Bugs & Drugs

Nikhil Premchand
Consultant ID & AIM, Northumbria Healthcare

Nikhil.Premchand@nhct.nhs.uk
Conflicts of Interest

• Unrestricted educational grant from Eumedica to attend ECCMID conference in 2018 & 2019
Structure

- Antimicrobial Resistance
- Antibiotic Usage
- Penicillin Allergy
Antimicrobial Resistance
Alexander Fleming, 1945 Nobel Lecture

“The time may come when penicillin can be bought by anyone in the shops. Then 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.

Moral: If you use penicillin, use enough.”
Annual Report of the Chief Medical Officer

Volume Two, 2011
Infections and the rise of antimicrobial resistance
Surveillance Atlas of Infection

Antimicrobial resistance

Klebsiella pneumoniae

Combined resistance (third-generation cephalosporin, fluoroquinolones and ami

Resistant (R) isolates proportion

<table>
<thead>
<tr>
<th>Country</th>
<th>Isolates proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malta</td>
<td>0.0</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.4</td>
</tr>
<tr>
<td>Norway</td>
<td>0.0</td>
</tr>
<tr>
<td>Poland</td>
<td>26.4</td>
</tr>
<tr>
<td>Portugal</td>
<td>-</td>
</tr>
<tr>
<td>Romania</td>
<td>-</td>
</tr>
<tr>
<td>Slovakia</td>
<td>-</td>
</tr>
<tr>
<td>Slovenia</td>
<td>11.5</td>
</tr>
<tr>
<td>Spain</td>
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</tr>
<tr>
<td>Sweden</td>
<td>0.4</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Antibiotic Guardian

Resistant (R) isolates proportion (%)

- <1%
- 1-<5%
- 5-<10%
- 10-<25%
- 25-<50%
- 50-<75%
- >=75%

Graph showing the resistant (R) isolates proportion from 2006 to 2016.
**Surveillance Atlas of Infectious**

**Antimicrobial resistance**

**Klebsiella pneumoniae**

Combined resistance (third-generation cephalosporin, fluoroquinolones and aminoglycosides)

**Resistant (R) isolates proportion**

<table>
<thead>
<tr>
<th>Country</th>
<th>Resistant (R) proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malta</td>
<td>0.0</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.7</td>
</tr>
<tr>
<td>Norway</td>
<td>0.0</td>
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<tr>
<td>Poland</td>
<td>0.0</td>
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<tr>
<td>Portugal</td>
<td>7.0</td>
</tr>
<tr>
<td>Romania</td>
<td>24.1</td>
</tr>
<tr>
<td>Slovakia</td>
<td>-</td>
</tr>
<tr>
<td>Slovenia</td>
<td>17.1</td>
</tr>
<tr>
<td>Spain</td>
<td>5.4</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.3</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Legend:
- Green: <1%
- Light green: 1-5%
- Light yellow: 5-10%
- Yellow: 10-25%
- Orange: 25-50%
- Red: 50-75%
- Maroon: >75%
Surveillance Atlas of Infectious Disease

Antimicrobial resistance

Klebsiella pneumoniae

Combined resistance (third-generation cephalosporin, fluoroquinolones and aminoglycoside)

Resistant (R) isolates proportion

<table>
<thead>
<tr>
<th>Country</th>
<th>2009</th>
</tr>
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<tbody>
<tr>
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<td>0.0</td>
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<td>1.5</td>
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<td>Poland</td>
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<td>Romania</td>
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<td>Slovakia</td>
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<tr>
<td>Sweden</td>
<td>3.1</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Map showing the proportion of resistant isolates across European countries.
Surveillance Atlas of Infectious Disease

Antimicrobial resistance

Klebsiella pneumoniae

Combined resistance (third-generation cephalosporin, fluoroquinolones and aminoglycoside)

Resistant (R) isolates proportion

<table>
<thead>
<tr>
<th>Country</th>
<th>Resistant (R) isolates proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malta</td>
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</tr>
<tr>
<td>Netherlands</td>
<td>4.3</td>
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<tr>
<td>Norway</td>
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<td>Poland</td>
<td>37.3</td>
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<td>Portugal</td>
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<td>Romania</td>
<td>30.0</td>
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<td>Slovakia</td>
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<td>Slovenia</td>
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<td>Spain</td>
<td>8.3</td>
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<tr>
<td>Sweden</td>
<td>0.9</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Resistant (R) isolates proportion (%)

