Measuring Implementation
Context, Process, and Outcomes

Hosted by:

Katharine Rendle, PhD, MPH, MSW
Assistant Professor, Family Medicine and Community Health
University of Pennsylvania Perelman School of Medicine

Jeremiah Brown, DCIS Director
Kelly Aschbrenner, DCIS Co-Director
Sarah Lord, DCIS Co-Director
Learning Objectives

→ To understand different strategies for collecting contextual data in implementation studies and trials
→ To identify approaches for ensuring equity and representativeness in contextual data collection
→ To describe importance of collecting contextual data within implementation studies and trials
LIFE COURSE APPROACH (MINE) TO DEFINING & MEASURING CONTEXT
ANTHROPOLOGY: HOLISTIC, IN SITU APPROACH TO STUDYING PHENOMENON
“Context is considered responsible for **study-to-study variations in outcomes**” Nilsen & Bernhardsson 2019.
“[Context] not a backdrop for implementation but interacts, influences, modifies and facilitates or constrains the intervention and the implementation…Context is much more versatile, embracing not only the setting but also roles, interactions and relationships”

Pfadenhauer et al. 2015.
HEALTHCARE SYSTEMS AS COMPLEX SYSTEMS

Multilevel Components

Assess Context & Mechanisms: Observational Analysis + Mixed Methods

Dynamically Configure

Complex Systems

Test Pragmatic Approaches to Implement Evidence-Based Cancer Care

Adapted from Taplin & Rodgers 2010

Boustani et al. 2019
When and why do we measure context in IS?

**Before Project**
- What are the determinants shaping uptake (or not) of specific evidence-based practice (EBP)?
- What strategies might best align with identified determinants?
- What strategies may be acceptable/feasible (or not) in a specific setting?
- What is the best outcome(s) to be measure?

**During Project**
- How are your strategies being adapted (or not) during your project?
- How might contextual factors outside your project (e.g., competing interventions) change during the course of your project?
- Are there any “voltage drops” related to equity occurring during your project and how can you address them?

**After Project**
- How and why did your strategies work or fail?
- From whom did your strategies work best and least?
- What mechanisms drove implementation success or failure overall?

**Beyond Project: Transferability/Generalizability/Scalability**
Understanding context at each phase is essential for interpretation and success of your specific project – but ALSO to guide and inform how transferable your findings/strategies may be to another setting (or not).
BEFORE: Contextual inquiry informs strategies to be used & equity gaps

OUTCOME: What is your primary implementation outcome(s) and how will you measure equity?

How is all of this CONTEXT going to shape, enable, or restrict implementation outcomes AND execution of strategies?

What can you measure and what can you not?

DURING AND AFTER: Measuring and assessing multilevel context with an (monitoring) eye on equity
But how can you measure context amid the complexities and realities of implementation practice and research?
More than 600,000 cervical cancer cases & 311,000 deaths worldwide
~90% in low- & middle-income countries
While people live & receive primary care across Botswana…

Cervical cancer mortality rate at 20.1 per 100,000 in Botswana (2.2/100,000 in USA)

…there is only one radiation oncology facility in Botswana & thus treatment is centralized
I. BEFORE: IDENTIFIED GAPS & DETERMINANTS OF DELAYS

“The challenge for me then becomes leaving to go [to the treatment clinic] and how I get there if that place is far from me.”

“I screened when I went for [an] antenatal check-up in Thamaga. I always tested but did not receive any results [so] I gave up.”

Rendle et al. 2022 BMC Women’s Health

Funding: K08CA230170-03S1; 3P30CA016520-45S7; P30AI045008
2. DESIGN STRATEGIES TO WORK WITH CONTEXT, NOT AGAINST IT: APPLICATION FOR ANY SYSTEM WITH RESTRAINTS (NCI U01)

- Use **centralized strategy** to enhance outreach and support to patients across the country
- Use **pragmatic and adaptive approach** to identify what combination of low and high strategies are needed to equitably increase care
- Use **embedded mixed methods** evaluation to understand mechanisms pragmatically
- Build **capacity & sustainability** with stakeholders across sectors: government, pathology, clinicians, patients, community members, researchers

![Figure 3: Design components of the SMART design](image-url)
MEASURING CONTEXT TO UNDERSTAND MECHANISMS & EQUITY IN PRAGMATIC TRIALS

PENN ISC3
Mission: To apply insights from behavioral economics to rapidly accelerate the pace at which evidence-based practices for cancer care are deployed and the extent to which they are delivered equitably, thereby increasing their reach and impact on the health and health equity of individuals with cancer.

