

Technology for Rural Healthcare

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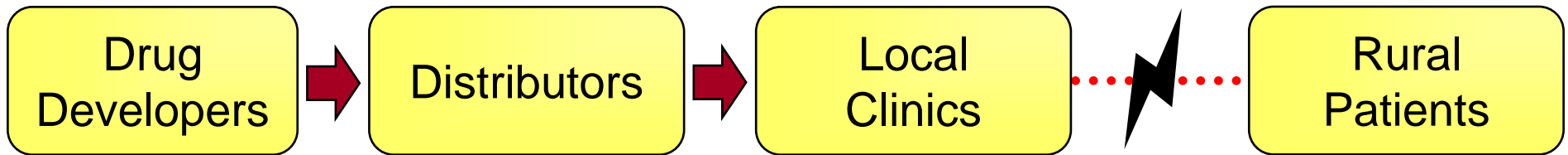
¹Massachusetts Institute of Technology

²Innovators In Health

³Abiogenix, Inc.

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Drug Delivery: Last-Mile is Often Broken



- TB treatment: 4 drugs, 6-8 months
 - Worker supervises ingestion 3 times/week (DOT)



Courtesy PIH



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- Rural programs operate in the dark
 - Interaction: Are workers reaching patients?
 - Adherence: Are patients taking medication?
 - Health: Are patients getting better?

Our Mission: Track Interaction, Adherence, Health



The uBox: A Smart Pillbox

Developed by Abiogenix, MIT, and Innovators In Health

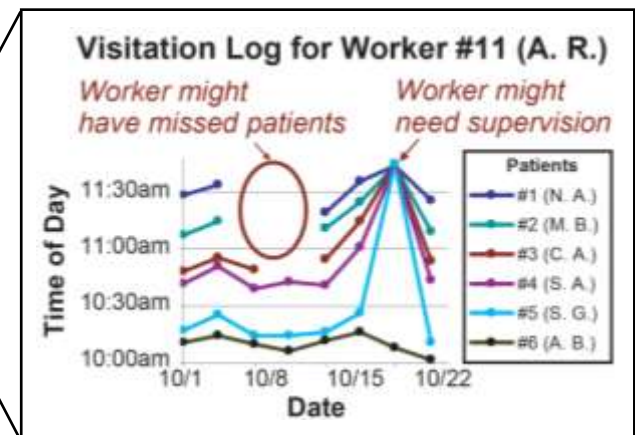
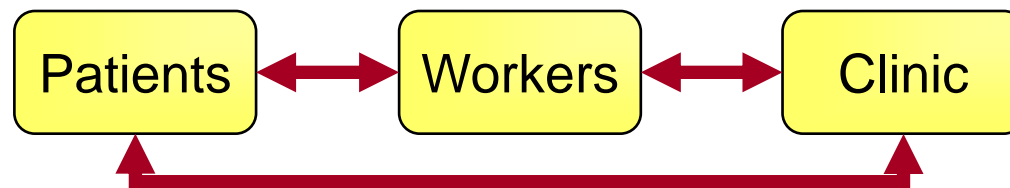
- The uBox monitors
 - Delivery, by logging worker visits
 - Adherence, by logging pills dispensed
- uBox impact
 - Worker supervision and incentives
 - Timely and targeted intervention
 - Lowers adherence burden



uBox
(one per patient)



uKey
(one per patient,
one per worker)



The uPhone: Monitoring Patient Health



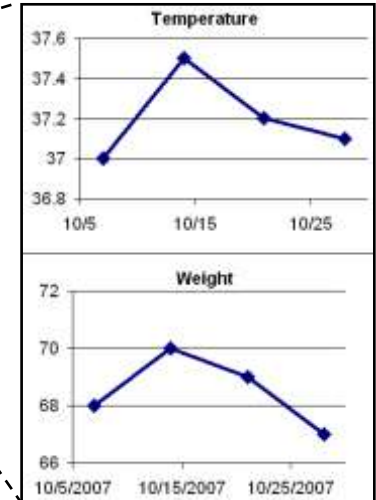
Worker

enters vital patient health indicators into cell phone



Nurse

analyzes data, identifies problems



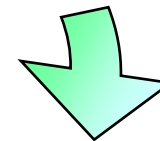
Patient

lives in a remote area



Physician

sends advice to patients, schedules field visits



Is Technology Really the Answer?

