Operations Research Mini Course

University of Washington Center for AIDS Research

Scientific Program on
Health Services and Strategies Research

August 1, 2008

Agenda

Room	Time	Session	Presenter
T-439	9:00–9:30	Introduction to OR and course	Mark Micek, MD, MPH
	9:30–10:00	Quantitative OR methodologies I	Mark Micek, MD, MPH
	10:00–10:45	Qualitative OR methodologies	James Pfeiffer, PhD, MPH
	10:45–11:15	Break and switch classroom	
T-639	11:15–12:15	Introduction to optimization models	Archis Ghate, PhD
	12:15–1:30	Lunch	
T-639	1:30–2:30	Ethics and OR	James Pfeiffer, PhD, MPH
	2:30–3:15	Quantitative OR methodologies II	James Hughes, PhD
	3:15 – 4:00	OR and policy change	John Burbank

An Introduction to Operations Research
------ or ------
How can I make my health program better?

Mark Micek, MD, MPH

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The Issue

- It is difficult to…
  - …effectively deliver scientifically proven health interventions in the "real world"
  - …translate research into health program settings

- Why?
  - Research generally occurs in controlled settings
    - Homogenous sample, controlled setting
  - Health programs exist in a complex setting
    - Heterogeneous clients, multiple settings
    - Dependent on external context of care-delivery system
      - i.e. policy, resource availability ($ and personnel), community perceptions

Example of difficulty translating proven treatment into practice

- **Short-course ARV therapy can decrease mother-to-child HIV transmission**
  - <u>BUT</u> few HIV+ women receive treatment

Women tested for HIV and receiving ARV prophylaxis in 11 pilot pMTCT sites, Jan00-Jun02
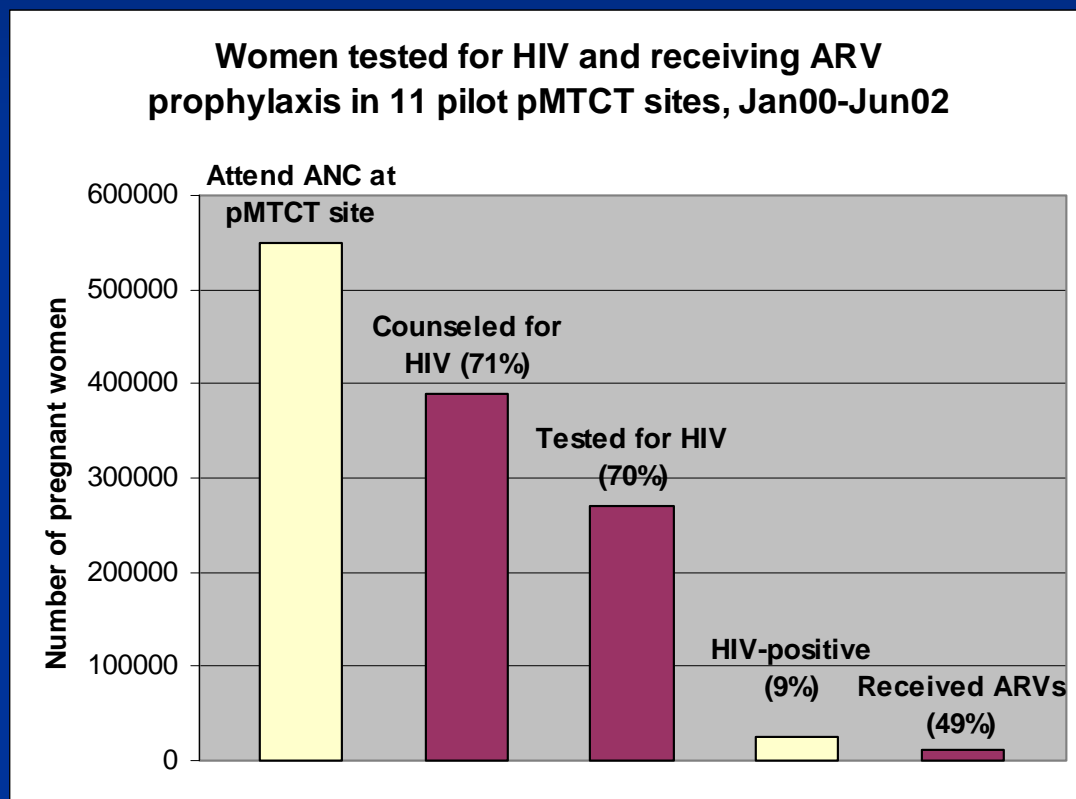
Data from: Evaluation of United Nations-Supported Pilot Projects for the Prevention of Mother-to-Child Transmission of HIV: Overview of Findings. UNICEF, New York, 2003.

