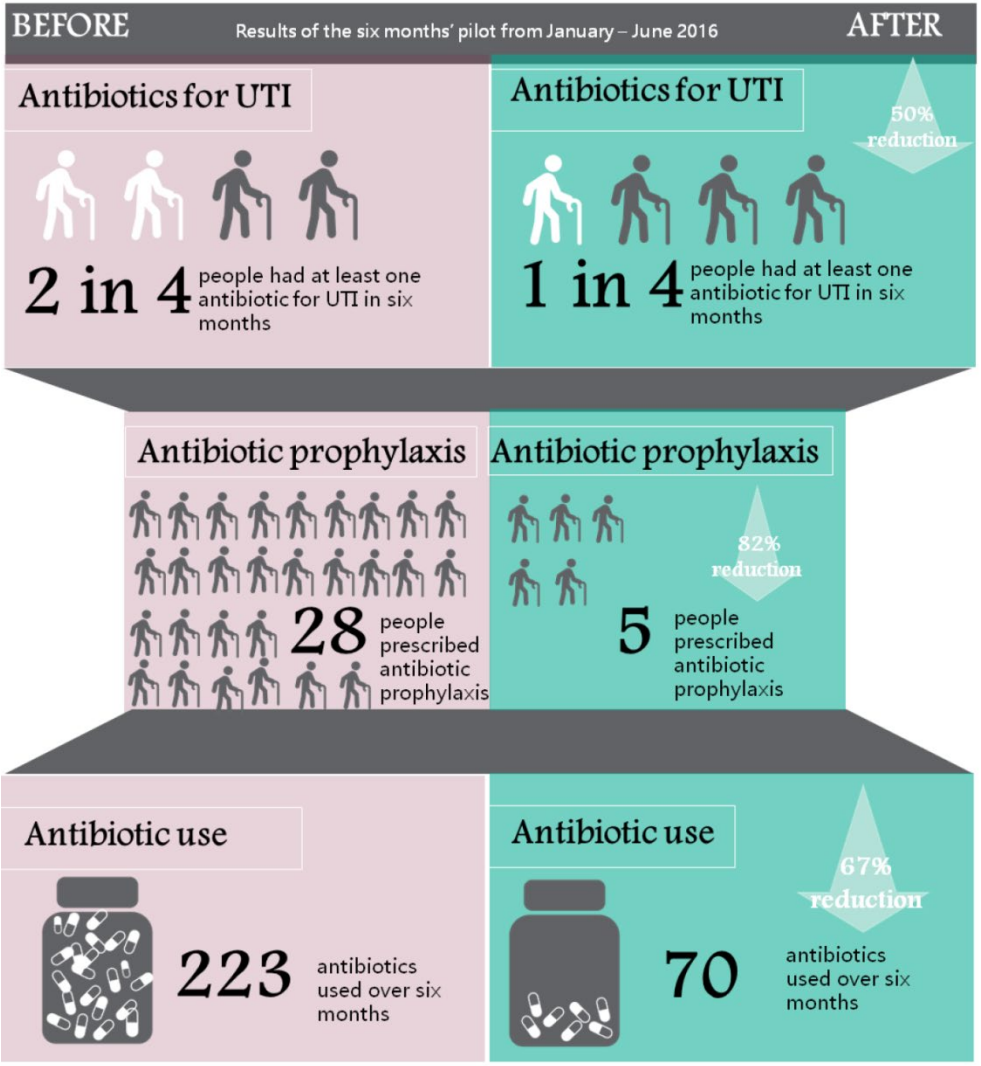
Relatively stable work force / organisational memory Edwards JInfPrev 2011

AMS pharmacy - complimentary roles

AMS strategy	Medical Lead	Pharmacy lead
AMS Committee	AMS Chair – better medical engagement	AMS committee Professional Secretary - Good at organising committees
Guidelines and policies	Diagnosis, investigations, non antimicrobial treatment, local drug choice	Drug dosing, processes eg. IVOS, AMS policy, new AB review
Audit & feedback	Feedback to difficult audiences	Tools, doing & feedback
Education	AMS ward rounds - diagnosis & investigations	Antibiotic related, e-learning
Surveillance	Antimicrobial resistance	Antimicrobial usage
Individual patient advice	Treatment failures Telephone support	Dose optimisation (TDM), ITU infusions, OPAT management
Miscellaneous		Formulary & restriction IT systems: web, Apps, etc Patient safety (incidents, systems, prescriptions), communication, shortages

New world of Infection Teams

- Merge IPC, sepsis & AMS teams to maximise efficacy & increase manpower.
- Senior leadership – ideally medical director
- Joint meetings incorporating all agendas at all levels
- Local ownership of infection (IPC, sepsis + AMS) by specialities
  - Develop champions or antibiotic guardians



Use of dipsticks in older people

- Inappropriate use of urine dipsticks to diagnose UTI in nursing homes & probably hospitals drive antibiotic use
- Example from Banes & NE Somerset shows how large improvements can be made

Journal of Hospital Infection 98 (2018) 232–235

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevier.com/locate/jhin

Short report

Optimization of the blood culture pathway: a template for improved sepsis management and diagnostic antimicrobial stewardship

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SUMMARY

Laboratory processing of blood cultures has remained static over the past 30 years, despite increasing antibiotic resistance and advances in analyser design. At the study hospital, siting the blood culture analyser in the blood sciences laboratory and optimizing the pre-analytical and analytic phases of blood culture management resulted in a reduction in the time taken to detect most blood culture isolates to <12 h. Fifty percent of positive blood cultures containing *Escherichia coli* were definitively reported with antibiotic susceptibilities in <24 h. More than 85% of blood cultures positive for *E. coli* had antibiotic susceptibilities reported within 36 h of collection, compared with 66 h at a comparator hospital.

