Applying Implementation Science Principles to the Design and Evaluation of an Antimicrobial Stewardship Intervention

Scottish Antimicrobial Prescribing Group Meeting
November 3, 2020
Background to PhD study

Follow up study to the BEAMS study- ‘Barriers and Enablers to Antimicrobial Stewardship in Scottish acute care hospitals’ (Currie et al, 2020).

PhD study overall aim:

- To apply implementation science theories, models and frameworks, and evidence (from BEAMS and literature review) to inform, design and evaluate an intervention and implementation strategies to improve the review of antibiotics in Scottish acute care hospitals.

Logic model for the implementation of the Hospital Antibiotic Review Programme\(^1\) in Scottish Acute Care Hospitals

| Situation: | There has been a steady year on year increase in antibiotic use is hospitals. Various factors are responsible for this; however data suggests that IV antibiotics are not being reliably reviewed and switched to oral antibiotics within 72hrs of initiation. Data also suggests that the durations of oral antibiotic therapy are often longer than those recommended in treatment guidelines. |

<table>
<thead>
<tr>
<th>Inputs (What is needed)</th>
<th>Activities (What is done)</th>
<th>Potential Outputs (What is created)</th>
<th>Potential Impacts (The difference made)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. NHS boards via their Antimicrobial Management Teams (AMTs) are to implement HARP across clinical teams.</td>
<td>1. Disseminate information about accessing HARP to all boards and request feedback on local implementation plans (by SAPG)</td>
<td>1. Weekly run charts on the percentage of IV antibiotics reviewed within 72 hours and with a documented antibiotic plan</td>
<td>1. Improved review of IV antibiotics and documentation of the duration of oral antibiotics according to antimicrobial prescribing guidelines</td>
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<td>2. HARP implementation strategies: Two slide sets; quality improvement (QI) toolkit (as a guide on how to initiate QI projects), IVOST guidelines; ReCORD tool and online resource on HARP. Developed by SAPG.</td>
<td>2. Review of IV antibiotics with a documented antibiotic plan, within 72 hours</td>
<td>2. Run charts on the percentage of oral antibiotics with a documented duration</td>
<td>2. Decrease in nurses’ workload due to overall reduced IV antibiotic administration</td>
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<tr>
<td>4. Actors (healthcare professionals responsible for initiating or carrying out review/documentation of duration of IV and oral antibiotics): •Nurses •Pharmacists •Prescribers</td>
<td>4. PDSA quality improvement cycles</td>
<td>4. Initiation of at least 1 quality improvement project per site</td>
<td>4. Improved prescribing indicators for acute care hospitals in Scotland</td>
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<tr>
<td>5.</td>
<td>5. Number of sites targeted</td>
<td>5. Number of healthcare professionals trained</td>
<td>5. Control of/ reduction in antimicrobial resistance and Clostridium difficile rates</td>
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<td>6.</td>
<td>6.</td>
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<td>6. Reduced hospitals costs</td>
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<tr>
<td>Assumptions</td>
<td>1. AMTs, clinical managers, front-line clinical teams, patients.</td>
<td>1.</td>
<td>7. Reduced lengths of stay in hospital</td>
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<td>COVID-19 priority, Hospital activity levels, staff shortages, prevalence of infection e.g. flu rates.</td>
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<td>Context pre-conditions to be met/contextual readiness: space, time and resources (e.g. use of HEPMA) and AMT, local leadership capabilities to make changes, the right cultural/organisational climate and goals etc.</td>
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\(^1\)https://www.sapg.scot/quality-improvement/hospital-antibiotic-review-programme/
Logic model of HARP implementation - a closer look

**Inputs** (What is needed)

1. NHS boards via their Antimicrobial Management Teams (AMTs) are to implement HARP across clinical teams.
2. HARP implementation strategies: Two slide sets; quality improvement (QI) toolkit (as a guide on how to initiate QI projects), IVOST guidelines; ReCORD tool and online resource on NES. Developed by SAPG
3. Training sessions facilitated by AMT leads/AMT Pharmacists
4. Actors (healthcare professionals responsible for initiating or carrying out review/documentation of duration of IV and oral antibiotics):
   - Nurses
   - Pharmacists
   - Prescribers

**Activities** (What is done) (Who is influenced)

1. Disseminate information about accessing HARP to all boards and request feedback on local implementation plans (by SAPG)
2. Review of IV antibiotics with a documented antibiotic plan, within 72 hours
3. Documentation of the recommended duration of oral antibiotics
4. PDSA quality improvement cycles

1. AMTs, clinical managers, front-line clinical teams, patients.

**Potential Outputs** (What is created)

1. Weekly run charts on the percentage of IV antibiotics reviewed within 72 hours and with a documented antibiotic plan
2. Weekly run charts on the percentage of oral antibiotics with a documented duration
3. Utilisation of the ReCORD Tool
4. Initiation of at least 1 quality improvement project per site
5. Number of sites targeted
6. Number of healthcare professionals trained
Potential Outcomes