Design: First two Signature Pilot Projects (tobacco cessation, serious illness conversations) in analysis and selected three more for next phase.
• Similar trial designs: pragmatic & factorial (usual care, patient, clinician, both) with embedded mixed methods cohort
• BE guided strategies to increase use of evidence-based cancer care with specific focus on rapid cycle approaches, health equity, & mixed-methods analysis
Rapid cycle approaches to design strategies to reduce barriers & increase equity

Penn ISC3 Equity Model

Social Determinants
- Race and ethnicity
- Income
- Education
- Zip Code

Implementation Strategies
- Patient Nudges
- Clinician Nudges

Mechanisms
- Multilevel
  - Patient
  - Clinician
  - Organizational
  - Community & Policy
- Equity Lens
  - Mistrust, Racism, Stigma, Discrimination, Health Literacy
  - Sampling & Recruitment

Outcomes
- Effectiveness of strategies overall & by social determinants
- Implementation overall & by social determinants (RE-AIM for equity/sustainability)

Developed by Rachel Shelton & Krisda Chaiyachati
CONCEPTUALIZE YOUR CONTEXT & ASSESS WHAT YOU CAN MEASURE

Outer Context

City/State
Neighborhood
Household
Individual

Inner Context

National & Global
Healthcare System
Clinic/Practice
Clinician & Clinical Teams

Conceptualization Map:
- City/State
- Neighborhood
- Household
- Individual
- National & Global
- Healthcare System
- Clinic/Practice
- Clinician & Clinical Teams
Baseline Clinician Survey across Penn ISC3 iLAB:
Prior to launching of the trials
149 respondents (60.3% response rate)

Geocode all patients across pilot projects and
link to census-tract SDOHs:
Outer and Inner Context

Embedded Mixed Methods Cohort & QCA
Post-trial interviews with patients, clinicians, and
clinical leaders

• Organizational and clinician mediators for trials
• Conditions for qualitative comparative analysis (QCA)

• Effect moderators & assess reach for trials
• Use to guide stratified sampling for interviews
• Compare area vs individual SDOH (interviews)
• Assess implementation of social risk factors

• Evaluate conditions associated with success & failure
within and across pilot trials (cross-cutting constructs)
• Evaluate mechanisms of inequities
BEFORE/DURING: Hypothesized Mechanisms (Baseline Survey)

Supportive Learning Environment (+)
Leadership (+)

Prioritization (+)

Communication self-efficacy (+)
Implementation self-efficacy (+)

Perceived Locus of Control (Unmeasured)

Higher rates of EVP (Patient-Level)
Baseline Clinician Survey: Cross-Cutting Domains Assessed

**Clinical Practices**
- Tobacco cessation (SPP1)
- Serious illness conversations (SPP2)
- Financial costs and burden
- Social needs

**Clinic-Level**
- Supportive learning environment: psychological safety, appreciation of differences, openness to new ideas (5 items)
- Supportive learning environment: Time for reflection (2-items)
- Leadership reinforces learning (4-items)

**Clinician-Level**
- Self-efficacy to discuss each clinical practice
- Self-efficacy to implementation each clinical practice
- Prioritization of each clinical practice
- Characteristics: Demographics, Training, Clinical Sessions
Baseline Clinician Survey: Cross-Cutting Domains Assessed

Clinical Practices
- Tobacco cessation (SPP1)
- Serious illness conversations (SPP2)
- Financial costs and burden

Clinician-Level
- Self-efficacy to implementation each clinical practice
- Prioritization of each clinical practice
- Characteristics: Demographics, Training, Clinical Sessions

The rationale for collecting these contextual data were to inform strategies AND to evaluate potential mechanisms that may impact success/failure of the trial.

