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Impact of Text-Messaging (SMS) Programs for Improving Antiretroviral Adherence in Kenya

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HIV treatment and care issues

- ≥ 90% of doses of ART supports optimum viral suppression and health outcomes
- Studies suggest adherence remains sub-optimal in many areas of Africa
- 62% retention rate at 24 months after ART initiation

* Rosen et al. *PLoS Medicine* 2007
Simoni et al. *Current Infectious Disease Reports* 2008
Barnighausen et al. *Lancet infectious disease* 2011
UNAIDS 2012
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Care with mobile phones (mhealth)

*http://www.scidev.net
(citing a Price Waterhouse Coopers Report)

mHealth adherence evidence

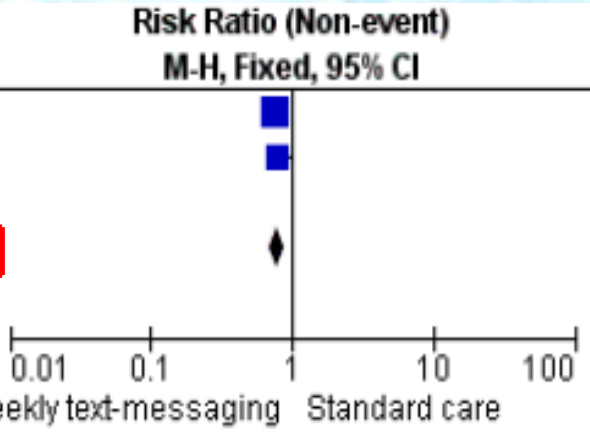
Horvath T et al. **Mobile phone text messaging for promoting adherence to antiretroviral therapy in patients with HIV infection.** *Cochrane Database Systematic Review.* 2012

Pooled adherence effect of weekly SMS compared to standard care:

Study or Subgroup	Text-messaging Events	Total	Standard care Events	Total	Weight	Risk Ratio (Non-event) M-H, Fixed, 95% CI
Lester 2010	168	273	132	265	57.0%	0.77 [0.63, 0.93]
Pop-Eleches 2011	117	221	56	139	43.0%	0.79 [0.65, 0.96]
Total (95% CI)		**494**		**404**	**100.0%**	**0.78 [0.68, 0.89]**
Total events	285		188			

Heterogeneity: Chi² = 0.04, df = 1 (P = 0.84); I² = 0%

Test for overall effect: Z = 3.61 (P = 0.0003)



Economic evaluation

- No cost-effectiveness analysis of adherence improving interventions
- Aim is to maximize health per dollar spent under conditions of budget constraint
- **Objective: evaluate cost-effectiveness and mortality benefits of SMS over standard care in Kenya**

*Bärnighausen et al. *Lancet Infectious Disease* 2011

HIV Decision Analytic Model

- Model of HIV natural progression
- Validated and previously published model
- Calculates lifetime HIV costs and quality adjusted life years (QALYs)

$$ICER = \frac{\begin{matrix}\textit{lifetime costs}\\ \textit{with intervention}\end{matrix} - \begin{matrix}\textit{lifetime costs}\\ \textit{with standard care}\end{matrix}}{\begin{matrix}\textit{QALY}\\ \textit{with intervention}\end{matrix} - \begin{matrix}\textit{QALY}\\ \textit{with standard care}\end{matrix}}$$

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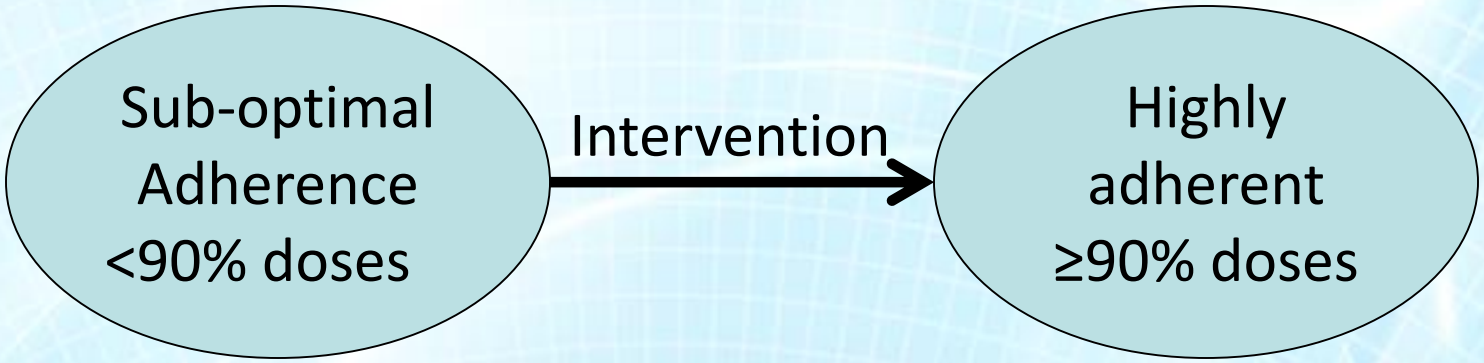
* Braithwaite et al. *AIDS* 2014
Keebler et al. Lancet Global Health 2014

