Tying it all together – health economic modeling

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How models can be used with cost-effectiveness to support decisions

- Work with decision makers to design models that can answer their questions (different from academics)
- Work closely with intervention studies to collect epidemiologic and cost data (before the study begins)
  - RCTs
  - Implementation science studies
  - Operations research
- Estimate impact on health, cost, CEA, BIA
- Clear communication of model results
- Build partnerships
- Epidemiologic and economic innovations

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Results

Initiation of antiretroviral therapy and viral suppression after home HIV testing and counselling in KwaZulu-Natal, South Africa, and Mbarara district, Uganda: a prospective, observational intervention study

Ruanne V Barnabas, Heidi van Rooyen, Elioda Tumwesigye, Pamela M Murnane, Jared M Baeten, Hilton Humphries, Bosco Turyamureeba, Philip Joseph, Meighan Krows, James P Hughes, Connie Celum

- Ankole region, southwest Uganda, and KwaZulu-Natal, South Africa
- Sept. 2011 – May 2013

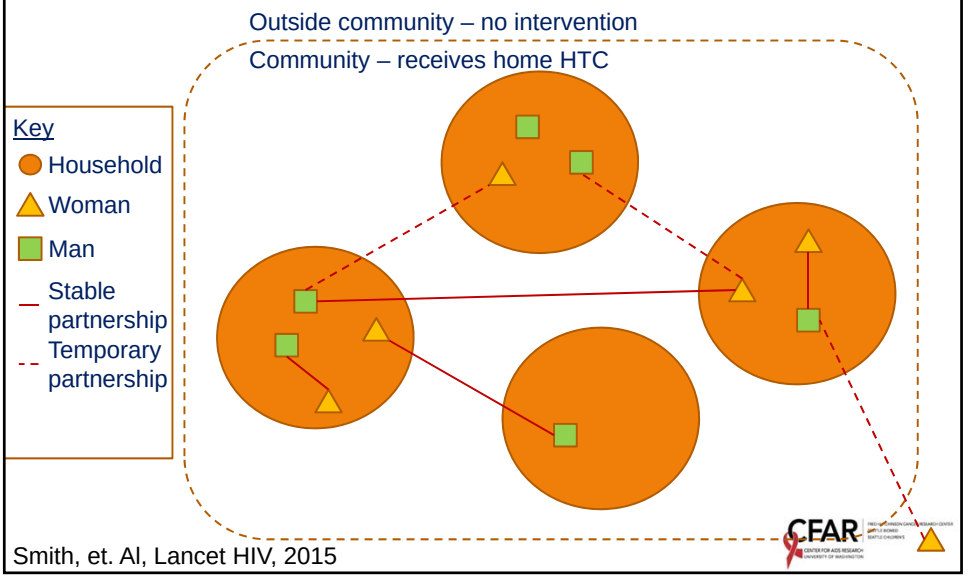
Findings	N (%)
Adults tested	3,393 (96%)
HIV+ identified	635 (19%)
Visited a clinic by month 12	96%
Started ART by month 12 (among those eligible for ART)	74%
Virally suppressed by month 12 (among those on ART)	77%