12% higher blood culture positivity rate if taken before antibiotics given vs within 90 minutes after. (31.4% vs 19.4% Cheng 2019 AnnIntMed
https://annals.org/aim/article-abstract/2751453

Strategies to improve outcomes in sepsis.

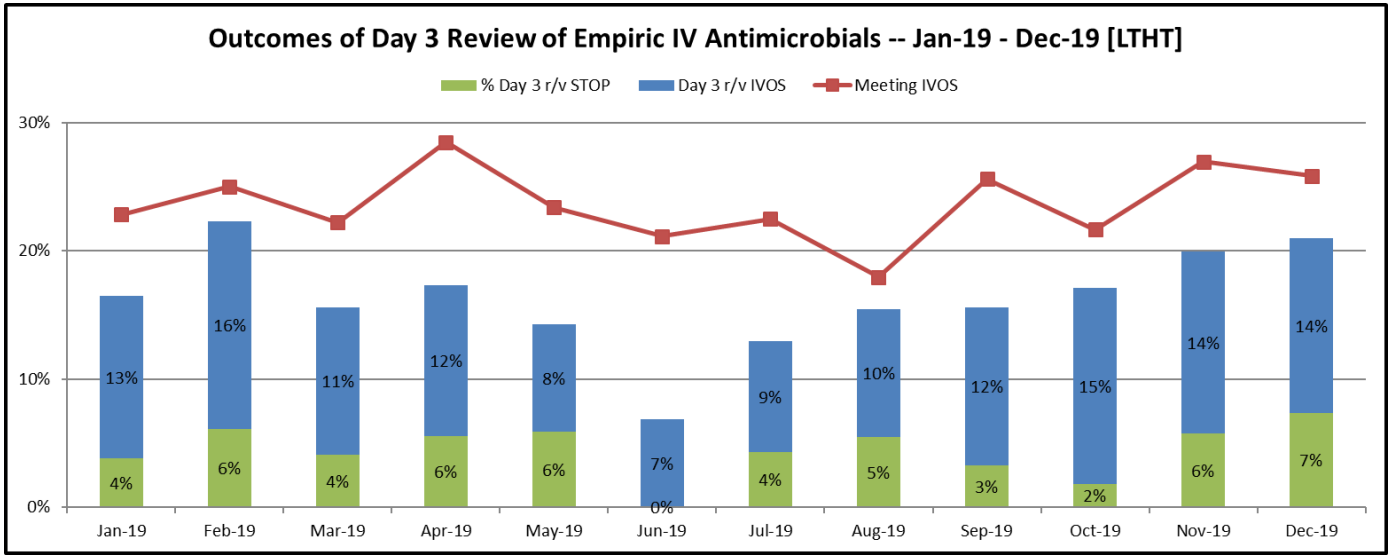
- SMI standard is 4hr from blood culture collection to incubation
- My hospitals struggles with specimens from St James' as pathology at LGI
  - 16% <4hr & 7% >10hr
- Weinbren study showed >85% Ecoli BSI within 36h vs 66h for comparators with effort to improve BC pathway.
- Scheer 2019 CMI 50.6% vs 27.7% blood culture positivity in patients with sepsis rate if taken before antibiotics given.
  https://www.sciencedirect.com/science/article/abs/pii/S1198743X1830449X

Use data from outcome of day 3 review of empiric antibiotics for efficient hospital working