- <1%
- 1-<5%
- 5-<10%
- 10-<25%
- 25-<50%
- 50-<75%
- >=75%
## Surveillance Atlas of Infectious Diseases

### Antimicrobial resistance

#### Klebsiella pneumoniae

Combined resistance (third-generation cephalosporin, fluoroquinolones and aminoglycoside)

<table>
<thead>
<tr>
<th>Country</th>
<th>Resistant (R) isolates proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malta</td>
<td>20.9</td>
</tr>
<tr>
<td>Netherlands</td>
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<td>Poland</td>
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<td>Spain</td>
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<tr>
<td>Sweden</td>
<td>1.7</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>4.8</td>
</tr>
</tbody>
</table>

![Map of Europe showing resistance rates](image)

### Graphs

- **Resistant (R) isolates proportion (%)**
  - ![Graph showing resistant isolates proportion from 2006 to 2016](image)
  - **2013**

- **%**
  - ![Bar chart showing % distribution](image)
ANTIBIOTIC RESISTANCE
HOW IT SPREADS

Antibiotic resistance happens when bacteria change and become resistant to the antibiotics used to treat the infections they cause.
420 tonnes of antimicrobials were sold to the (UK) veterinary sector 508 tonnes prescribed to the (English NHS) human health sector. One Health Report 2015
Burden of disease caused by *Streptococcus pneumoniae* in children younger than 5 years: global estimates

Katherine L. O’Brien, Lance Wolfson, James P. Watt, Emily Herkle, Maria Delaria-Knoll, Natalie McCall, Ellen Lee, Kim Mulholland, Orin S Levine, Thomas Cherian, for the Hib and Pneumococcal Global Burden of Disease Study Team*

Figure 3: Ten countries with the greatest number of pneumococcal deaths in children aged 1–59 months*

Eili Y. Klein et al. PNAS 2018;115:15:E3463-E3470
Antibiotics are being used as a substitute for public health
LIFE EXPECTANCY IS LONGER WHERE THERE IS BETTER SANITATION

Controlling for income, increasing access to sanitation in a country by 50% is correlated with more than nine years of additional life expectancy.

Access to sanitation, given income is:
- Better than expected
- Worse than expected

Graph includes all countries with a GDP per capita of less than $25000 for which data was available, high-income countries were excluded as almost all have close to 100% sanitation rates. Sanitation and life expectancy data are from the World Health Organization. Income data is from the World Bank and the calculations are the Review's own. Results are statistically significant at 1%, T-value=5.33, p-value=0.000.
ANTIBIOTICS FOR ALL

Carbapenem antibiotics are increasingly available without prescription in India, compared with Western nations. This is driving the emergence of microbial resistance to the drugs in the country.

THERE IS A HIGH CORRELATION BETWEEN ANTIBIOTIC USE AND RESISTANCE

E. coli bacteraemia proportion resistance to key antimicrobials; England, by region, 2017
Table 23: Consumption of colistin in secondary care by Trust type, expressed as DDDs per 1000 admissions, England, 2013-2017

Note: Data by trust type should be interpreted with caution, as data on the trust level was only available from 2014 onwards; merging and demerging of trusts were not taken into account in 2013.
RESISTANT INFECTIONS LEAD TO HIGHER DEATH RATES AND ARE MORE EXPENSIVE TO TREAT

A study in the US in 2010 found that infections caused by the superbug methicillin-resistant Staphylococcus aureus (MRSA) were more than twice as expensive to treat as infection caused by the easier-to-treat methicillin-sensitive Staphylococcus aureus (MSSA).

- Mortality rate 11.5%
- $16,000 to treat drug-sensitive infection (MSSA)
- $35,000 to treat drug-resistant infection (MRSA)

Mortality rate 24%

Deaths attributable to AMR every year compared to other major causes of death

- AMR now 700,000 (low estimate)
- Tetanus 60,000
- Road traffic accidents 1.2 million
- Measles 130,000
- Diarrhoeal disease 1.4 million
- Cholera 100,000 - 120,000
- Cancer 8.2 million
- AMR in 2050 10 million

Estimated attributable deaths in 2050 due to AMR
Timeline of Antibiotic and Vaccine Development