Barnabas, et. al., Lancet HIV, 2014

Using study data for models

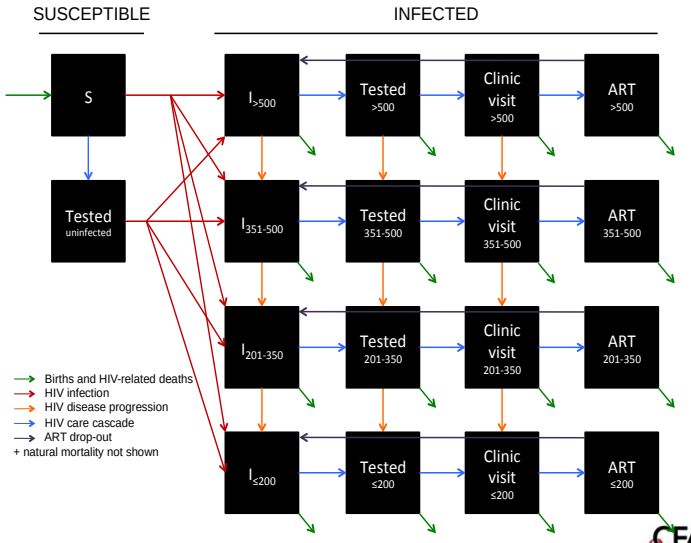
- Demographics
- Mixing patterns
- Natural history
- Transmission probability
- Factors that change susceptibili
- Factors that change infectiousne
- Effectiveness of interventions
- Engagement in health care
  - Used realistic parameters
  - Outcome viral suppression
  - High retention
  - Activity-based micro-costing

Model: community structure & partnerships



Smith, et. Al, Lancet HIV, 2015

Individual-based model structure and HIV care continuum



Micro-costing methods

- Interventions:
  - Examining study budgets and financial records
  - Time and motion observation – informed efficiency ceilings
  - Staff interviews about time and resource use
- Standard of care:
  - Estimates from literature review on costs of facility based VCT, ART.
- Separated intervention and research costs
- Scenario analysis

Monisha Sharma

Efficiency assumptions (Home HTC):

Number of persons tested per day

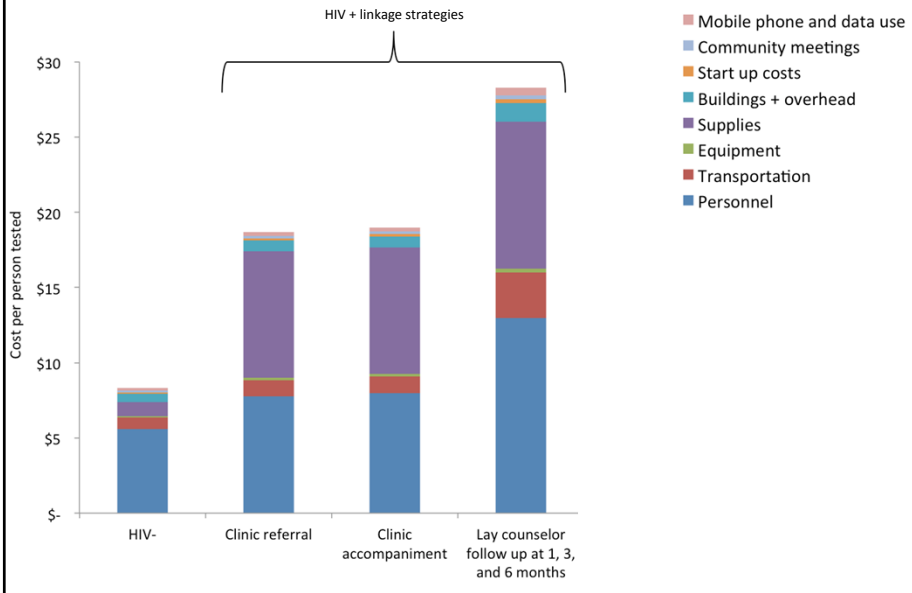
- HIV- : 35 min per HTC for 7 hours worked plus 14 min travel to home, testing 2 pple per home (ave of *=10 pple tested/day)*
- HIV+ : 60 min per HTC for 7 hours worked plus 14 min travel to home, testing 2 pple per home = *6.27 pple tested/day*. 1.5 hours per HTC = *4.32 pple tested/day* (Used middle estimate of 5)