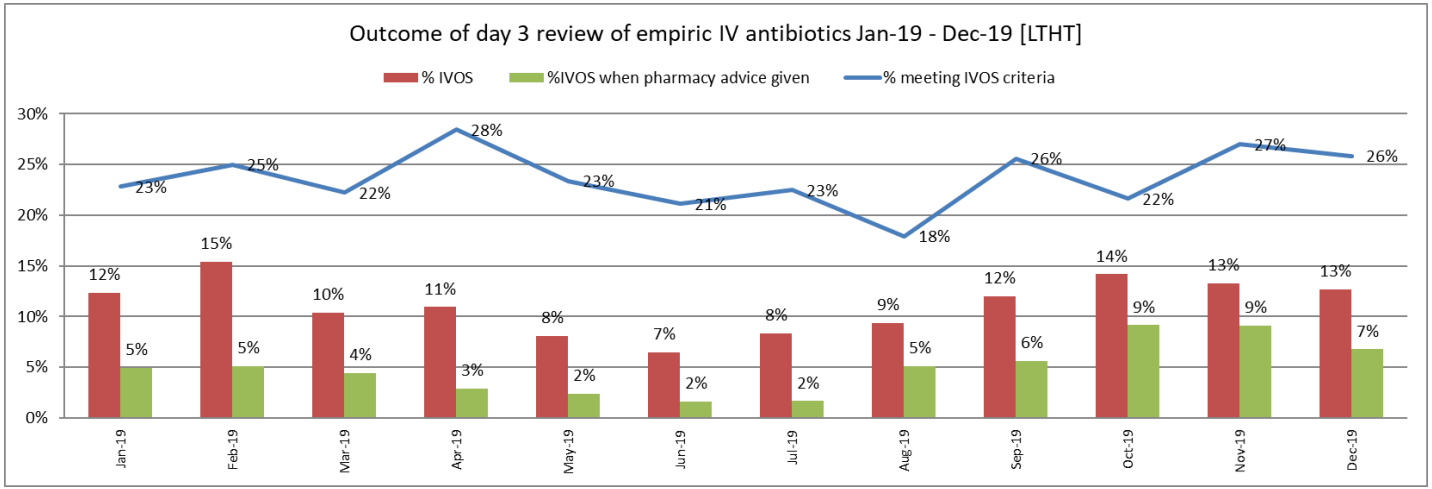
- **IV to oral switch** ↓ LOS by 6 days, £32/pt = free up beds Dryden 2012
- **IV antibiotics** take up lots of nursing time & cost more = 6.5 shifts/day & £450k/yr (per 1000 bed hospital) Smits 2016 Davey 2017
- **C.diff** linked to longer courses of ALL broad spectrum AB (incl pip-tazo & carbapenems). Cdiff **mortality** is ~20% at 28d & 30% at 90d. £4.5k & 3-18 LOS↑/pt & much higher nursing workload
- Less phlebitis (& probably less MSSA/MRSA BSI as 15% device related) Weber 2003
- **Netherlands:** only 37% continue (vs 65% UK). All pts seen at 48h by A-team. 0.1wte/ward. €475 saved per consultation 6x Return on investment (Dik et al., PLoS One. 2015; 10(5):e0126106)

How do we get physicians to review patients on IV antibiotics?

- Nurses or eRx report (duration, indication) of patients on IV antibiotics for ward / board rounds especially those eating and drinking.
  - ITU 20% ↓ AB use with nurse prompting review Raybardhan 2020 AJCC https://aacnjournals.org/ajcconline/article-abstract/29/1/71/30623
- Policy to document justification of those remaining on IV AB after day 3 & evidence of local IV – oral switch tool applied. State final diagnosis eg sepsis unknown origin is
- Audit by ward pharmacists / nurses of outcome of day 3 review and % meeting IVOS but not switched.
  - 50% of IVOS initiated by clinical pharmacists in my hospital



Example of a ward pharmacist audit each month.
Could be done by a AMS nurse, ward nurse or pharmacy technician.



Design systems to improve AMS

SHORT COURSE ANTIMICROBIALMEDICINES

All antimicrobials should be reviewed daily in accordance with the Trust Antimicrobial Medicines Code. This includes a clinical review and a review of microbiology tests. It should decide if it is appropriate to stop, switch IV to oral, change or continue the antimicrobial. The drug administrator should request a medical review if antibiotics have not been reviewed after 48hours. Prescribe long term antimicrobial therapy on regular section; prescribe procedure prophylaxis as single doses in once only section.

Check allergy status on front page and record here.

Antibiotic	Type of reaction

Drugs containing penicillins:
Amoxicillin, Flucloxacillin,
Co-amoxiclav (Augmentin),
Piperacillin /Tazobactam (Tazocin),
Cofluampicil (Magnapen),

Co-trimoxazole contains Trimethoprim and Sulfamethoxazole

For patients over 65 years - avoid cephalosporins, ciprofloxacin, and clindamycin except where recommended.

M E D I C I N E

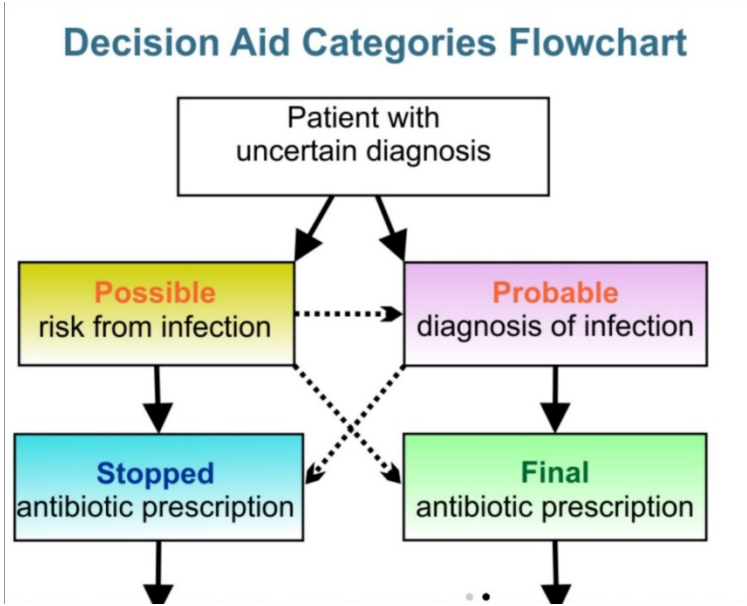
DOSE	microgram	mg	gram	other	Route	Additional information *(e.g. antimicrobial codes)*
Indication		Planned duration		Start date		
Print NAME		Contact Number		Sign	Date	Pharm / Supply