Short to medium-term

Hospital quality indicators (0-12 months)
1. % Documentation of the indication for antibiotic treatment
2. % Compliance of the antibiotic treatment with the local prescribing protocol
3. % Administration of all prescribed doses of antibiotics
4. % Documentation of duration or stop date for oral antibiotics
5. % Documentation of clinical review of IV antibiotics or combination therapy within 72 hours, and outcome of the review

Long-term

Higher level data linked to UK AMR strategy (>12 months)
1. Total Antibiotic consumption rates (defined daily doses per occupied bed days; DDDs/1000 OBDs)
2. Total Intravenous antibiotic use (DDDs/1000 OBDs)

Potential Impacts
(The difference made)

1. Improved review of IV antibiotics and documentation of the duration of oral antibiotics according to antimicrobial prescribing guidelines
2. Decrease in nurses’ workload due to overall reduced IV antibiotic administration
3. Reduction in time spent administering IV antibiotics
4. Improved prescribing indicators for acute care hospitals in Scotland
5. Control of/ reduction in antimicrobial resistance and Clostridium difficile rates
6. Reduced hospitals costs
7. Reduced lengths of stay in hospital
Describing the intervention and implementation strategy

Stakeholders involved

- The Scottish Antimicrobial Prescribing Group (SAPG)
- Antimicrobial Management Team (AMT) Leads
- Nurses
- Pharmacists
- Medics
- Macro level
- Meso level
- Micro level

Tallentire, Harley & Watson (2019)
Research objectives

Objectives:

Stage 1

• 1. Inform the design of the content of an intervention to improve the review of antibiotic therapy
• 2. Advise on the factors to be considered in designing an implementation strategy for the intervention
The Behaviour Change Wheel

Theoretical Domains Framework

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Intentions</th>
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<tbody>
<tr>
<td>Skills</td>
<td>Goals</td>
</tr>
<tr>
<td>Social/professional role and identity</td>
<td>Memory, attention and decision processes</td>
</tr>
<tr>
<td>Beliefs about capabilities</td>
<td>Environmental context and resources</td>
</tr>
<tr>
<td>Optimism</td>
<td>Social influences</td>
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<tr>
<td>Beliefs about consequences</td>
<td>Emotion</td>
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<tr>
<td>Reinforcement</td>
<td>Behavioural regulation</td>
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Normalization Process theory (NPT)
Findings from the preliminary analysis

Gaps in the Day-3 Review Resource (5 Suggested Behaviour Change Techniques, BCTs to Include)

<table>
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<th>TDF domain</th>
<th>BCTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Knowledge</td>
<td>8.1 Behavioural practice/rehearsal</td>
</tr>
<tr>
<td>• Social/professional role and identity</td>
<td>6.3 Information on others’ approval</td>
</tr>
<tr>
<td>• Beliefs about capabilities</td>
<td>15.3 Focus on past successes</td>
</tr>
<tr>
<td>• Environmental context and resources</td>
<td>15.1 Verbal persuasion about capability</td>
</tr>
<tr>
<td>• Social influences</td>
<td>6.2 Social comparison</td>
</tr>
<tr>
<td>• Behavioural regulation</td>
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Findings from the preliminary analysis contd.

Key recommendations/implementation gaps from NPT analysis

1. Impact of limited staff resource
2. Engagement with all relevant HCPs
3. Addressing attitudes of senior staff who may be resistant to the Intervention
4. Barriers to communication e.g. absence of AMS ward rounds
5. Multiple competing priorities, e.g. *COVID-19, ‘Sepsis Six’
6. IT and technology issues
7. Ensuring regular, direct feedback on audit results and AMS performance indicators
8. Creating a link between audit data and quality improvement.

Summary report sent to SAPG in January 2019

*Newly added*
Research aim and objectives - next step

Stage 2

• 3. Evaluate the feasibility and acceptability of a) the intervention and b) the implementation strategy in the context of Scottish acute care hospitals
• 4. Evaluate the clinical effectiveness of the intervention

Through:

- Selection of at most 5 case sites (from NHS Health Boards)
- Qualitative data collection: Online interviews
  1. One-on-one interviews with AMT leads, separately
  2. One-on-one interviews and/or focus group discussions with HCPs, analysis using social science/behaviour change frameworks
- Quantitative data collection: Prescribing indicators, process and outcome measures to measure HARP effectiveness
Recruitment?

- Boards that are interested in taking part
- Recruiting AMTs and HCPs to interviews
- The best approach to recruitment
Thank you for listening

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  – Professor Kay Currie
  – Dr Jen MacDonald
  – Dr Valerie Ness
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Any questions?