Delivery Strategies, Cold Chain, and Logistics

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Delivery Strategies, Cold Chain, and Logistics

- Vaccine supply and quantity
- Surveillance
- Service delivery
- Advocacy and communication
- Logistics
Section A

Components of a Vaccine Delivery System
Components of a Vaccine Delivery System

- Strategies for hard-to-reach populations
- Vaccine and surveillance logistics
- Injection safety
- Cold chain
- Data quality
- These components characterize every vaccination program
- Programs in the U.S. and developing countries use different strategies to achieve them
- Over time, the strategies are converging
Vaccine Delivery in the U.S.

- Vaccines are delivered routinely through a mix of public and private fixed facilities
- Traditionally, a state responsibility
- Significant federal inputs (Childhood Immunization Initiative) following 1991 measles epidemic
- Private insurance: covers 60% of children ages 0–5, but only half cover vaccines
- HMOs: give about 25% of all U.S. child immunizations; virtually all cover vaccines
- Vaccines for Children Program (1994–present)
  - Gives free vaccines to 35% of all infants
  - 1/3 of providers are public, 2/3 private

Continued
Vaccine Delivery in the U.S.

- High-risk groups least likely to be immunized
  - Inner-city neighborhoods
  - Low-income
  - Uninsured
  - Racial and ethnic minorities

- Vaccines: federal (CDC) purchasing and safety oversight

- Specimens: CDC, state laboratories

- Cold chain: vaccines, drugs fully integrated

- Data quality: standard CDC supervision protocols, provider and state registries
<table>
<thead>
<tr>
<th></th>
<th>Three Healthy People 2010 (U.S.) Vaccination Objectives</th>
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<tbody>
<tr>
<td>1.</td>
<td>Achieve immunization coverage of at least 90% among children 12–23 months</td>
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<td>2.</td>
<td>Ensure that all states reach at least 90% immunization coverage among children 19–35 months</td>
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<td>3.</td>
<td>Increase to 90% the number of children 24–35 months receiving vaccinations as part of comprehensive health care</td>
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The U.S. vaccination system must improve its performance in order to accomplish these and other objectives.
Based on an extensive literature review, the Task Force on Community Preventive Services (Briss et al 2000) recommended interventions for improving vaccine delivery. They fall into three categories:

1. Increasing community demand
2. Enhancing access to vaccines
3. Provider-based interventions
Section B

Recommendations and Strategies
Recommendations of the Task Force

1. To increase community demand
   - Client reminder-recall methods
   - Mass media, community education
   - School immunization requirements

Source: Task Force on Community Preventive Services, 2000
### Recommendations of the Task Force

2. To increase access to immunizations
   - Reduce out-of-pocket costs
   - Increase clinic hours, convenience
   - Link to other programs
   - Home visits

Source: Task Force on Community Preventive Services, 2000
3. To improve provider efficiency
   - Provider reminder-recall methods
   - Periodic assessment, feedback
   - Standing orders

Source: Task Force on Community Preventive Services, 2000
Recommendations of the Task Force

- The optimal intervention mix
  - Depends on local conditions
  - Could add 16% to current coverage
  - Combines two or more interventions
- We will learn more about them later in the course
Developing World Vaccine Delivery Strategies

- Routine fixed facility services
- Campaigns: national immunization days
- Sustained outreach services
- Containment and mop-up
Lessons from Polio Eradication

Routine performance versus NIDs

Source: WHO
Defining the Unreached

- People don’t want to go to health services
  - Insufficient quality
  - Operational constraints: transport, cold chain
  - Irregular service
  - Staff attitudes
  - Fees, etc. (provider, client, health service triangle)

Source: WHO
<table>
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<tr>
<th>Developing World: Vaccine and Surveillance Logistics</th>
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<tr>
<td>- Transport management</td>
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<td>- Computer-assisted stock control</td>
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<td>- Specimens: reverse cold chain</td>
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<tr>
<td>- Data: collection and prompt feedback</td>
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</table>
Syringe, needle technology: must maximize sterile technique, minimize needle-stick injuries
- Reusable -> steam sterilization
- Auto-destruct -> safe disposal needed
- Pre-filled -> safe disposal needed
- Jet injectors -> not yet feasible
Developing World: Injection Safety