**Antibiotics**

- *Mercury* used for treatment of syphilis.
  - “One night with Venus, a lifetime with Mercury.”
- *Hexamine* used for urinary tract infections; topical *pyocanase* for wound infections.
  - The first organic anti-syphilitic agent compound 606 or arsphenamine (Salvarsan) discovered by Sachachiro Hatu in the lab of Paul Ehrlich.
- Alexander Fleming accidentally discovers the antibacterial properties of *Penicillium nonatum* (later *chrysogenum*), an environmental mould, contaminating a bacterial specimen left near an open window; shown to inhibit cell wall synthesis of Gram-positive bacteria.
- Measles, Mumps and Rubella vaccines developed, followed by combined MMR vaccine in 1971.
- Rifampicin supercedes streptomycin as anti-tuberculous therapy.
- Hepatitis B and *Haemophilus influenzae* type b vaccines developed.
- Smallpox declared eradicated from the world.

**Vaccines**

- First vaccine publicised by Edward Jenner for smallpox.
- Vaccines developed for cholera, rabies, tetanus, typhoid and bubonic plague.
- First vaccine for Human Papilloma Virus (HPV), cause of cervical cancer, and Menactra meningitis vaccine licensed.
- Smallpox declared eradicated from the world.
- Conjugate pneumococcal vaccine.

**Early Sixteenth Century**

- 1598: *Hexamine* used for urinary tract infections.
- 1899: *Topical pyocanase* for wound infections.

**1798**

- First vaccine publicised by Edward Jenner for smallpox.

**1879-1897**

- Vaccines developed for cholera, rabies, tetanus, typhoid and bubonic plague.

**1899**

- Howard Florey and Ernst Chain develop mass production of penicillin; first patient successfully treated in 1942 in Australia.

**1910**

- Prontosil red, derived from dyes and precursor to sulfanilamide, the first “broad-spectrum” antibiotic, developed by Gerhard Domagk.

**1928**

- Diptheria, Pertussis (whooping cough), BCG and Yellow Fever vaccines developed.

**1940-1942**


**1945**

- Influenza vaccine.

**1945-1948**

- Chloramphenicol, tetracyclines and macrolides developed from soil micro-organisms.

**1949-1952**

- First cephalosporins developed from mould *Cephalosporium*; activity against Gram-positive and Gram-negative bacteria.

**1955, 1961**

- Amoxicillin, a broader spectrum penicillin, developed.

**1968**

- Anti-pseudomonal penicillins.

**1975**

- Rifampicin supercedes streptomycin as anti-tuberculous therapy.

**1980**

- First carbapenem developed.

**1982-1985**

- Linezolid, daptomycin and tigecycline.

**1993**

- Anti-pseudomonal penicillins.

**2000**

- Conjugate pneumococcal vaccine.

**2000-2005**

- First vaccine for Human Papilloma Virus (HPV), cause of cervical cancer, and Menactra meningitis vaccine licensed.

**2007**

- Future challenge of rising antibiotic resistance to existing antibiotics with few new antibiotics in development.

**Present Day**

- Smallpox declared eradicated from the world.

**Future challenge of rising antibiotic resistance to existing antibiotics with few new antibiotics in development.**
Antibiotic discovery and resistance timeline

Antibiotic class
- **PENICILLINS**
- **MACROLIDES**
- **TETRACYCLINES**
- **FLUOROQUINOLONES**
- **CARBAPENEMS**

Date of resistance identified:
- 1940
- 1953
- 1985
- 1993

Date of discovery:
- 1928
- 1948
- 1985

Year:

30 years since a new class of antibiotics was last introduced
Antimicrobial Resistance

- 38% - 50% of organisms that cause surgical site infections in USA are resistant to standard antimicrobial prophylaxis\(^1\)
- Biggest “emerging infection” threat

\(^1\)Lancet Infect Dis. 2015 Dec;15(12):1429-37
Antibiotic Usage
1 in 3 patients in hospitals in England are on an antibiotic at any one time.

1 in 3 individuals in England takes at least one course of antibiotics each year.
WHO IS PRESCRIBING?