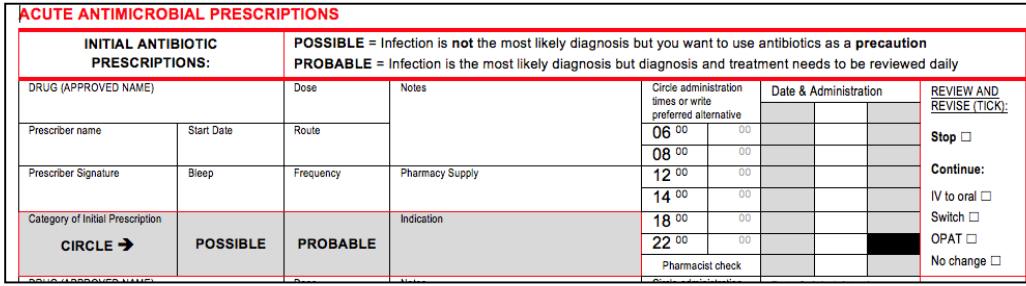
REVIEW CODES DAILY
Stop = S
IV to Oral = O
Oral to IV = V
Change drug = D
Continue = C

Daily Review - Document in notes.

Date	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7	
Time	Admin	Review Code	Admin	Review Code	Admin	Review Code	Admin	Review Code	Admin	Review Code	Admin	Review Code	Admin	Review Code
06														
08														
12														
14		Sign		Sign		Sign		Sign		Sign		Sign		Sign
18														
22														

Daily review to day 3 (ARK study)





Tells everybody that the diagnosis is not finalised

http://stage.antibioticreviewkit.org.uk/

Patients on IV antibiotics, is an oral switch possible? 4 Yes's = oral switch strongly encouraged

A - Afebrile >24hours

No | Yes

C - Clinically improving over the past 24hours

A. Improving signs and symptoms of infection B. No unexplained tachycardia C. Blood pressure stable with no unexplained hypotension D. Respiratory rate normal E. High white cell count is falling F. C-reactive protein (CRP) is falling

No | Yes

E - Eating suitable (oral antibiotic available and the patient is able to take it)

A: Can tolerate oral fluids or have fluids via a tube into the gut B: No signs of malabsorption

No | Yes

D - NOT suffering from certain Deep-seated/high-risk infections

A. Liver abscess B. Osteomyelitis, septic arthritis C. Inadequately drained abscesses or empyema D. Cavitating pneumonia E. Staphylococcus aureus bacteraemia F. Severe necrotising soft tissue infections G. Severe infection during chemotherapy related neutropenia H. Infected implants/prosthesis I. Meningitis/encephalitis J. Intracranial abscesses K. Mediastinitis L. Endocarditis

No | Yes

Antibiotic plan: (please ensure the antibiotic is correctly prescribed on the drug chart, with indication and duration, plus a microbiology code is needed for a restricted antibiotic)

Antibiotic(s):

Route (PO/IV)

PO

Review/Stop Date

Format MM/dd/yyyy

+ Add

Antibiotic stewardship **ACED**

Afebrile>24hrs

Clinically Improving Over last 24hrs

Eating

NOT – **D**eep seated infection

Consider IVOS

Pharmacist / nurse driven IVOS

Microbiology Code?

N/A | Yes

Advice from:

- ☐ Micro / infectious diseases
- ☐ Antimicrobial pharmacist
- ☐ Guidelines
- ☐ Other

Reason for continuing same IV AB e.g. N/A or Reason

Consider stopping antibiotics if no clinical and no microbiological evidence of infection.

All guidelines should have oral switch antibiotic if no +ve micro

Cancel

Submit

Antibiotic course durations: shorter is better?

Stewardship: Shorter = Better

Diagnosis	Short (d)	Long (d)	Result	#RCTs
CAP	3 or 5	7-14	Equal	9
VAP	8	15	Equal	2
Pyelo	7 or 5	14 or 10	Equal	7
Intra-abd	4	10	Equal	2
GNB Bacteremia	7	14	Equal	1*
AECB	≤5	≥7	Equal	>20
Cellulitis	5-6	10	Equal	4*
Chronic Osteomyelitis	42	84	Equal	2
Septic Arthritis	14	28	Equal	1
Ortho Implant w/removal	28	42	Equal	1
Neutropenic Fever	AFx72 h	+ANC>500	Equal	1
P. vivax Malaria	7	14	Equal	1

