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**Title**: HIV Treatment and Prevention: A Simple Model to Determine Optimal Investment

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**Journal**: Medical Decision Making, April 2016, 36(3): 391-409

**Main Focus**: To create a simple model to help public health decision makers determine how to best invest limited resources in HIV treatment scale-up and prevention

**Summary**:

* Background:
  + ~35 million people worldwide life with HIV, 2.3 million infections occurred
  + Important measures: ART (Anti-Retroviral Therapy), PrEP (Pre-Exposure Prophylaxis), CBE (Community based education)
  + Limited resources for control of HIV
* Models considered:
  1. Linear resource allocation problem
  2. Resource allocation problem w/overlap
  3. Resource allocation problem w/overlap + increasing marginal costs
  + Goal: maximize health benefits (either QALYs or HIV infections averted)
* Optimal to:
  + Always invest min required in PrEP (if any)
  + Invest max possible in CBE
  + Invest remaining budget in ART scale-up

**Discussion Questions**:

* HIV Discussion:
  + Recently ART was required for every person who had HIV but it was realized that there wasn’t enough ART in the world for so many people to take, so there’s always been discussion over who gets what (stratification/prioritizing)
* Critiques:
  + Paper didn’t focus on effect on time, focused on stable epidemic (stationary in time)
  + Rate of infections is one fixed parameter vs. using rate of infections for following year
  + Epidemics in US are pretty stable
  + Some inputs were a red flag – ART in paper is at 41%, however in reality, it’s in the 80’s (sensitivity analysis brings it up to 73)
  + ART always came out on top is because with ART, 15 QALYs are gained. With PrEP, it’s only one.
* Is there a paper that compares model to real outcomes/implementations?
  + This paper compares the model to a separate model done by the same author.
  + At MGH, they have papers that compare models to clinical trial results.
  + If this paper followed the same path, it may have more value.
* Was the model oversimplified? Does it still have value?
  + May have been oversimplified from a clinical standpoint
  + However it seemed as though that was the intent of the authors because other models are so complex
  + A figure that explains the mathematics behind the model may have been beneficial, especially for non-mathematicians.
  + More explanation of the model may have added far too much length
  + Model seems to lead to the “obvious” answer, sometimes engineers develop models since because they can or because they want to prove they can do it
  + This paper may be more useful for policy makers.