74%
General practice

11%
Hospital inpatients

7%
Hospital outpatients

5%
Dental practices

3%
Other community settings
NHS Scotland: Proportion of population receiving antibiotics in primary care 2015

Proportion of population prescribed an antibiotic

29.6% of Scottish population prescribed an antibiotic

STRAMA 20%
Antibiotic prescriptions per person for 2015

Antibiotic prescriptions per person

August

December

A defined daily dose (DDD) of antibiotics per 1000 people living in England per day

2011: 21.6
2014: 23

Antibiotic use
Risen by 6.5% over the past 4 years
Table 16: Antibiotic items prescribed by GP, expressed as items per 1,000 inhabitants per day, England, 2013-2017
NHS Scotland: Use of antibiotics in primary care
items/1000/day 2006-2015

84% of human prescribing

2.4% reduction in items per 1,000 population per day since 2014
88,490 items fewer since 2014
3rd year of successive reductions
Table 19: Total acute Trust prescribing, expressed as DDDs per 1,000 admissions, England, 2013-2017
Broad spectrum usage increasing

Proportion of broad spectrum antibiotics/total antibiotics, presented as defined daily dose (DDD) per 1,000 people living in England per day

General practice: 8.5% down from 2010 levels

NHS Trusts: 33.3% up from 2010 levels
## How low can you go?

<table>
<thead>
<tr>
<th></th>
<th>Prescriptions/1000/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>TARGET (Swedish/expert group)</td>
<td>250</td>
</tr>
<tr>
<td>Sweden</td>
<td>325</td>
</tr>
<tr>
<td>Netherlands</td>
<td>350</td>
</tr>
<tr>
<td>USA</td>
<td>506</td>
</tr>
<tr>
<td>England</td>
<td>684</td>
</tr>
<tr>
<td>Scotland</td>
<td>704</td>
</tr>
</tbody>
</table>

JAMA 2016;315:1864
ESPAUR 2015
AMR report HPS2016
Statistics Nbo 2016
UTI (lower): antimicrobial prescribing

Non-pregnant woman

Consider a back-up antibiotic prescription or immediate antibiotic, noting that the evidence for back-up antibiotics was from women not needing immediate treatment.

If urine sent for culture and susceptibility, and antibiotic given:
- review antibiotic choice when results available, and
- change antibiotic if bacteria resistant.

Give advice about managing symptoms with self-care.

Lower urinary tract infection (UTI)

Give advice about managing symptoms with self-care.

Send midstream urine for culture and susceptibility for pregnant women and men.
Send urine for culture and susceptibility or dipstick in line with the NICE guideline on urinary tract infection for under 16s.
Offer immediate antibiotic.
Assess and manage fever in under 3s in line with the NICE guideline on fever in under 3s.

With all antibiotic prescriptions, advise:
- possible adverse effects of antibiotics include diarrhea and nausea.
- seeking medical help if symptoms worsen at any time, do not improve within 48 hours of taking the antibiotic, or the person becomes very unwell.

With a back-up antibiotic, provide advice:
- antibiotic is not used.

Antibiotics

- When considering antibiotics, take account of severity of symptoms, risk of complications, previous urine culture and susceptibility results, previous antibiotic use which may have led to resistant bacteria and local antimicrobial resistance data.

Asymptomatic bacteriuria

- Asymptomatic bacteriuria is significant levels of bacteria in urine with no UTI symptoms.
- Screened for and treated in pregnant women because risk factor for pyelonephritis and premature delivery.
- Not screened for or treated in non-pregnant women, men, children or young people.

NICE uses ‘offer’ when there is more certainty of benefit and ‘consider’ when evidence of benefit is less clear.

Refer to hospital if a person aged 16 or over has any symptoms or signs suggesting a more serious illness or condition (for example, sepsis).

Refer children and young people to hospital in line with the NICE guideline on urinary tract infection in under 16s.

Background

Lowest UTI

Paracetamol for pain or if referred and suitable, ibuprofen.
- Advise drinking enough fluids to avoid dehydration.
- No evidence found for cranberry products or urine alkalising agents to treat lower UTI.

NICE National Institute for Health and Care Excellence

October 2018

No role for urine dipstick – symptoms are key.
# Leaflets to share with patients

The patient information leaflets are a widely used part of the TARGET resources. They are designed to be shared with patients during the consultation and aim to improve the patient’s confidence to self care and the prescriber’s communication with patients and carers.