The "Know-Do Gap"

- **We know many times more than we are able to apply**
  - 30-50% lack essential drugs globally
  - Childhood vaccination ~ 50% in Africa
  - Antenatal care (pMTCT, malaria, syphilis) ~ 10-30%
  - ARVs are quite effective, but only 30% in treatment

Factors that contribute to (or inhibit) successful health programs

- Political will
- Funding
- Access to affordable medicines
- Infrastructure (human resource, physical capacity)
- Health program management
- Laboratory systems and diagnostics
- Poverty
- Hunger
- Gender inequality
- Conflict

Major issue is systems

"Every process is perfectly designed to give you exactly the outcome that you get."

Don Berwick, Institute for Healthcare Improvement

How can we improve the performance of our programs in an evidence-based way?

➢ Use the principles of Operations Research
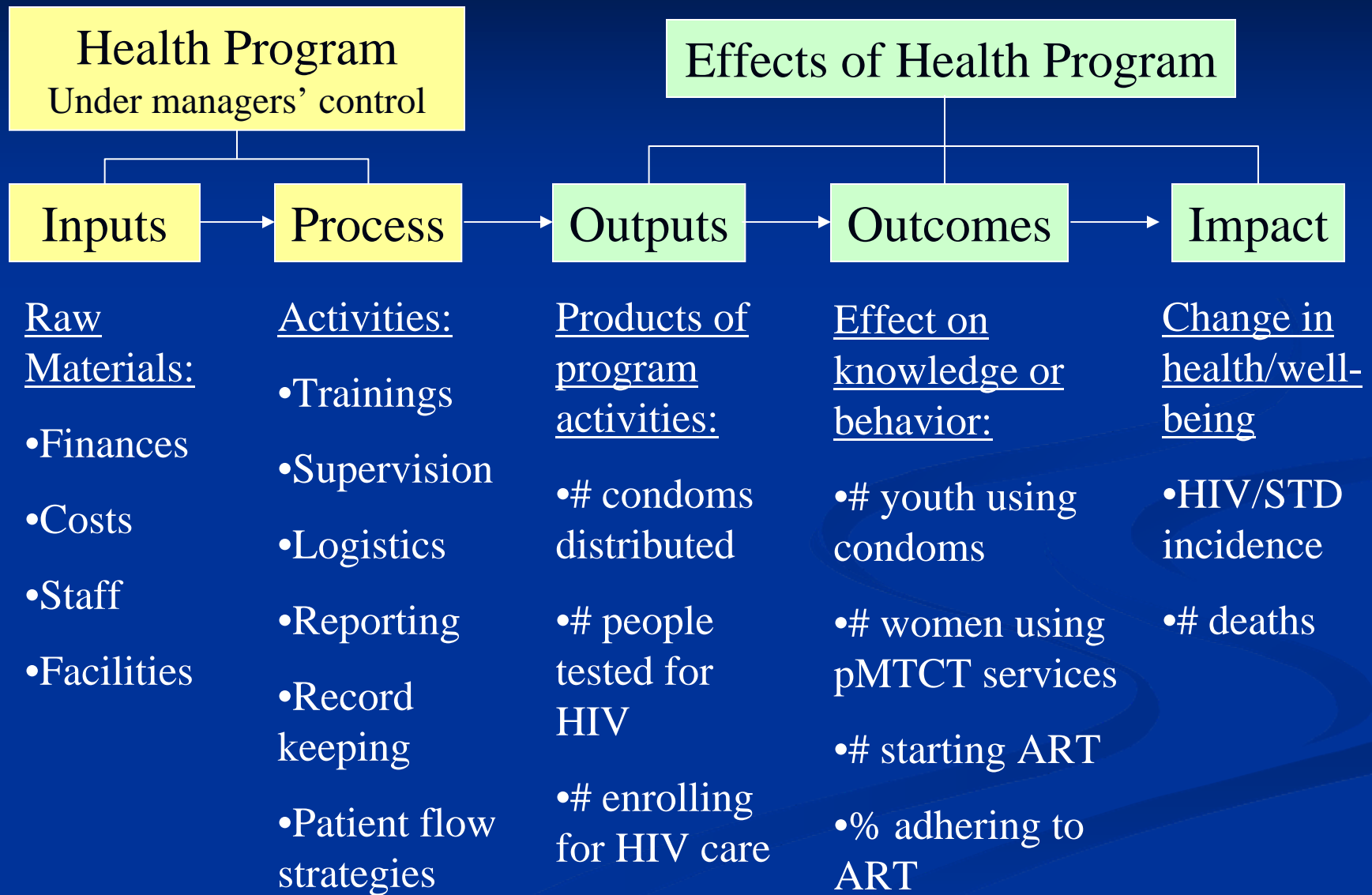
What is OR?
Generic definition