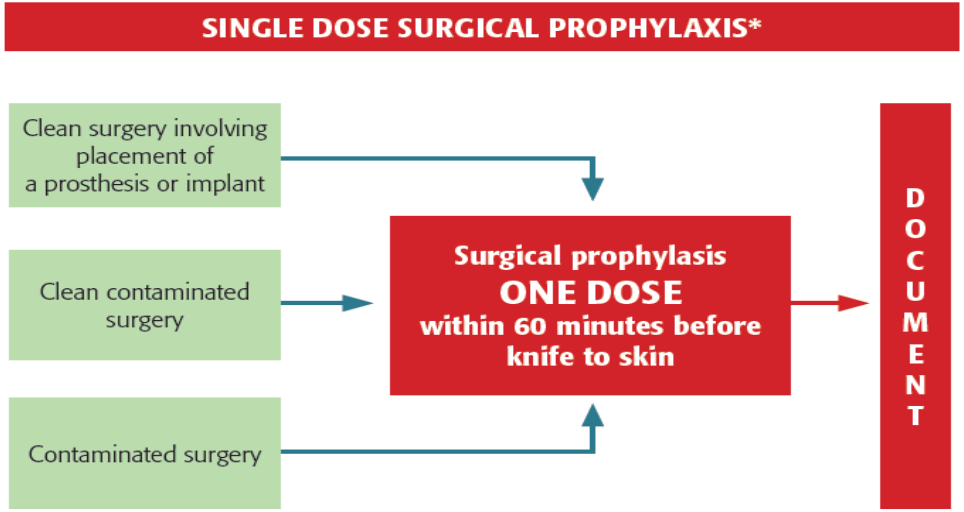
*GNB bacteremia also in UTI/cIAI RCTs; 3 cellulitis RCTs equal, 1 (low dose oral flucox) ↑relapses; refs at https://www.bradspellberg.com/shorter-is-better

- Spellberg JAMA Intern Med 2016
- Royer JHospMed 2018 In-Patient
- Anakpoya PLoSOne 2018 Out-patients

"One more day" in ITU = extra 8% resistance with cefepime / pip-tazo & 2% in meropenem (Teshome 2019)

Use shortest proven course.

- Stop extra 5, 7 or 10 days being prescribed on IVOS
- only remaining course on discharge



* A repeat dose dose of prophylaxis may be required for prolonged procedures or where there is significant blood loss. A treatment course of antibiotics may also need to be given (in addition to appropriate prophylaxis) in cases of dirty surgery or infected wounds. The appropriate use and choice of antibiotics should be discussed with infection specialists for each case.

Prosthesis (hip/knee) – 24 hours or teicoplanin.
Cardiac – dose at end of surgery.
http://sign.ac.uk/pdf/sign104.pdf

Re-dose after 2 half-lives of antibiotic eg 2 hours for most cefalosporins

Excess SSI proph	2 days	3 days	>3 days
NNH AKI	9	6	4
NNH Cdiff	2000	90	50

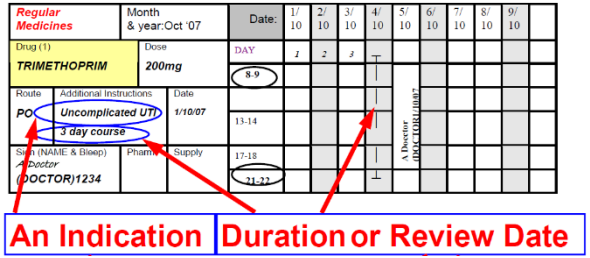
Branchelliman 2019 JAMA Surg.

Audit & feedback

- 5 patients / month
- Nurse /pharmacist audit
- 95% target for timing, AB vs guideline, duration of 1 dose or 24h
- England 2016 PPS 40% >24hr, Scot 5%
- Do run charts

Using safety huddle for education on AMS/AMR – the druggle or buggle

- Based on safety huddle – multidisciplinary 5 minute structured meeting each day to improve safety
- Medication issues (including antibiotics), equipment malfunction, falls, wounds, infection prevention & control issues, behaviours, safety / security.
  - Include patients on IV antibiotics each day
- 4 slides: hot topic, prescribing discussion of the week, highlight good prescribing, weekly prescribing run chart.



Edbrooke-Childs BMJ Qual Safety 2017;
www.ihi.org/resources/Pages/Tools/SafetyHuddleResultsCollectionTool.aspx

Assessing penicillin allergy labels

20-85 extra deaths per year in my hospital

- 10-20% claim beta-lactam allergy. (6% in UK GP records) – probably ~1%
- Risk factor for *C.diff* (35%), MRSA (55%) in UK. Higher costs
- ↑ meropenem usage 7% vs 1.1% where allergy label in a single hospital (Powell 2018)
- Higher mortality & ITU admission. Extra 6 deaths/1000 people in next year
  Alternatives: ↑ADE: CV deaths with macrolides, quinolones – liver, CV, skin, tendons
- Increasing Strep pneum resistance to macrolides / doxycycline
- RCT shows safe to use oral amoxicillin challenge test without skin-prick testing in adults where non-life threatening reaction >7 to 10yr ago
- Pharmacist led delabelling. (1) 24%↓ restricted AB use. (2) 80% delabelled by interview, 16% uneventful oral challenge. 98% remained de-labelled at 12month

Reddy 2013 J of Allergy Clin Immunol, Blumenthal BMJ 2018, Schembi BMJ 2013, Ray NEJM 2012, MHRA reports, Charneski 2011 Pharmacotherapy 31(8)742, Macy 2014 JAllergyClinImmunol, Iammatteo 2019 JAllergyClinImmPract, Mustafa 2019 JACI-IP, West JAC 2018, Devchand JAC 2018, Du Plessis JAC 2019

