What Is Implementation Science? Implications for Conducting Antimicrobial Stewardship Research

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VA Disclaimer

- The opinions expressed in this presentation are those of the author and do not necessarily reflect the views of the Department of Veterans Affairs.
Objectives

- To define implementation science and compare and contrast it to other fields of research.
- To examine how conceptual models and strategies in implementation science can be applied to antimicrobial stewardship research.
- To learn from examples of antimicrobial research conducted with an implementation science framework.
Implementation Science Defined

- “scientific study of methods to promote the uptake of research findings into routine healthcare in clinical, organisational or policy contexts”

  Implementation Science
  ([http://implementationscience.biomedcentral.com/](http://implementationscience.biomedcentral.com/))
Research to Practice Pipelines

- NIH’s T1-T4
  - Translate to Humans
  - Translate to Patients
  - Translate to Practice
  - Translate to Population Health
Research to Practice Pipelines

- VA’s QUERI Process
  - Establish evidence-based practice
  - Identify gaps in practice
  - Identify and develop implementation strategies
  - Conduct trial of implementation strategies
  - Evaluate large-scale implementation project and sustainment
Where is antimicrobial stewardship along these pipelines?
One Other “Pipeline”

Plan

Act

Do

Study
Implementation Science

“scientific study of methods to promote the uptake of research findings into routine healthcare in clinical, organisational or policy contexts”

<table>
<thead>
<tr>
<th>From definition</th>
<th>Translation to IS</th>
<th>Applied to ASP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research findings</td>
<td><strong>Innovation</strong></td>
<td>Appropriate antibiotic use improves patient outcomes and population health</td>
</tr>
<tr>
<td>Scientific study</td>
<td>Conceptual model</td>
<td>PARiHS, RE-AIM, CFIR, etc.</td>
</tr>
<tr>
<td>Methods</td>
<td>Strategies</td>
<td>Audit feedback, education, champions, etc.</td>
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<td>Scientific study</td>
<td>Outcomes</td>
<td>-Implementation: adoption, fidelity, etc.</td>
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<td></td>
<td></td>
<td>-ASP Outcomes: # of antibiotics, etc.</td>
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Four Essentials Questions

1) What is the gap between evidence-based practice and clinical practice?

2) What conceptual model best describes how you hypothesize change will occur?

3) What implementation strategies will facilitate that change?

4) What outcomes do we need to measure to evaluate whether the changed occurred in practice and clinical outcomes?

➢ What needs to change?

➢ How/why will this change occur?

➢ What will create the change?

➢ What changed?
Conceptual Models

  - 61 models reviewed
  - Guidance on:
    - Flexibility of model
    - Dissemination and/or implementation focus
    - Socioecologic level (system, community, organization, individual, or policy)
  - Includes:
    - Diffusion of innovation
    - PARiHS
    - RE-AIM
    - CFIR
Considerations

- Target setting
  - Health system wide implementation or single hospital?

- Target clinicians
  - Hospitalists, specialists, etc.

- Scope of innovation
  - All antibiotics?

- Outcomes...and how you will measure them
  - Implementation outcomes
  - ASP-specific outcomes
How/Why Will Prescribing Change?

Multi-level framework predicting implementation outcomes, Chaudoir, Dugan, Barr, IS, 2013, 8:22.
How/Why Will Prescribing Change?

Multi-level framework predicting implementation outcomes, Chaudoir, Dugan, Barr, IS, 2013, 8:22.
How/Why Will Prescribing Change?

Multi-level framework predicting implementation outcomes, Chaudoir, Dugan, Barr, IS, 2013, 8:22.

