How Digital Systems Can Impact on Antimicrobial Stewardship (AMS)

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Importance of AMS

Antimicrobial Resistance:

*Any selective pressure on organisms by antimicrobials will drive resistance*

- Bugs do not care if an antibiotic is appropriate or not, if duration or indication is documented on a drug chart / notes
- Antimicrobial Resistance is inevitable
- International healthcare has driven the spread of resistance
Minimise the ecological impact of Antimicrobial Resistance:

Infection Prevention & Control

✓ **Avoidance** of infection and exposure to resistant organisms is key
✓ We expose our most vulnerable patients to our highest-risk practice

Antimicrobial Stewardship

✓ **Any reduction in antimicrobial usage will reduce risk of resistance**
✓ The ‘easy win’ is inappropriate usage
  - reduce broad spectrum ABX (traditional AMS role)
  - reduce durations (greatest impact?)
  - reduce ABX when no infection is present (pt education)
Influencing Users of Antimicrobials

Patients
✓ Biggest gain in primary care / less appropriate in secondary care setting

Prescribers
✓ First do no harm (understandable risk adverse approach to medicine)
✓ Culture of ABX prescribing to change due to adjustment of known risk benefit

NICE Sepsis 2016 (aggressive initiation of ABX) / CQUIN
vs
AMS (reduce ABX) / ESPAUR Resistance / CQUIN
# Strategies for Influencing / Change

## Limitations

- Lack of power / authority of AMS committee [Consult service]

## Current Practice

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Intervention</th>
<th>Limitations</th>
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</thead>
<tbody>
<tr>
<td>Evidence base practice / reasoning</td>
<td>Due to heterogenic and acuity of presentation little or know robust EBM available (no RCTs)</td>
<td>Practice varies by microbiology teams across the country Little EBM interventions known</td>
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<tr>
<td>Sanctions</td>
<td>National sanctions on sub-optimal performance (e.g. MRSA, CDT)</td>
<td>Performance doping / Gaming</td>
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<tr>
<td>Feedback on practice</td>
<td>Annual Audits the norm in antimicrobial prescribing (PPS / Start Smart etc)</td>
<td>Feedback loop too long, little/no improvements seen</td>
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<tr>
<td>Restrictions</td>
<td>AMS team ‘restrict’ antibiotic therapies to rationalise use of expensive / broad-spectrum ABX</td>
<td>Directly contradicts our Sepsis policies (1-hour dosing) Culture of AMS policing develops (negative association with team)</td>
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<tr>
<td>Incentives / Rewards</td>
<td>National CQUIN / QIPPs</td>
<td>Lack of focus on primary endpoint (pt outcomes), gaming (e.g. lower dosing of ABX)</td>
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The Chelsea Experience
Pre-intervention / Background

The Site
✓ Acute teaching hospital in NW London (430 beds on old site)
✓ Large maternity / paediatric department, growing acute adult service / Burns tertiary centre

The AMS Team
Long history of ABX pharmacists (x2)
Two microbiology doctors

Award winning AMS
UKCPA PIN award for Orla Geoghegan 2015
The Chelsea Experience
Pre-intervention / Background

Restricted ABX list
• Broad-spectrum antimicrobials (e.g. Tazocin, Carbapenems, Clindamycin)

Use EPR to pull a list of all newly started Restricted ABX

ABX pharmacist assess each prescription for compliance with local guidelines

All ABX discussed with senior microbiologist (review sensitivities / appropriateness)

Responsible clinical team bleeped / called to R/V inappropriate ABX

Strengths:
• Very tight control of inappropriate ABX prescribing
• Extended durations minimised (reduce resistance and C. difficile burden)

Limitations:
• Time consuming (4-5 hours / day for ABX pharmacist plus 2 hours for Microbiologists)
• Culture of ‘policing’ microbiology team
• Not identifying failing or non-BS ABX
• No resource to cover paeds / maternity
Evolution of AMS Service with Clinical decision support systems (CDSS)

Clinical decision support systems (CDSS)
- Introduced live from April 2016
- IC NET Pharmacy module (Baxter)
- 1st site to use in the UK
- Web-based service (mobile devices)
- Live feeds for real-time intervention
The Chelsea Experience
Learning from CDSS