- Disposal technology
  - Integrate syringe, needle destruction with disposal of other medical wastes
  - Must incinerate sharps (needles) and softs (bandages)
  - Adverse events reported, investigated
- **Central cold room**: store national supply
- **Other large equipment**: regional cold rooms, freezers, refrigerators
- **Small equipment**: cold boxes, vaccine carriers, ice packs, thermometers, vaccine vial monitors (vaccination centers)
The “Fast” Cold Chain

- Problem: distribute viable vaccines as far from the routine cold chain as possible
- Useful for eradication efforts
- Consists of vaccine boxes, carriers, ice packs and vaccine vial monitors

Continued
Cold Chain

- After finishing this lecture, please visit the following link for a cold chain vignette from West Africa:

http://seattlepi.nwsource.com/africa/infographics/coldchainjourney.asp
Section C

Data Quality
Countries cannot depend forever on DHS, other surveys for reliable vaccine coverage estimates
Donors need to know reported data validity
Solution: Data Quality Audit (DQA)
- Assess reporting system
- Identify remedial action
DQA Overview

- Two internal, two external team members visit a sample of 24 health units, 4 districts, and national EPI offices (2 weeks)
- DTP3 coverage, dropout rates, district reporting: key EPI performance indicators
- Result: monitoring/reporting system assessment, DPT3 coverage audit
<table>
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<th>Example of a DQA Measure: National Quality Index Score</th>
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<tr>
<td>- Five components</td>
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<td>1. Recording practices</td>
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<td>2. Data storing, reporting</td>
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<td>3. Monitoring, evaluation</td>
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<tr>
<td>4. Denominators</td>
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<tr>
<td>5. System design</td>
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Two sample indicators used in the scoring of “recording practices” at national level

- **Indicator #1**: is the current ledger book up-to-date for DTP vaccine?
  - (Up-to-date= all receipts and issues entered within 24 hours)
- **Indicator #2**: does each report from the audit year received from the four selected districts have the date of receipt stamped or written on it by the national office?
  - (If >50% of the four selected districts, score “yes”; if <100%, discuss need to have dates, check other reports awaiting processing)
Similar indicators are measured at national, district, and health unit levels for all DQA measures.

Results are tabulated, adjusted for the level of errors, and summarized in a series of Excel tables and charts.
<table>
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<tr>
<th>Problems Commonly Encountered at all Levels</th>
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<tr>
<td>• Organization, filing, and storage of reports</td>
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<tr>
<td>• Electronic data storage</td>
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<tr>
<td>• Dating and signing reports</td>
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<tr>
<td>• Keeping records up to date</td>
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<tr>
<td>• Report completeness</td>
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<tr>
<td>• Analysis of EPI data and provision of feedback</td>
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<tr>
<td>• Report timeliness</td>
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<tr>
<td>• Dissemination of EPI policies and use of guidelines</td>
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Source: GAVI
A Plug for TechNet!

- Join TechNet at:
  
  http://www.technet21.org/
We have considered the first three steps of the problem-solving paradigm

- Define problem
- Measure its magnitude
- Conceptualize its determinants
- Strategize interventions
- Implement and evaluate

Now let’s consider the next two steps by applying them to common vaccine delivery problems
Exercise

- Consider the Task Force on Community Preventive Services review as a problem-solving exercise
- Let’s analyze its approach for one intervention area: client reminder-recall methods
Problem Solving: Patient Recall-Reminders

- Problem definition
  - Parents forget which vaccinations their children need—and when they need them

- Magnitude
  - 12% of potential coverage

- Determinants
  - Complexity of vaccination schedule (cause)
  - Provider willingness to send reminders
  - Technique, content of messages
Problem Solving: Patient Recall-Reminders

- Strategize interventions
  - Phone contact vs. letter vs. postcard
    - Personal
    - Computerized
  - Message content, intensity
    - Specific (Child x, Vaccine y, on Date z)
    - General (neutral, state risks, appeal to parental responsibility, etc.)
Implement and evaluate
- 42 studies judged methodologically adequate

Conclusions
- Phone, letter, postcard equally effective
- Intense messages get best response
- Cost-effective: $9/vaccination
Most of the time, managers and vaccine providers face a specific problem with multiple causes. The problem-solving paradigm is one tool they can use.
Summary

- Vaccine delivery systems are complex and must meet exacting technical standards
- DC, LDC vaccine delivery systems are converging due to new technologies
- As they advance, vaccination program performance increasingly depends on the ability to solve management-related problems