<table>
<thead>
<tr>
<th>Title</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Treating Your Infection - Urinary Tract Infection Leaflet</td>
<td></td>
</tr>
<tr>
<td>Treating Your Infection - Respiratory Tract Infection Leaflet'</td>
<td></td>
</tr>
<tr>
<td>Antibiotic Guardian leaflet</td>
<td></td>
</tr>
<tr>
<td>When Should I Worry? booklet for parents and carers</td>
<td></td>
</tr>
<tr>
<td>Caring for children with coughs leaflet</td>
<td></td>
</tr>
<tr>
<td>Get Well Soon Without Antibiotics leaflet</td>
<td></td>
</tr>
</tbody>
</table>
Do we know how long a course should be?

The New Antibiotic Mantra—“Shorter Is Better”

There is a lack of evidence that recommended durations are superior to antibiotic-sparing approaches*

*w/exception of otitis media, Hoferman A et al New Eng J Med. 2016;375:2446-2456

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Table. Infections for Which Short-Course Therapy Has BeenShown to Be Equivalent in Efficacy to Longer Therapy

<table>
<thead>
<tr>
<th>Disease</th>
<th>Treatment, Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community-acquired pneumonia</td>
<td>3-5</td>
</tr>
<tr>
<td>Nosocomial pneumonia</td>
<td>( \leq 8 )</td>
</tr>
<tr>
<td>Pyelonephritis</td>
<td>5-7</td>
</tr>
<tr>
<td>Intraabdominal infection</td>
<td>4</td>
</tr>
<tr>
<td>Acute exacerbation of chronic bronchitis and COPD</td>
<td>( \leq 5 )</td>
</tr>
<tr>
<td>Acute bacterial sinusitis</td>
<td>5</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>5-6</td>
</tr>
<tr>
<td>Chronic osteomyelitis</td>
<td>42</td>
</tr>
</tbody>
</table>

Abbreviation: COPD, chronic obstructive pulmonary disease.
The antibiotic course has had its day

With little evidence that failing to complete a prescribed antibiotic course contributes to antibiotic resistance, it’s time for policy makers, educators, and doctors to drop this message, argue Martin Llewelyn and colleagues

Martin J Llewelyn professor of infectious diseases¹ ², Jennifer M Fitzpatrick specialist registrar in

Key messages

Patients are put at unnecessary risk from antibiotic resistance when treatment is given for longer than necessary, not when it is stopped early

For common bacterial infections no evidence exists that stopping antibiotic treatment early increases a patient’s risk of resistant infection

Antibiotics are a precious and finite natural resource which should be conserved by tailoring treatment duration for individual patients

Clinical trials are required to determine the most effective strategies for optimising duration of antibiotic treatment
Bias

• Recollection Bias

• “Medicine is the art of keeping the patient amused while nature heals the disease.”
  Voltaire
Antibiotic “course”

- Historical concept based on limited evidence
- Emerging evidence of non-inferiority of shorter durations
- Some improvement due to anti-inflammatory effects of antibiotic
- Remember that in surgical prophylaxis, patients often have a single dose of antibiotic – no evidence of significantly increased resistance
Route of administration

• IV perceived to be superior to oral
  • May be the case for certain sites, drugs or comorbidities
• Emerging evidence of non-inferiority of oral treatment of deep infections
Oral versus Intravenous Antibiotics for Bone and Joint Infection

Partial Oral versus Intravenous Antibiotic Treatment of Endocarditis


Abstract

January 31, 2019
DOI: 10.1056/NEJMoa1808312
What can you do?

- Have the gumption to not start/stop antibiotics
- Encourage team to send samples for culture
- Consider if pathology may not be bacterial
- If unsure what is going on, stop antibiotics and review/re-culture
- Procalcitonin may have a role
• More is not always better…
• Judicious prescribing and stopping empirical antibiotics in the absence of infection is up to us
ANTIMICROBIAL STEWARDSHIP
Treatment algorithm

Start Smart

Then Focus

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 infections⁵
3. Comply with local antimicrobial prescribing
   guidance
4. Document clinical indication (and disease
   severity if appropriate), dose⁶ and route⁶ 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)

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

⁵ In accordance with surviving sepsis patient safety alert
⁶ According to weight/age in children refer to local formulary or BNFC
*Use appropriate route in line with severity/patient factors
*Outpatient Parenteral Antibiotic Therapy
ARK-Hospital

A new approach to antibiotic prescribing for medical patients

- Improve antibiotic prescription ‘review and revise’

Stop antibiotics in patients who don’t need them
To reduce use across the hospital
To protect patients from antibiotic resistance
Achieve quality targets
The current review and revise mindset

Continue unless I can justify stopping

The ARK review and revise mindset

Stop unless I can justify continuing
ARK provides

1. An educational module for healthcare professionals
2. A decision aid to support antibiotic prescribing
3. Patient information
4. A structure for audit and feedback
Penicillin Allergy
Is this a problem?