Dermatological

Clinical manifestation		Recommendation & Resultant allergy type	
Childhood exanthem (unspecified) *Details of rash timing unknown and no severe features or hospitilisation*		☐	Unlikely to be significant (non-severe)
Immediate diffuse rash ("itchy immediate rash") *<2 hours post dose*		☐	Immediate hypersensitivity (non-severe)
Diffuse rash or localized rash with no other symptoms *> 24 hours post starting antibiotic*	≤ 10 years ago	☐	Delayed hypersensitivity (non-severe)
	> 10 years ago	☐	Delayed hypersensitivity (non-severe, low risk)
Rash & mucosal ulceration ("mouth, eye or genital ulcers") *Be alert for history of SCAR*		☐	Delayed hypersensitivity (severe)
Pustular, blistering or desquamating ("skin shedding") rash *Be alert for history of SCAR*		☐	Delayed hypersensitivity (severe)
Angioedema ("lip, facial or tongue swelling")		☐	Immediate hypersensitivity (severe)
Swelling (outside of angioedema)		☐	Immediate hypersensitivity (severe)
Urticaria ("wheals and hives")		☐	Immediate hypersensitivity (non-severe)

Respiratory or Systemic

Clinical manifestation	Recommendation & Resultant allergy type	
Laryngeal involvement ("throat tightness" or "hoarse voice")	☐	Immediate hypersensitivity (severe)
Respiratory compromise ("wheeze or shortness of breath")	☐	Immediate hypersensitivity (severe)
Fever ("high temperature") - *Not explained by infection or other cause*	☐	Delayed hypersensitivity (severe)
Anaphylaxis or unexplained hypotension or collapse	☐	Immediate hypersensitivity (severe)

Haematological

Platelets < 150 x10^9/L or unknown	☐	Potential immune mediated (severe)
Neutrophils < 1x10^9/L or unknown	☐	Potential immune mediated (severe)
Haemoglobin < 100 g/L or unknown	☐	Potential immune mediated (severe)
Eosinophilia (>0.7 x 10^9/L or unknown) *Examine history for DRESS*	☐	Delayed hypersensitivity (severe, if DRESS)

Unknown reaction

Clinical manifestation	Recommendation & Resultant allergy type	
Unknown reaction ≤ 10 years ago	☐	Unlikely significant (non-severe)
Unknown reaction > 10 years ago or family history of penicillin allergy only	☐	Unlikely significant (non-severe, low risk)

Renal

Severe renal injury or failure (>50% reduction in eGFR from baseline or absolute serum creatinine increase of ≥26.5µmol/L, or transplantation, or dialysis)	☐	Potential immune mediated (severe, if AIN)
Renal impairment (Does not meet criteria for renal failure or severe injury [see box above])	☐	Unlikely immune mediated (non-severe, low risk)

Liver

Severe liver injury or failure (≥5x upper limit of normal (ULN) for ALT or AST, or ≥3x ULN for ALT with ≥2x ULN for bilirubin, or ≥2x ULN for ALP, or transplant)	☐	Potential immune mediated (severe, if DILI)
Hepatic enzyme derangement (Does not meet criteria for liver failure or severe injury [see box above])	☐	Unlikely immune mediated (non-severe, low risk)

Neurological, gastrointestinal or other

Gastrointestinal symptoms ("nausea, vomiting, diarrhoea")	☐	Unlikely immune mediated (non-severe, low risk)
Mild neurological or CNS manifestation ("headache, confusion, depression, mood disorder")	☐	Unlikely immune mediated (non-severe, low risk)
Severe neurological or CNS manifestation ("seizures or psychosis"), Other, OR: Anaphylactoid/infusion reaction	☐	Unknown or unclear mechanism – Contact ID pharmacist for advice

Appropriate for direct de-labelling - removal of allergy label without testing [oral rechallenge if required]	
Appropriate for supervised direct oral rechallenge[a]	
Refer to ID – May be appropriate for skin testing followed by oral rechallenge[b]	
Appropriate for outpatient antibiotic allergy assessment +/- testing	

Abbreviations: SCAR, severe cutaneous adverse drug reactions; DRESS, drug reaction with eosinophilia & systemic symptoms; AIN, acute interstitial nephritis; DILI, drug-induced liver injury; ULN,

[a] In the appropriate setting a direct oral rechallenge may be performed under specialist guidance [b] Skin testing followed by oral rechallenge can be performed in the outpatient or inpatient setting