- "Use of systematic research techniques for program decision-making to achieve a specified outcome."

  - [Population Council, 2006]

- Goal = find a best possible solution to improve performance of the organization
  - Early examples in military, business
  - Use data, statistics, mathematical modeling

- Goal (health care) = "to increase the efficiency, effectiveness, and quality of services delivered by providers, and the availability, accessibility, and acceptability of services desired by users"

  - [Population Council, 2002]
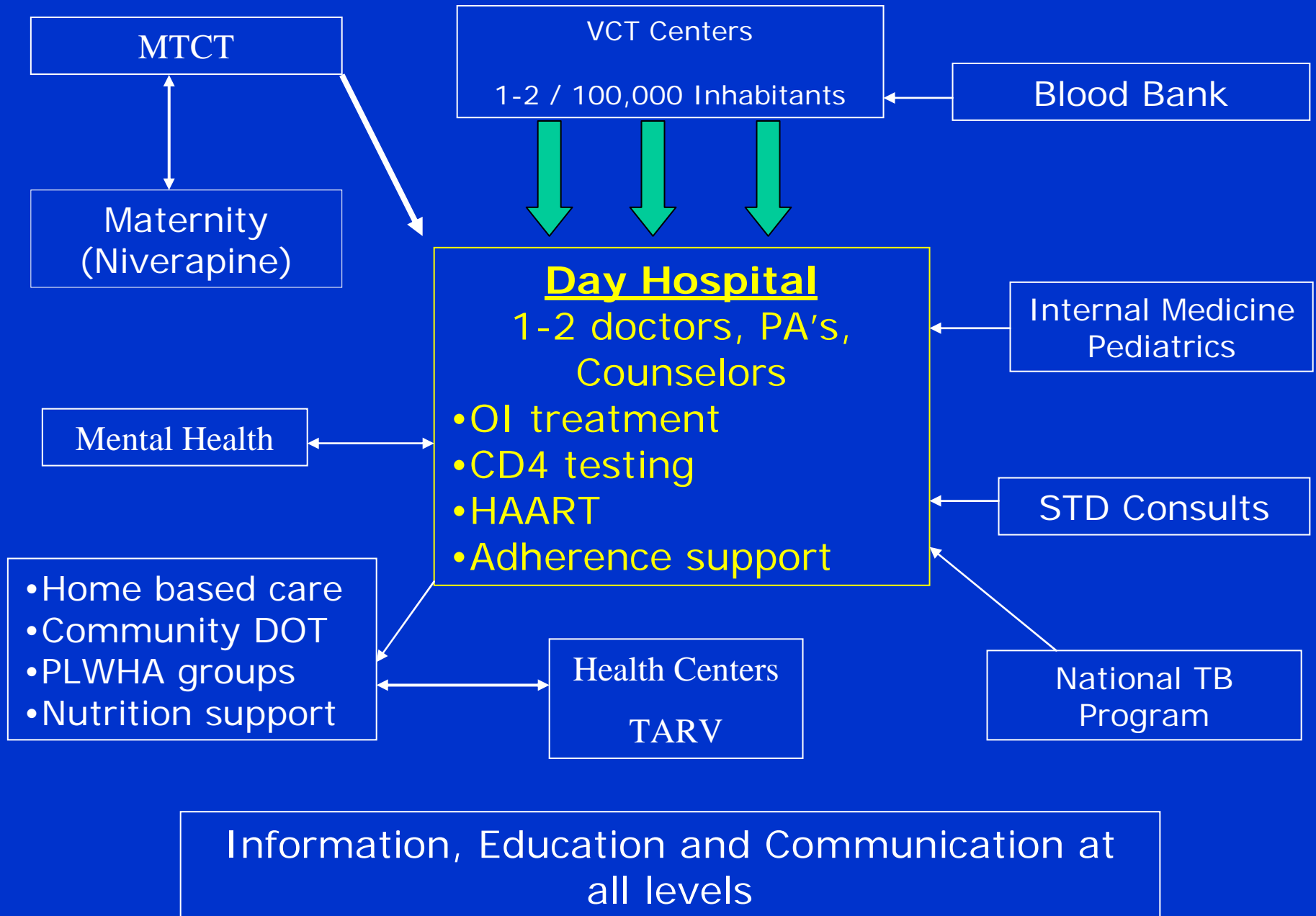
3 Core Principles of OR

