

The Cost-Effectiveness of Cotrimoxazole as Prophylaxis against Opportunistic Infections in HIV-Infected African Children: the CHAP Trial

#-706

M Ryan¹, B Chitah², S Griffin³, S Walker⁴, V Mulenga⁵, D Kalolo⁵, M Thomason⁴, C Chintu⁵, M Sculpher³, D Gibb⁴.

1. Department of Pharmacology & Therapeutics, Trinity College, Dublin, Ireland. 2. Ministry of Health, Lusaka, Zambia. 3. Centre for Health Economics, University of York, United Kingdom. 4. Medical Research Council Clinical Trials Unit, London, United Kingdom. 5. University Teaching Hospital, Lusaka, Zambia.

1. Introduction

- In 2005, there were 2.3 million children under the age of 15 living with HIV/AIDS worldwide and 570,000 died of the disease (UNAIDS 2006).
- The CHAP trial showed a 43% reduction in mortality and a 23% reduction in hospital admissions with cotrimoxazole prophylaxis in HIV-infected children (1-14 years) in Zambia. Cotrimoxazole is a relatively inexpensive, low technology intervention which could potentially be adopted prior to scaling up comprehensive HIV care including ART.
- The cost-effectiveness of cotrimoxazole prophylaxis in children following 2006 WHO guidelines is unknown and this intervention is yet to be incorporated in the basic healthcare packages of many African countries.

2. Methods

- **Model:** A probabilistic decision analytic model of HIV/AIDS progression in children based on CD4% was constructed in R and populated with epidemiological, disease progression and resource utilisation data from the CHAP trial (median follow-up 19 months).
- **Costs:** Unit costs were measured at the University Teaching Hospital. Inpatient and outpatient costs at community health centres were derived from the cost estimations for the Basic Healthcare Package. The costs for each 12-week period of follow-up in the trial were estimated using a GLM regression adjusted for clustering by patient.
- **Economic analysis:** In the base case, a healthcare provider perspective was adopted and cost-effectiveness estimated over the patient life-time. The starting cohort mirrored the characteristics of the CHAP cohort (mean age 4.4 years, 48% with AIDS, 28% with CD4% > 15%). The cost of haematological and CD4% monitoring was excluded in the base case (WHO guidelines). Incremental cost-effectiveness ratios (ICERs) were reported in US\$2006 as cost per life year saved and cost per disability adjusted life year (DALY) averted. A cost-effectiveness threshold of \$1019 per outcome was assumed i.e. GDP per capita in Zambia in 2006

3. Results:

- Principal unit costs are summarised in Table 1.
- Cotrimoxazole prophylaxis in a tertiary care facility in Zambia was associated with ICERs of \$72 per life year saved and \$53 per DALY averted (Table 2)
- Probabilistic analysis demonstrated a 100% certainty of cost-effectiveness assuming a cost-effectiveness threshold of \$1019 for Zambia ie GDP per capita 2006. Figure 1.
- The intervention remained cost-effective in univariate sensitivity analysis with all ICERs < \$250 per outcome and was cost-saving in children aged >9 years and those with CD4% > 15%.
- Providing cotrimoxazole prophylaxis as part of the Basic Healthcare Package at primary healthcare facilities was associated with ICERs of \$4 per life year saved and \$3 per DALY averted.

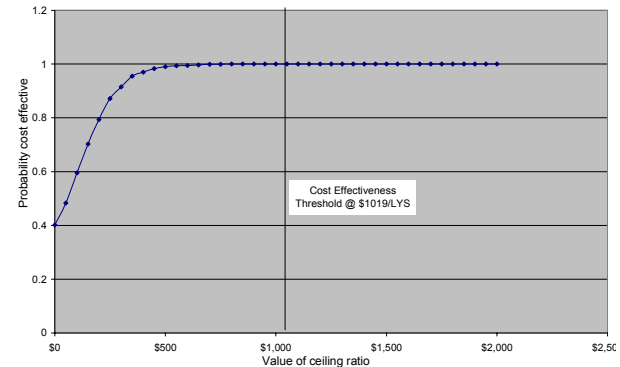
Table 1: Unit costs

Unit cost	US\$
Cotrimoxazole	
< 5 years, 240mg daily (annually)	5mls susp (480mg/5ml) \$0.036 (\$13.14)
	\$0.0043 (\$1.57)
	½ 480mg tablet \$0.0086 (\$3.14)
≥ 5 years, 480mg daily (annually)	1 x 480mg tablet
Inpatient and outpatient costs at University Teaching Hospital, Lusaka	
Inpatient day on general ward	\$29.27
Outpatient visit	\$11.28
Inpatient and outpatient costs at local health centres	
Inpatient day	\$23.79
Outpatient visit	\$9.16

Table 2: Incremental cost-effectiveness ratios for cotrimoxazole prophylaxis

	Cost	Life yrs	DALYs	Incr cost per Life Year saved	Incr cost per DALY averted
No prophylaxis	US\$2,032	3.26	-22.74	-	-
Cotrimoxazole prophylaxis	US\$2,158	5.01	-20.39	US\$72	US\$53

Figure 1: Cost-effectiveness acceptability curve to show the uncertainty around the mean cost-effectiveness results expressed in life years saved at a cost-effectiveness threshold of \$1019



6. Conclusions

- Cotrimoxazole prophylaxis in HIV-infected children is an inexpensive low technology intervention which has proved highly cost-effective in Zambia with ICERs of \$72 per life year saved and US\$53 per DALY averted.
- Providing cotrimoxazole prophylaxis as part of the Basic Healthcare Package at primary healthcare facilities would be even more cost-effective with ICERs less than \$5 per outcome.
- Including routine blood monitoring doubled the cost-effectiveness ratios. Although less cost-effective than clinical monitoring alone, the ICERs remained well below the cost-effectiveness threshold.
- The intervention is cost-saving in less advanced stages of disease further endorsing a universal strategy regardless of clinical stage or CD4%.
- This study strongly supports the adoption of WHO guidelines on use of cotrimoxazole prophylaxis into essential healthcare packages in low income countries.

This study is funded by the Advisory Board for Irish Aid