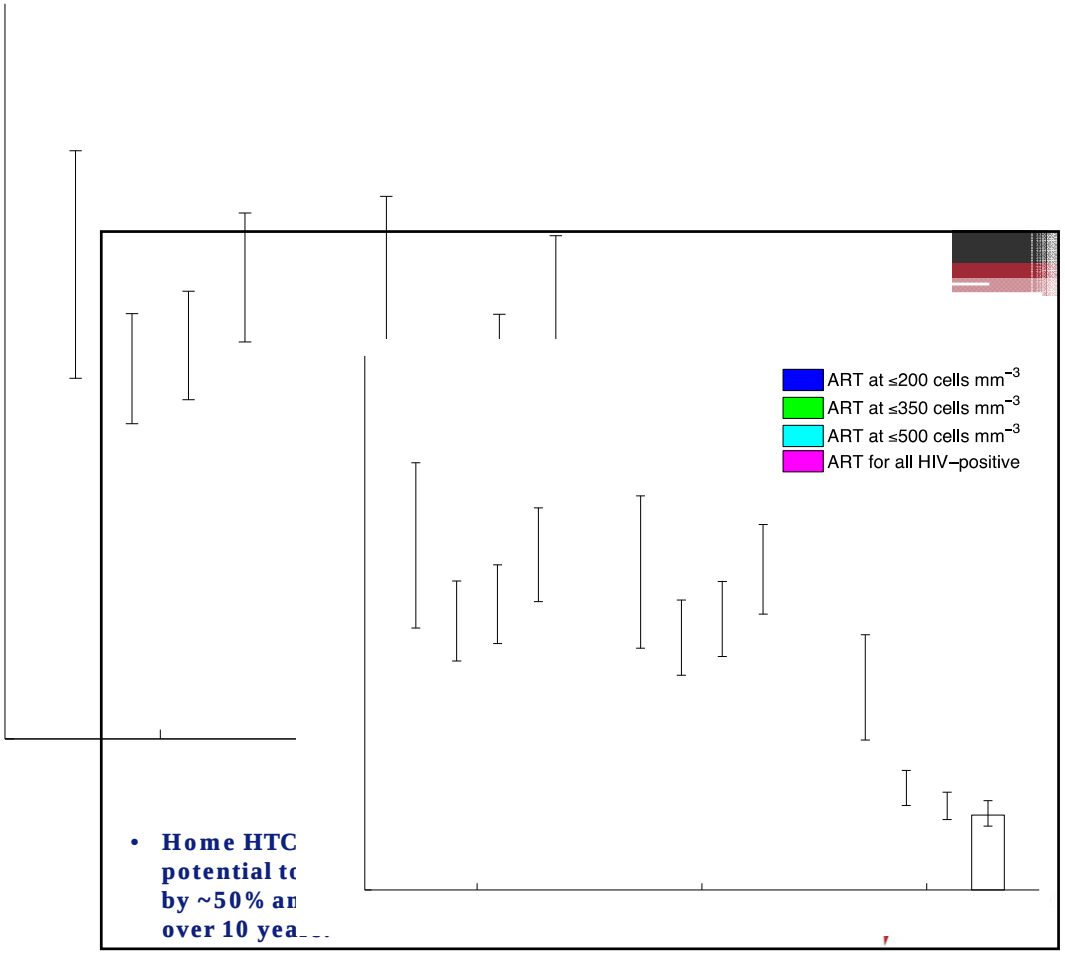
Results: South Africa

HTC cost per person tested (2012 USD)

	HIV-	HIV +
	HIV testing and counseling only	**Counselor follow up at 1, 3, & 6 months to encourage linkage to ART**
Home based HTC *(Point of care CD4)*	8.32	28.29