Adherence Model Depiction



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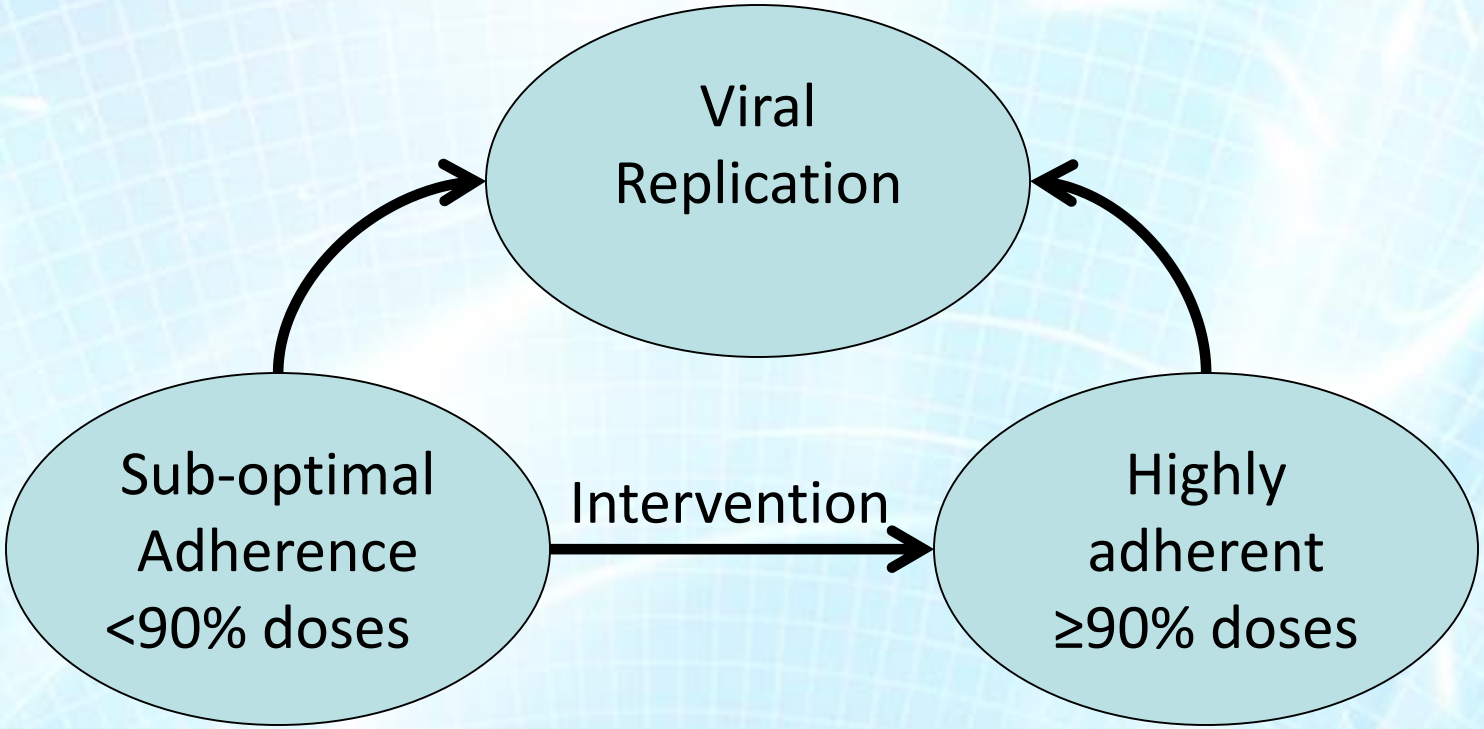
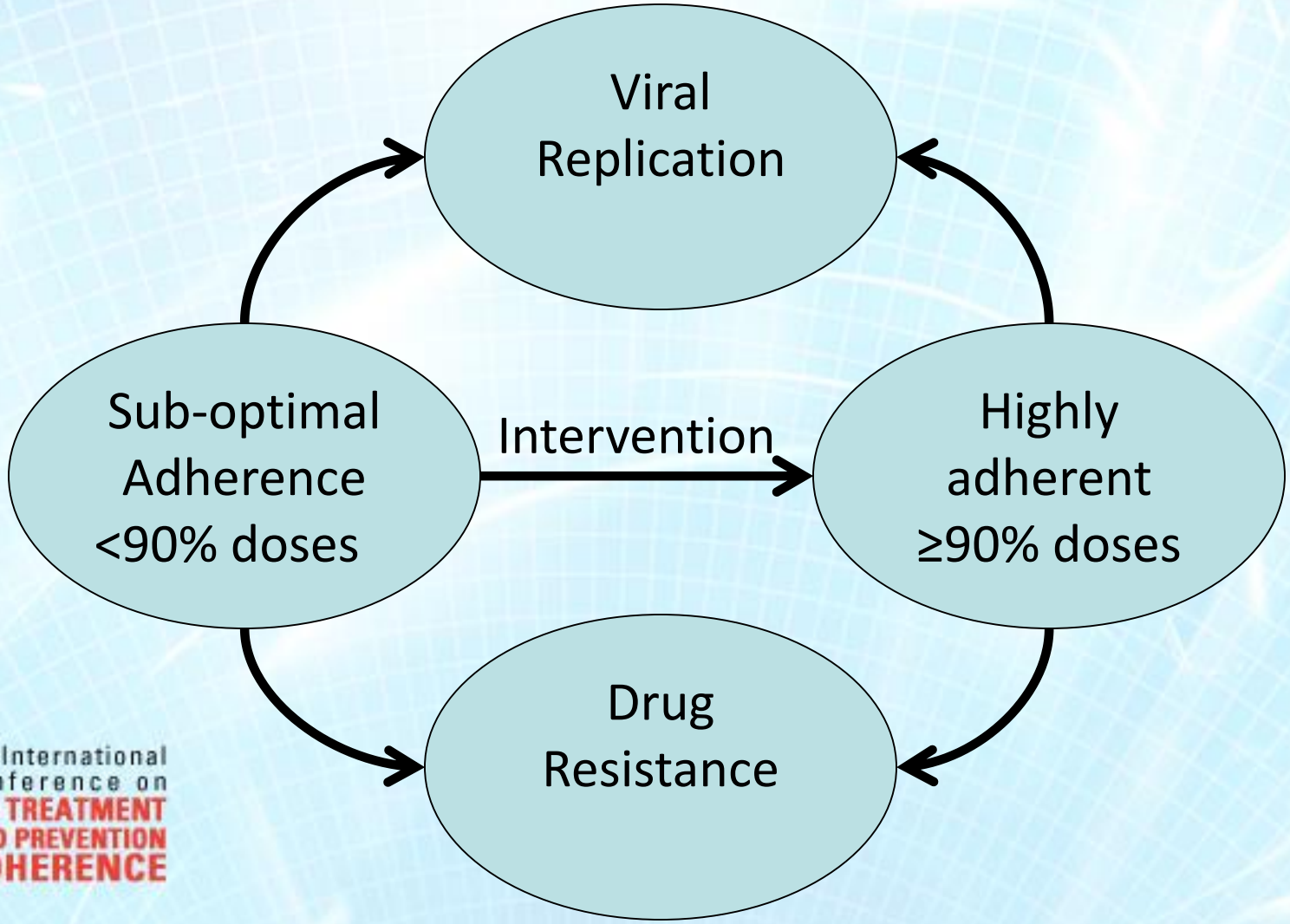
Adherence Model Depiction