- Decrease in rate of antibiotics prescribed
- Deescalation of antibiotics
- Decrease # of lab orders

ASP Outcomes
Implementation Strategies


- 73 implementation strategies labeled and defined

- Includes:
  - Create new clinical teams
  - Audit and provide feedback
  - Identify and prepare champions
  - Use capitated payments
  - Mandate change

- Suggests combining them based on innovation and conceptual model
Compare and Contrast

HSR  ASP

Interventions
A) Audit and feedback v.
B) Restricted formularies

Measures
Outcomes: Fewer antibiotics in A v. B

IS  ASP

Strategies
• A) Audit and feedback v.
• B) Restricted formularies

Measures
• ASP Outcomes: Fewer antibiotics
• Implementation Outcomes
Implementation Outcomes

- Number of audits
- Number of restricted prescriptions requests
- Measure of physician acceptance
- Interviews with clinicians about their perceptions of the program and barriers and facilitators
- ...etc., etc.

Hybrid Type II Design: Trial of the effectiveness of the innovation and implementation strategies (i.e., both ASP and implementation outcomes)
Methodological Considerations

- Majority of IS research is mixed methods
  - Needs assessment
    - What characterizes this site and how can we tailor the implementation strategies to be most effective?
  - Formative evaluation
    - What are stakeholders perceptions of the strategies and what are the facilitators and barriers to their success?
    - How do we use this information to change or improve the strategies during the study?
  - Process evaluation
    - What are stakeholders perceptions of the strategies and what are the facilitators and barriers to their success?
  - Summative evaluation
    - What are stakeholders perceptions of the strategies and what are the facilitators and barriers to their success?
A Case: ERASE C. Diff

- Ostrowsky et al. Lessons Learned from Implementing Clostridium difficile-Focused Antibiotic Stewardship Interventions. *ICHE*, 2014;35(S3).

A Case

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<tr>
<td>Research findings</td>
<td>Evidence-based practice</td>
<td>Appropriate antibiotic use improves patient outcomes and population health</td>
<td>Focus on C. Diff</td>
</tr>
<tr>
<td>Scientific study</td>
<td>Conceptual Model</td>
<td>CFIR, PARiHS, RE-AIM, etc.</td>
<td>Van Deusen Lukas</td>
</tr>
<tr>
<td>Methods</td>
<td>Strategies</td>
<td>Audit feedback, education, champions, etc.</td>
<td>Facilitation, Audit and provide feedback, etc.</td>
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<td>Outcomes</td>
<td>-Implementation: adoption, fidelity, etc.</td>
<td>-Implementation: lessons learned</td>
</tr>
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<td>-ASP Outcomes: # of antibiotics, etc.</td>
<td>-ASP Outcome: Reduction in C. Diff</td>
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ERASE C. Diff Conceptual Model

External facilitation
- Data support
- Stewardship technical assistance
- Support of shared learning across sites

Local implementation strategies
- ASP staffing
- Case-control to identify antibiotics
- Education/training/internal facilitation

Clinical intervention
- ASP targeted antibiotic interventions

Process outcome
- Reduction of targeted antibiotics

Organizational context
- IT support
- Staffing resources
- Leadership support
What Implementation Science Has Brought Us

- More rigor to quality improvement
- Experience doing science in the real world
- Forced us to better define our terms and articulate how we think change happens
- Better understanding of mediating and moderating variables that are themselves modifiable
- More examples of the benefits of integrating quantitative and qualitative research
Thank you!

- Program Planning Committee
- VA QUERI Sub-Groups
  - Adaptation and Fidelity
  - Facilitation
- Many, many colleagues
Questions?
...or two

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<th>Your Research</th>
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<td>Research findings</td>
<td>Evidence-based practice/medicine</td>
<td>Appropriate antibiotic use improves patient outcomes and population health</td>
<td>Vancomycin and Cefazolin for MRSA positive patients getting a hip or knee replacement</td>
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<td>Scientific study</td>
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<td>CFIR, PARiHS, RE-AIM, etc.</td>
<td>CFIR (particularly inner setting)</td>
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<td>Methods</td>
<td>Strategies</td>
<td>Audit feedback, education, champions, etc.</td>
<td>Regular meeting, implementation plan, templates for EHR</td>
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<td>-Implementation: # of facilities that adopt bundle -ASP Outcomes: SSI rates</td>
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