Centre for Antibiotic Allergy and Research

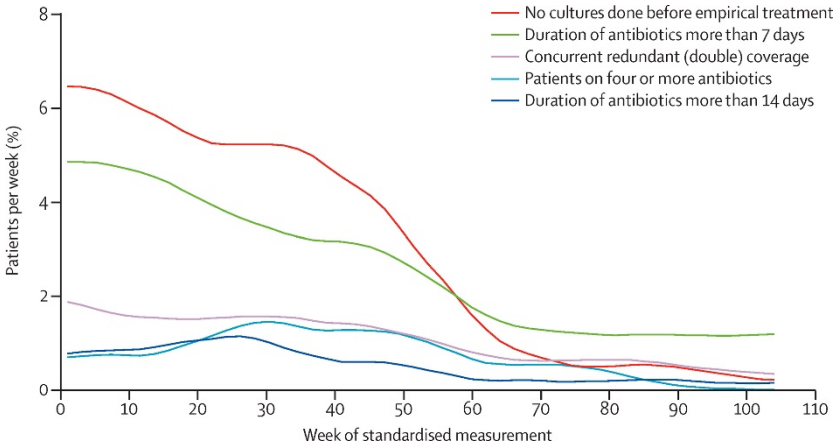
Allergy label assessment tool

- De-label
- Oral challenge
- ID referral for skin testing
- Out patient allergy assessment

Trubiano 2017 CID Australia

Training South African pharmacists to deliver AMS

- Trained hospital pharmacists in AMS
- Work alongside doctors and nurses
- Focus on cultures before starting antibiotics, AB >7d and 14d, >4 antibiotics at same time, recurrent
- Expanded to 47 Netcare hospitals
- Seen decreases in AMR



Brink LID 2017
https://www.sciencedirect.com/science/article/pii/S1473309916300123#fig4

Formularies and restricted antibiotics

New antibiotics

- Need approval before use. ASP should review ALL new antibiotics before DTC
- Consider restricting access by Pharma in hospitals or tight policy on visits
- Declarations of competing interest should be routine. National register.

Restricted antibiotics – most rapid control but replaced by unrestricted antibiotics

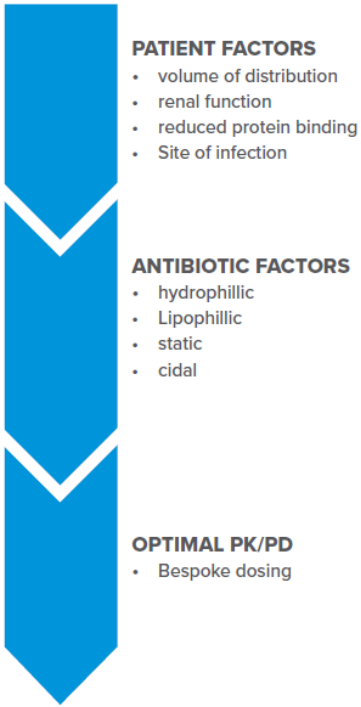
- Restrict dispensing of targeted antimicrobials to approved indications
- Fully restricted (always needs authorization) or partial restriction (authorization outside of guidelines OR beyond a certain duration eg 3 days).
  - Eg codes 1st or 2nd dose in hospitals depending on staffing (24/7) using a code usually eg ABCDDMMXNN (ABD = Dr initials, DDMM = date, X = random letter, NN = days of approval)
- Pharmacist re-authorization after day 3 reduced LOS by 2 day (8 to 6) & 28%↓ in restricted AB beyond 4 days. Eljaaly 2018 JAC https://academic.oup.com/jac/article/73/2/527/4565580

Dose optimisation by clinical pharmacists

WHEN IS PK/PD CLINICALLY RELEVANT?

	Potential altered PK/PD	Example
Obesity	Reduced tissue penetration	Quinolones
	Shorter mean $T_{1/2}$ *	Vancomycin
	Increased Vd**	Aminoglycosides
	Increased clearance	Aminoglycosides
Renal insufficiency	Decreased clearance	Aminoglycosides
Neonates	Decreased clearance	Aminoglycosides
		Glycopeptides
Children	Increased clearance	Aminoglycosides
Critical illness	Increased Vd	Aminoglycosides
		Beta lactams
		Glycopeptides
		Colistin
	Increased clearance	Beta lactams
Pregnancy	Increased clearance	Aminoglycosides
		Cefuroxime
	Increased Vd	Hydrophilic agents
Cystic fibrosis	Increased clearance	Aminoglycosides