- Often ignores systemic and societal issues
- But, delivery is overwhelmingly about diligence
 - Today: 2.4M doses/day, 187 countries, 77% reliability
 - Need: 7M doses/day, 100% reliability
 - FedEx: 7.5M shipments/day, 220 countries, 97.7% reliability
- Our goal is to reduce the burden of diligence
 - Change the culture: 85% is not enough
 - Need to respond to every failed transaction
 - Identify superstar workers early and replicate techniques



uBox Training

Bihar, Spring 2008



- Class was proficient in < 3 hours
- Overcame prototype shortcomings
- Gave very good suggestions



uPhone Training

Bihar, Spring 2008



- uPhone more challenging – literacy and prior cell phone experience needed
- Lesson learned:
 - even with intensive training, many errors on menu-based interface



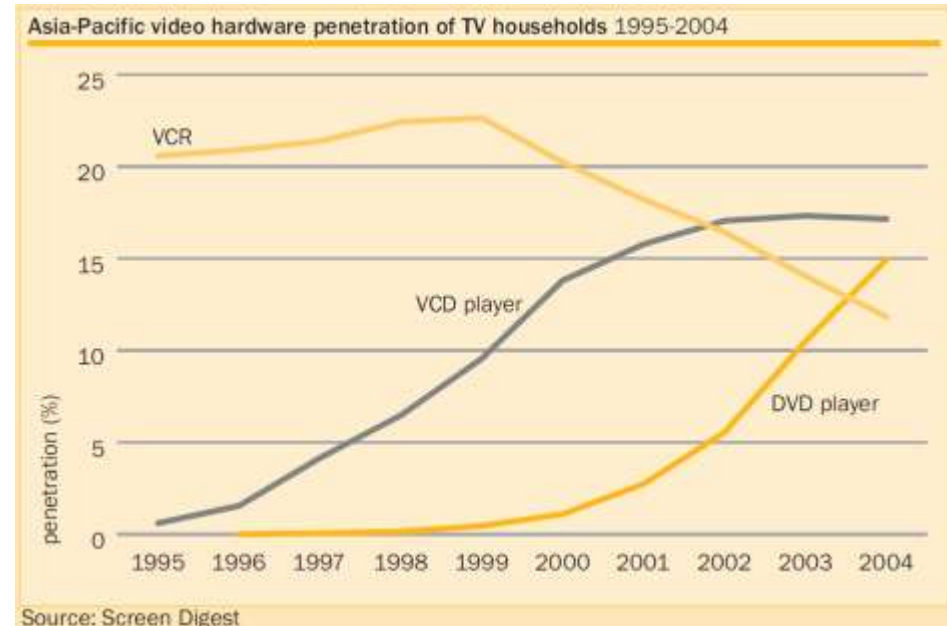
Next Steps: Evaluate in TB Program

- In process of establishing treatment program in Bihar
 - Screened 300 patients in Bihar Sharif, Dalsingh Sarai
 - Led 3-day TB training camp for >20 health worker candidates
- In Spring 2009:
 - Controlled trial with 100 patients
 - Test whether uBox, uPhone influences health outcomes



Interactive DVDs for Education

- Televisions with DVD players are increasingly common in India
- Common usage: watching movies



Source: Screen Digest

Approximately 25% of Asia/Pacific market is outside Japan, Australia, New Zealand

- But DVD format supports rich, interactive features
 - >10,000 menus
 - Flexible navigation
 - Simple computations
- ➔ **Opportunity:** Leverage interactivity to create engaging educational content



Untapped Potential of Interactive DVDs

- In the classroom
 - Low-cost display of PowerPoint slides
 - Retrieve and display Internet content
 - High-resolution maps
- In children's homes
 - eBook reader
 - Study aides / self-assessment tools (Flash cards)
 - Educational games (e.g., Carmen San Diego)
- In other domains
 - For assisted health diagnostics
 - As an offline Wikipedia



Conclusions

- Potential for simple technologies to offer large benefits for improving healthcare and education
- Low-tech interfaces may be highest-impact
 - uBox provides transparent interface
 - Simple voice interface better than automated SMS, Forms
 - Potentially leverage DVD infrastructure for new applications
- Most exciting aspects of work coming in next steps
 - Can technology improve health outcomes in controlled trial?
 - Is DVD interface engaging and useful for education?