Real-time availability of EPR data in usable format:
• Time spent formatting ABX surveillance (2-3hr/day) converted into patient facing contact
• Little / no preparation needed for ward visits (live reports available for each ward)

Increase ward based antimicrobial presence
• Face-to-face intervention
  • Moved from office based service targeting FY1s to ward based service targeting senior clinicians
  • Routinely see / examine patients on wards with complex infections
  • Review observations / notes for more informed interventions
  • Improves success of interventions (high acceptability) and we make more patient orientated interventions (escalation of therapy / alteration of diagnosis)

Use of Clinical Decision Support System
• Automated alerts and reports to identify pertinent interventions
  • All bacteraemias are alerted to pharmacy team (check appropriate ABX prescribed)
  • Bug – drug mismatch (e.g. ESBL e.coli on Tazocin) is alerted for every isolate
  • Drug safety monitoring alerts (e.g. any new ALT/ALP rises post-ABX initiation alerted)
  • Patients with known infection control ‘flags’ are identified to team (e.g. CDT)
The Chelsea Experience
Impact of CDSS

Increased AMS service provision with no additional staffing
- **Pre-CDSS:** Adult in-patient wards only
- **Post-CDSS:** All patients using EPR (currently excludes ITU)
- All broad-spectrum ABX, antifungals and antivirals reviewed daily

Increase ward based antimicrobial review
- Regular ward rounds (AAU 3-5/wk, HDU 1/wk, Paeds 2/wk) and daily review of complex patients (all wards)
- Improved rapport with clinical teams / more receptive to our consult service
- Increased ward contact triggers opportunistic AMS interventions
- Clear documentation of AMS interventions in medical notes (reduces the need for multiple follow-up as patient moves through wards)

Feedback on sub-optimal prescribing
- Instant feedback to prescribers (via face-to-face interaction) has improved general prescribing habits
- Use as education opportunity
- Enables rapid cycles of change (e.g. after change of guidelines) through audit / feedback at prescriber level
# The Chelsea Experience
## Impact of CDSS

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<tr>
<td>Evidence base practice / reasoning</td>
<td>Report on all microbiology results down to divisional / departmental level to influence prescribing</td>
<td>This evidence makes guideline development more transparent and helps improve stakeholder engagement in their design</td>
</tr>
<tr>
<td>Feedback on practice</td>
<td>Real-time data and ward based working allows team to feedback prescribing ‘habits’ to prescribers</td>
<td>This rapid feedback corrects poor prescribing early (reduces harm and reoccurrence) whilst also identifies an educational need</td>
</tr>
<tr>
<td>Restrictions</td>
<td>No restriction of ABX stock on wards (all broad spectrum ABX readily available)</td>
<td>This supports our Sepsis targets (1-hour dosing)</td>
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<td></td>
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<td>Improves patient outcomes</td>
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<tr>
<td>Clinician Engagement</td>
<td>Face-to-face interaction improves the rapport and interest in AMS with clinicians Micro / I.D. team can better support clinicians with on-ward consults</td>
<td>Every intervention is an educational opportunity AMS moved from policing to enabling service (less of outward focus on avoiding restricted ABX and more to improving patient outcomes)</td>
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The Chelsea Experience
Outcomes of CDSS intervention

More patient contact from AMS team
- **Report generation time** (down from 60mins to 40mins/day)
- Zero time spent at desk with microbiologist (down from 2 hours/day)
- **More patients reviewed** (2664 daily patient reviews in 3 mth period)
- **Interventions made** increased (298; up from 138 & 169 over 3 mth period in 2016, 2013 & 2014 respectively)
- **Interventions accepted** increased by clinical team (97%; up from 70% baseline)

Increased complexity of patient interventions
- More focus on optimising patients based on treatment failure / drug:bug mismatch or sub-optimal dosing

Improved guideline adherence
- >95% compliance with empiric guidelines
- >90% 48-72 hour review

![Figure 1. Interventions made adjusted per 1000DDD.](image)
Summary

Antimicrobial Resistance and AMS is a complex system

✓ The AMS team has little impact without clinician engagement
✓ Punitive / restrictive policies can negate this relationship further

CDSS enabled working

✓ CDSS provides mobile, real-time data from EPR with microbiology / pathology feeds to identify the high-risk patient groups within your hospital
✓ This easily accessed data enables targeted AMS interventions to improve both patient care and feedback on errant prescribing patterns