Adherence Model Depiction



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Key Input Parameters

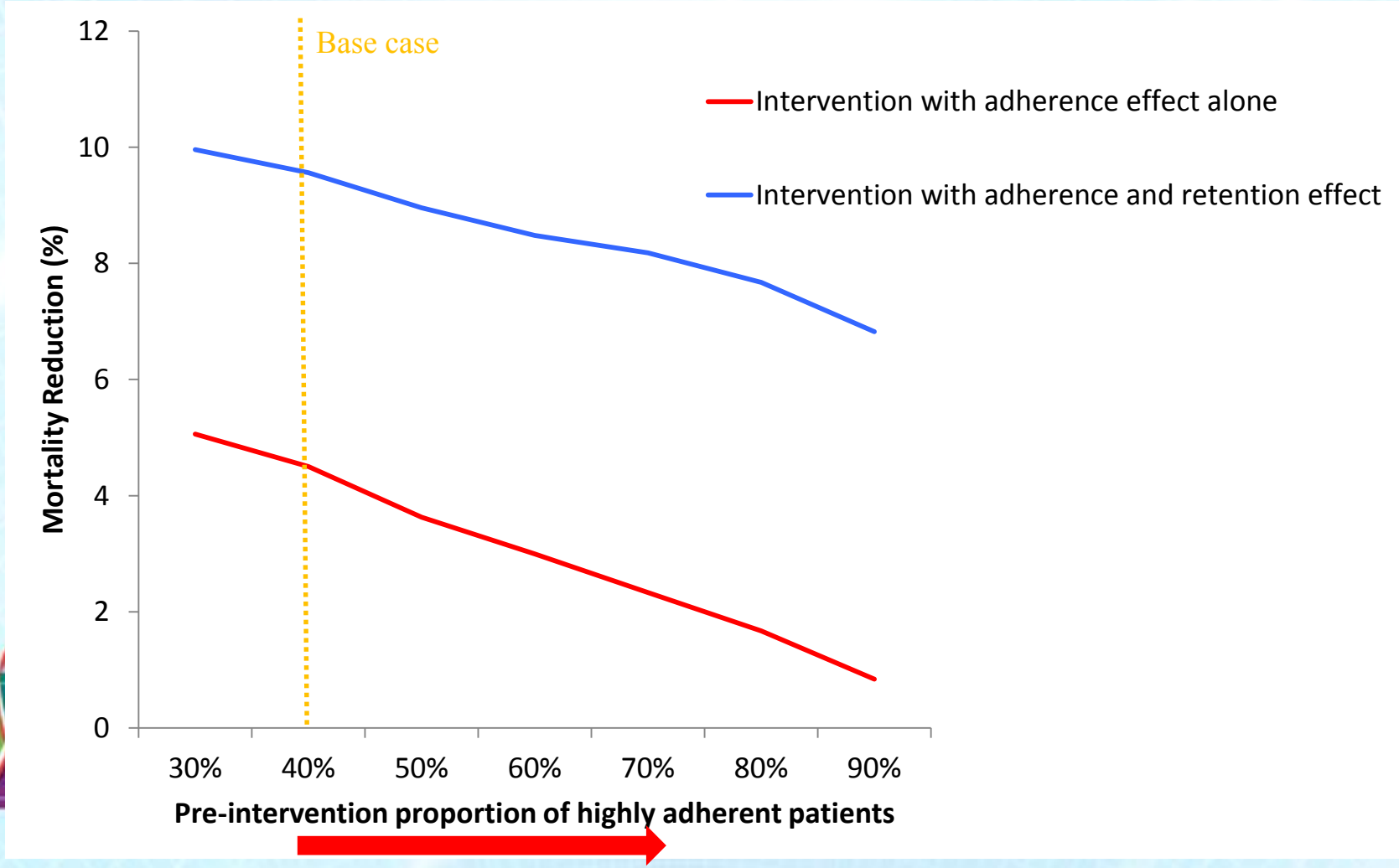
Adherence Inputs	**Base**	**Range tested**	**Source**
Pre-intervention proportion highly adherent	40%	30% to 90%	Trial Data
Intervention Inputs			
Adherence < 90% (Relative Risk)	0.78	0.63 to 0.96	Cochrane Review
Annual intervention Cost (USD per person)	$15	$10 to $20	Unpublished trial dats
Retained in care (Relative Risk)	1.69	1 to 3.23	Lester Trial

* Horvath T et al. *Cochrane Database Systematic Review* 2012
Lester et al. *Lancet* 2010
Pop-eleches and Thirumurthy *AIDS* 2011