We also used EHR data to identify gaps and disparities associated with each evidence-based practice before and during the trials.
<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Prevalence</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Isolation Risk</td>
<td>0.3%</td>
<td></td>
</tr>
<tr>
<td>IPV Risk</td>
<td>0.3%</td>
<td></td>
</tr>
<tr>
<td>Alcohol Risk</td>
<td>3.9%</td>
<td></td>
</tr>
<tr>
<td>Stress Risk</td>
<td>3.9%</td>
<td></td>
</tr>
<tr>
<td>Physical Activity Risk</td>
<td>4.0%</td>
<td></td>
</tr>
<tr>
<td>Financial Resource Risk</td>
<td>8.9%</td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td>3.3%</td>
<td></td>
</tr>
<tr>
<td>Transport Needs Risk</td>
<td>9.3%</td>
<td></td>
</tr>
<tr>
<td>Food Insecurity Risk</td>
<td>9.0%</td>
<td></td>
</tr>
<tr>
<td>Depression Risk</td>
<td>59.3%</td>
<td></td>
</tr>
<tr>
<td>Tobacco Risk</td>
<td>76.5%</td>
<td></td>
</tr>
</tbody>
</table>

Haines...Rendle (2024). Addressing social needs in oncology care: another research-to-practice gap. JNCI Cancer Spectrum (In press)
USING OUTER CONTEXT AS PRAGMATIC APPROACH TO SAMPLING FOR INTERVIEW PARTICIPANTS & MODERATION ANALYSIS

**How**

1. Geocoded all trial participants (in both SPPs) using ArcGIS Pro: EMR address → Census tract
2. Match patients to outer context variables (e.g., % living in poverty in tract) using 2012-2016 American Community Survey Data (NCI SDOH File) or Outer Context file (now created!)
3. Identify key constructs for moderation analysis specific to project & known disparities
4. Identify key constructs for interview sampling specific to project & known disparities
   1. Randomly sample & invite participants based on key constructs
   2. Monitor enrollment and adjust sampling (%) as needed
5. Done (😊)

**Why**

- Neighborhood as pragmatic way to monitor & evaluate equity in trials
- Neighborhood as proxy for individual social risk & needs
- Neighborhood may capture structural effects of inequity & racism

SPPI Interview Participants (n=30)
- 77% HS diploma or lower
- 47% identified as Black
- 47% reported household income <$30K
- 24% lived in a neighborhood with high poverty rate (25%+)
Recruit participants for embedded mixed methods study across projects – while monitoring and ensuring equity.

- Trial starts
- Outcomes assessed at the individual level
- Identify equity domains
- Develop sampling strategies
- Use diverse approaches to recruit participants
- Monitor enrollment
- Adapt sampling strategy if needed to ensure equity
- Analyze for equity
- Analyze for success and failure
COMBINE DATA FROM PILOT PROJECTS TO EVALUATE PROJECT SPECIFIC & CROSS-PROJECT MECHANISMS: EQUITY FOCUS

Cross-Project Domains of Inquiry

- **Baseline Survey Domains**
  - Organizational/clinician data
- **Structured (Pre-Interview Questionnaire):**
  - Medical Mistrust, Financial Toxicity, Patient-Centered Communication, Health Literacy, Social Needs, Project Specific
- **Open-Ended (Interview):**
  - CFIR guided and tailored to project content/response to nudges
  - Includes health discrimination and health equity (what does health equity mean to you?) questions

**Large amount of data for analysis**

- 149 baseline clinician surveys
- 60+ patient mixed methods interviews
- 30+ clinician mixed methods interviews
Context matters not only for your project but so that others can understand what may have drove your findings – and what might need to be in place (or not) to work in another context…
THANK YOU!

QUESTIONS? COMMENTS?
Hosted by:
Jeremiah Brown, PhD, DCIS Director
Kelly Aschbrenner, PhD, DCIS Co-Director
Sarah Lord, PhD, DCIS Co-Director

Monthly on the 2nd Tuesday

May
Implementation Frameworks:
PRISM & RE-AIM
Tina Studts, PhD
University of Colorado
Samantha Harden, PhD
Virginia Tech

Tuesday, May 14

June
Designing for Dissemination & Sustainability
Allison L’Hotta, OTD, OTR/L, PhD
University of Colorado
Thembekile Shato, PhD, MPH
Washington University in St. Louis

Tuesday, June 11

Recent Sessions
Available at:
geiselmed.dartmouth.edu/dcis/past-events/

From Concept to Impact: Exploring Implementation Models and Frameworks
Sara Malone, PhD
March 2024
Recording | Slides

Five Considerations for Formulating an Implementation Science Research Question
Kelly Aschbrenner, PhD
February 2024
Recording | Slides