Programme Science Initiative: An Overview

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Some Conceptual Roots

- "Evidence-based Decision Making"
  - Decision makers actively using "evidence" in policy and program development

- "Knowledge Translation"
  - "... the process of supporting the uptake of health research..."\(^1\)

- "Implementation Science"
  - "...the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices... to improve the quality and effectiveness of health services and care."\(^2\)

1. Canadian Institutes of Health Research
Some Potential Pitfalls in Knowledge Translation in Public Health

- Knowledge production and synthesis often addresses a single component in a single sphere of knowledge:
  - Protective efficacy of a biomedical intervention
  - Effectiveness of a specific behaviour change method

- “Evidence traps” for public health programs:
  - Focus on single interventions (“magic bullets”)
  - Ignore the epidemiological context
  - Ignore the social, cultural, political, economic context
“Research driven” approach to intervention design and assessment

Theoretical Basis

Intervention Design

Demonstrate efficacy / effectiveness

Implement and Scale Up With “Fidelity”
Constraints of “research driven” models in HIV prevention

- Complexity and heterogeneity of HIV transmission dynamics:
  - Designing and assessing the right intervention for a particular context

- Complexity of social and sexual structures within and across populations

- Interactions between interventions and populations
Differing Research Paradigms: “GRIP” to “GROP”¹

- “GRIP” – Getting Research Into Policy
- “GROP” – Getting Research Out of Practice

Pathways of activities and evidence flow into, and out of, policy and practice

Evidence continuum
From...
Clear, “reliable” evidence, direct cause-effect
To....
Evidence gaps, unclear causality, complex interventions, multiple interacting factors

Program Science: Two Aspects

1. A research domain or enterprise ("program" as adjective):
   - Theoretical base
   - Methodologies

2. An interactive process ("program" as noun):
   - Dynamic interaction between scientists, program and policy leaders, and implementers/practitioners
   - The "embedded scientist" (cf. David Wilson)
“Program Science” for HIV/STI Prevention: A Component Model

**Spheres of Knowledge**
- Epidemiology
- Transmission dynamics
- Policy analysis
- Health systems research
- Efficacy / effectiveness
- Operations research
- Surveillance
- Monitoring/evaluation
- Operations research
- Health systems research

**Spheres of Practice**
- Strategic Planning
  - Policy Development
- Program Implementation
- Program Management

**Intended Outcomes**
**Choose:**
- The best strategy…
- The right populations…
- The right time…

**Do:**
- The right things…
- The right way…

**Ensure:**
- Appropriate scale…
- Efficiency…
- Change when needed…
HIV Prevention in India – Reflections from a “Program Science” Perspective
A Concentrated Epidemic: Implications for HIV Prevention Strategies

FSWs

Targeted Interventions

Male Clients

Discordant Couple Interventions

Female Partners

PMTCT

Children
PMTCT – Substantial scaling up in Karnataka, but a huge gap remains

- Added >550 centres and many more 24x7 PHCs statewide
- 7-fold increase in PMTCT uptake
- Total PMTCT tests equivalent to approx. 30% of live births

![PMTCT Tests Graph](chart.png)
The PMTCT Service Gap – Mapping the distribution of approx. 385,000 deliveries in N. Karnataka, 2009-2010

- Missing: 28%
- SC: 9%
- 24x7, PHC: 15%
- Home: 9%
- Private: 13%
- DH: 6%
- TH: 11%
- FRU: 4%
- CHC: 4%
- Public Sector – 40%
HIV prevention in discordant couples in India – strategic considerations

- **What is the intervention?**
  - Counseling, condoms
  - PrEP?, PEP?
  - Microbicide?