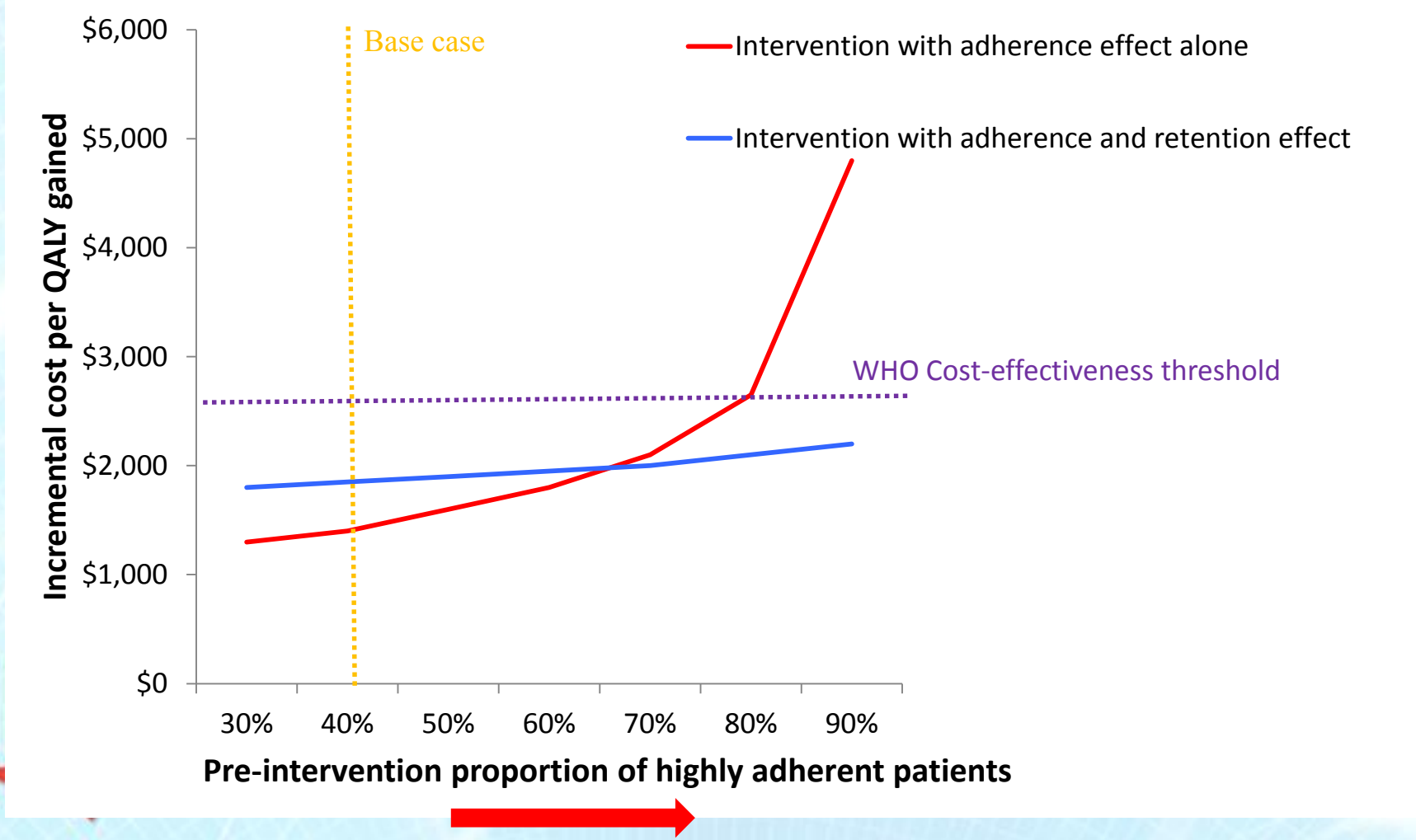
Estimated adherence related mortality in Kenya

- 550,000 people on ART in Kenya in 2012
- Estimated 715,000 life years lost due to suboptimal adherence
- Estimated 27,500 deaths over five years

5 year mortality reduction (%) by SMS over standard care



Cost-effectiveness of SMS over standard care



Limitations

- Simplifying assumptions
- Limited comparison programs
- Model variable uncertainty due to limited data

Conclusion

- Proven SMS interventions are cost-effective
- Retention and adherence interplay
- Cost-effectiveness should be considered along with effectiveness
- Adherence increasingly important with expanded ART availability

Thank you

Questions or correspondence:

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