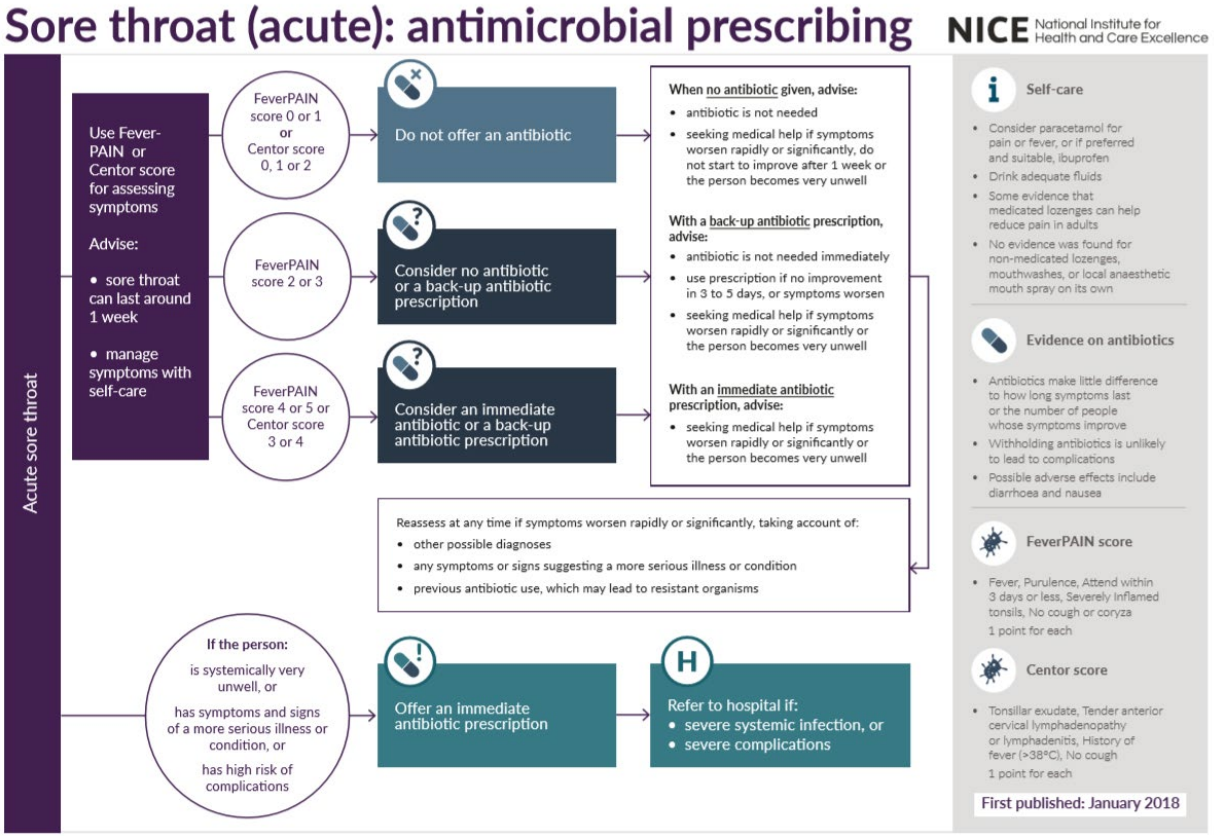
*$T_{1/2}$ half life, **Vd volume of distribution)



Key role of the hospital pharmacist is TDM of glycopeptides and aminoglycosides. Dose optimisation in difficult populations eg obese, ITU, renally impaired.

Community pharmacists should only supply antibiotics when appropriate

UK NICE guidelines show where antibiotics should not be supplied, where to get patients to return in a few days (with safety netting) and when to supply antibiotics



www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/antimicrobial-prescribing-guidelines

THIS E-BOOK HAS BEEN DEVELOPED BY BSAC

BSAC BRITISH SOCIETY FOR ANTIMICROBIAL CHEMOTHERAPY

IN COLLABORATION WITH ESGAP/ECMID

ESGAP ESCMID STUDY GROUP FOR ANTIMICROBIAL STEWARDSHIP
European Society of Clinical Microbiology and Infectious Diseases

Chapter on nurse role & pharmacist role

ANTIMICROBIAL STEWARDSHIP

FROM PRINCIPLES TO PRACTICE

www.bsac.org.uk

BSAC BRITISH SOCIETY FOR ANTIMICROBIAL CHEMOTHERAPY

KEY PRINCIPLES OF PRUDENT ANTIMICROBIAL PRESCRIBING

Modern medicine would not be possible without antibiotics (Figure 2). These amazing drugs have revolutionised how we care for patients in the 21st century. We are able to care for premature babies, critically ill patients with sepsis, transplant solid organs and provide chemotherapy to patients with cancer among other miracles. Unfortunately, the appropriate and inappropriate use of these drugs has consequences.

As global rates of antibiotic resistant infections increase antibiotic research and development has been dwindling, resulting in a catastrophic lack of weapons to use in this public health crisis. In response to this challenge, healthcare workers on the front lines have been tasked with minimizing unnecessary and inappropriate prescribing of antibiotics in order to prevent

Lancet Infect Dis 2017

Published Online
June 16, 2017
http://dx.doi.org/10.1016/S1473-3099(17)30325-0

FIGURE 1
Add here the systematic review: [COULD ADD PDF IN THE RESOURCE BOX]

Modern Medicine Is Not Possible Without Antibiotics

http://ams-pt-forum.co.uk/

AMS Pharmacy Technicians FORUM

A professional meeting place for all pharmacy technicians involved and with an interest in antimicrobial stewardship

BRITISH SOCIETY FOR ANTIMICROBIAL CHEMOTHERAPY

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Would a AMS Pharmacist forum be useful? Perhaps link with FIP.

Summary: how nurses & pharmacists can support AMS

- Nurses are present on all hospital wards & have a low turnover
- AMS activities can decrease nursing workload
  - less IV administration with IVOS.
  - Less antibiotic associated diarrhoea = less cleaning
- IPC nurses can incorporate AMS education / audit into IPC roles
- Pharmacists can do much of the process design and administrative roles in AMS & antibiotic restriction.
  - Use expertise for dose optimisation & IVOS where staff available
- Start small but think big! Be seen as a “can do” pharmacist / nurse.