- **What should be the timing in relation to the partnership (vast majority are marriages)?**
  - Any time during partnership?
  - Beginning?
  - Before marriage?
Intervention timing – must be very early to have a substantial impact

- Large proportion of infections among pregnant women occur very early in marriage:
  - High proportion of HIV infections among pregnant women occur prior to first pregnancy
  - HIV prevalence high among 15-19 year olds
  - Average <2 years from cohabitation to 1st delivery
Getting Research out of Practice – FSW Intervention

• **Singular objective – achieve “80% condom use”**
  – Models suggest this would lead to epidemic reversal and eventual elimination

• **Well-defined approach**
  – Mapping
  – Peer education
  – Condom distribution
  – STI services, community mobilization
How should we implement our intervention package?

- "High scale" intervention → 100% of FSWs with 80% condom usage
- "High quality" intervention → 80% of FSWs with 100% condom usage
- Does it matter?
Insights from program monitoring – heterogeneity within FSW populations

- Client volume distribution
- HIV prevalence
Heterogeneity in the distribution of client volume among FSWs, 8 cities of Pakistan
Proportion of sex acts with condom used by covering 80% FSWs with lowest client volume.

- Faisalabad: 68%
- Karachi: 51%
- Hyderabad: 44%
Relative odds* of HIV infection among FSWs by sex work type, Karnataka

<table>
<thead>
<tr>
<th>Sex work type</th>
<th>Odds ratio*</th>
<th>P</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>1.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Brothel</td>
<td>2.23</td>
<td>.004</td>
<td>1.29 - 3.85</td>
</tr>
<tr>
<td>Street</td>
<td>2.09</td>
<td>.000</td>
<td>1.53 - 2.86</td>
</tr>
</tbody>
</table>

*Adjusted for socio-demographic and behavioural characteristics, including client numbers and condom usage
Strategic Level – Does it matter which intervention we use?

- To reduce mother to child transmission
  - Targeted intervention vs. PMTCT

- To control the epidemic
  - FSW vs. discordant couple intervention
Predicted impact of a targeted intervention on PMTCT in a concentrated epidemic: (80% condom use in FSW in Karnataka)*

Relative impact of “test and treat” – modeled by M. Pickles et al.*

- Targeted interventions at current level of intensity would push most district epidemics to “elimination level” within 5-15 years.

- Fully scaled “test and treat” would achieve “elimination” later, and would cost 10-fold more annually than current targeted interventions.

* ISSTDR 2011, Quebec City.
Program Science – FAQs

• How does PS differ from “translational research”?
  – Translational research focuses on how to get scientific “evidence into practice”. The process tends to focus on single interventions and too often a unidirectional process of knowledge translation.
  – In addition to focusing on multiple interventions and their interfaces at the population level, program science emphasizes “getting research out of practice” and formulating new hypotheses that emerge out of programmatic experience.
• How does PS differ from “operations research”?
  
  – Operations research focuses on how to optimize the implementation of a particular intervention, not on strategic planning to achieve maximum population-level impact.
  
  – In addition to optimizing implementation, program science focuses on population impact, which depends on population focus, selection of interventions, interactions between interventions, etc.
Isn’t Program Science just the same as good program management?

- Program science should result in good program management, but also seeks to develop new insights and knowledge that can be translated to the design and implementation of future programs. New knowledge could emerge in areas such as:
  - Better approaches to appraising epidemics and transmission dynamics
  - Novel approaches to impact evaluation
  - Expanding public health sciences into new fields that address complexity, including new methods for understanding how epidemics emerge and the interfaces between individuals, pathogens, their environments and programs.
How is “program science” different from “implementation research”?

- Implementation research, as often conceptualized and practiced, focuses on identifying and scaling up a single “evidence-based” intervention or set intervention packages.

- Program science is concerned with the totality of a program, including an appraisal of the epidemic transmission dynamics, setting appropriate prevention objectives by sub-population, selecting and combining interventions and allocating resources between interventions accordingly.
What is the status of the Program Science initiative and how will it progress?

- Establishment of a “Program – Science” consortium to:
  - Further develop the concepts and program and science questions
  - To identify and translate knowledge emerging from program science initiatives and other sources
  - To contribute to the evolution of new scientific approaches

- Program Science initiatives in:
  - Kenya, Nigeria, India USA
Thank You