1. ## Study health programs
   - Programs define problems and solutions
2. ## Actively try to make the program better
   - Better "understanding" not enough
3. ## Use results to improve the program
   - Local → national → international

Corollary: requires collaboration between managers and researchers

Health program as system

Health Program
Under managers' control

Effects of Health Program

| Inputs | → | Process | → | Outputs | → | Outcomes | → | Impact |

Raw Materials:
- Finances
- Costs
- Staff
- Facilities

Activities:
- Trainings
- Supervision
- Logistics
- Reporting
- Record keeping
- Patient flow strategies

Products of program activities:
- # condoms distributed
- # people tested for HIV
- # enrolling for HIV care

Effect on knowledge or behavior:
- # youth using condoms
- # women using pMTCT services
- # starting ART
- % adhering to ART

Change in health/well-being
- HIV/STD incidence
- # deaths

Integrated Health Network Model

How is OR different from other types of research?

- All types of health research try to improve health
- All types of research can use similar methodologies
  - Quantitative, qualitative, focus groups, surveys, experiments, simulations

- Difference = focus and goals

OR overlaps with other types of research

- Health services/systems research
- Implementation science
- Translational research
- Quality improvement
- Policy and economic analysis

- Difficult to define OR in exclusion of other types

OR resources

- Designing HIV/AIDS Intervention Studies: An Operations Research Handbook. Andrew A. Fisher and James Foreit. The Population Council, New York, 2002. Available at: http://www.popcouncil.org/pdfs/horizons/orhivaidshndbk.pdf

- An Approach to Rapid Scale-up: Using HIV/AIDS Treatment and Care as an Example. World Health Organization, Geneva, 2004. Available at: http://www.who.int/entity/hiv/pub/prev_care/en/rapidscale_up.pdf

- The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. Institute for Health Care Improvement. Cambridge, MA, 2003. Available at http://www.ihi.org/NR/rdonlyres/BCA88D8F-35EE-4251-BB93-E2252619A06D/0/BreakthroughSeriesWhitePaper2003.pdf

- Population Council / Horizons program on HIV/AIDS OR: http://www.popcouncil.org/horizons/