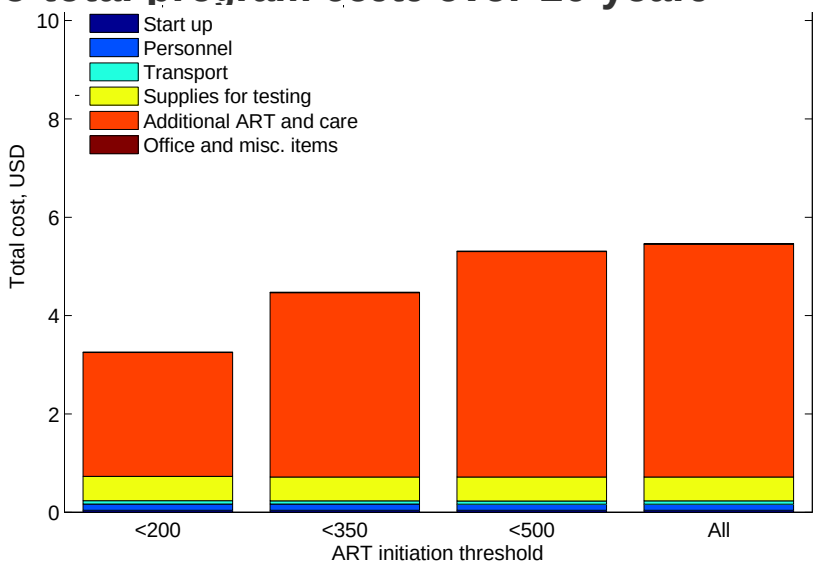
Costs of Home HTC with point of care CD4 analysis (PIMA)





- **Home HTC potential tc by ~50% ar over 10 yea**

HTC total program costs over 10 years



ART costs far outweigh all other costs

J. Smith, Lancet HIV

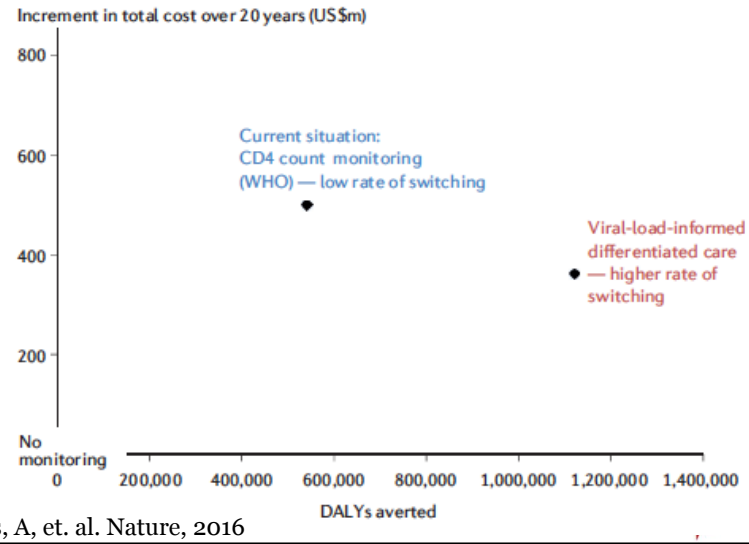
Discussion

- Community based HTC and linkage strategies achieve high uptake of testing, linkage to care and viral suppression
- Following CD4≤500 guidelines, this approach has the potential to cost-effectively avert ~40% of incident infection
- The cost of ART is the largest proportion of program costs over ten years – a variable cost

Discussion

- Key implementation science questions include
  - Estimating the incremental contribution of each linkage strategy (POC CD4, follow-up visits etc.)
  - Strategies for retention in pre-ART care
  - Strategies to identify and re-link persons who migrate or are otherwise lost to follow-up
- Integrating modeling and costing into treatment and prevention research, facilitates timely estimates of cost-effectiveness

Integrate health economics: DSD for HIV in Zimbabwe



Phillips, A, et. al. Nature, 2016

Limitations

- Uncertainty increases over longer time horizons
- Need good estimates of parameters, esp. key drivers
- Gaps in data
- Background interventions and the status quo changes

Discussion

- Modeling a key part of economic evaluations
- Need high quality data on burden, impact, and cost
  - Build a minimum list
- Iterative process
- Bring innovation for potential solutions
- Build long-term relationships
- CISNET (Cancer intervention and surveillance modeling network)

Thank you

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