- Expected rate of true allergy <0.5%

<table>
<thead>
<tr>
<th>Trust</th>
<th>Rate (%)</th>
<th>Sample</th>
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</thead>
<tbody>
<tr>
<td>Kings College</td>
<td>12.7</td>
<td>122</td>
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<tr>
<td>UCLH</td>
<td>17.5</td>
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<td>Sheffield</td>
<td>11.7</td>
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<td>Derby</td>
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<tr>
<td>Newcastle</td>
<td>8</td>
<td>53116</td>
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<tr>
<td><strong>Northumbria</strong></td>
<td>4.72 (PAS) – 15 (audits)</td>
<td>749,744</td>
</tr>
</tbody>
</table>
• Approx. 10% of inpatients report penicillin allergy
• Life threatening anaphylaxis seen in 0.01-0.05% of patients
• Vast majority do not have allergy
• Considerable impact on patients

• If inaccurate – two of the most dangerous words to write in patients notes!
Impact

• Bad medicine
• Greater exposure to broad spectrum antibiotics (glycopeptides and quinolones)
  • Twice as likely to receive vancomycin (39.7% vs 17.4%) three times more likely to receive quinolones (21.8% vs 8%)\textsuperscript{1}
• Greater financial cost
• Treatment potentially less efficacious
• Development of drug resistance (MRSA, VRE)

\textsuperscript{1}Arch Intern Med 2000;160(18):2819
Anaesthesia, Surgery, and Life-Threatening Allergic Reactions

Anaphylaxis in the operating theatre is a life-threatening drug reaction that happens suddenly, without warning and can affect anyone. Low blood pressure, impaired circulation and lack of oxygen in the lungs combine to starve the tissues of oxygen, leading to shock which in extreme cases rapidly progresses to cardiac arrest or even death. The National Audit Project of the Royal College of Anaesthetists (NAP6): Perioperative Anaphylaxis is the largest ever prospective study of anaphylaxis related to anaesthesia and surgery.

1. 100% of NHS hospitals took part in NAP6, which studied every case of life-threatening anaphylaxis during 3 million anaesthetics given in the UK over a year long reporting period.

2. The incidence of perioperative anaphylaxis was 1 in 10,000 anaesthetics.

3. Antibiotics were the most common trigger for anaphylaxis.

4. Teicoplanin is 17-fold more likely to cause anaphylaxis than alternatives.

5. Elderly patients with cardiac disease and the obese were most at risk of cardiac arrest and death.

6. It is regularly used for patients who are believed to be allergic to penicillin – though we know that more than 90% of these patients are not truly penicillin-allergic. Better identification of these patients will improve safety.

7. Three quarters of patients required admission to ICU, but most recovered quickly.

8. >100 days
CATALYST
(Challenging Antibiotic Allergy Study)

• Protocol developed
  • Patients identified as inpatients
  • Patient information leaflet
  • Nature of allergy assessed
  • Low risk patients challenged as IP
  • Future aim: skin test elective clinic run via ambulatory care
  • ?Nurse led with Consultant support
- History inconsistent with IgE-mediated hypersensitivity
  - Use penicillins – remove allergy from records

- Vague history of IgE-mediated hypersensitivity
  - Use alternative antibiotics
  - Refer for testing

- Clear history of IgE-mediated hypersensitivity
  - Use alternative antibiotics
A number of suspected allergens are tested on the arm at the same time.

Positive test: area becomes red and swollen.

Suspected allergen

Sterile needle
Summary

• Antimicrobial resistance is a burgeoning problem and is the biggest threat to healthcare delivery in the next 30 years
• We need improved stewardship
  • Up to all of us
  • Change our mindset and behaviours
    • “Innocent until proven guilty”
• Penicillin allergy vastly over-reported and de-labelling strategies are a key priority
Live as if you were to die tomorrow. Learn as if you were to live forever.

Mahatma Gandhi
Questions?