Cost-effectiveness of interventions designed to support the scaling up of RDTs

Mon 7 Oct, 08:00-9:30

Chairs: **Kristian Hansen and Virginia Wiseman**

OVERVIEW

Objective: This symposium will present empirical data from ACT Consortium projects on the cost effectiveness of interventions designed to support the introduction and scale-up of Rapid Diagnostic tests across 3 countries: Cameroon, Uganda and Ghana. The range of factors influencing cost-effectiveness will also be highlighted.

Rationale: Presumptive diagnosis and treatment for uncomplicated malaria continues to be common in many parts of Africa both in the formal and the informal health care sectors. Current WHO guidelines on malaria case management recommend parasitological confirmation prior to treatment with an artemisinin-based combination therapy (ACT). Rapid diagnostic tests (RDTs) for malaria have been shown to perform generally well under a range of conditions and if used as intended, have the potential to improve the care of patients presenting with fever and reduce inappropriate use of antimalarials. Cost-effectiveness analyses to date have suggested that their introduction may also be very cost-effective compared to presumptive diagnosis or microscopy. These analyses highlight that the relative cost-effectiveness of RDT diagnosis depends critically on a range of factors. Among the important factors identified are: the prescribers' degree of adherence to negative RDT results, the level of malaria prevalence (affecting the proportion of fever patients being parasite-positive), the accuracy of the RDT in general and compared to the alternatives, cost of the RDT as well as the cost of drug regimens for parasite-positive and parasite-negative patients.

Content: The ACT Consortium was formed with the goal of developing and evaluating delivery mechanisms to improve ACT access, targeting, safety and quality. The purpose of this symposium is to present some of the findings of the Consortium's cost-effectiveness analyses which were conducted to assess the desirability of introducing malaria RDTs across a range of countries with different delivery systems. Special attention will be paid to the factors found to influence the relative cost-effectiveness of RDTs across these different settings. The symposium will begin with an overview of some of the key considerations in assessing cost-effectiveness of RDTs including the perspective, the alternative strategies, subsequent treatment seeking and outcomes of interest.

Each of the four presentations will then show how different factors affect cost-effectiveness at these different loci. Each presentation shows results from cluster randomised trials in different malaria endemic countries.

1. Economic evaluation of a cluster-randomized trial of interventions to improve health workers' practice in diagnosing and treating uncomplicated malaria in Cameroon

Presenter: Virginia Wiseman

Team: Lindsay Mangham-Jefferies[1], Virginia Wiseman[1], Olivia Achonduh[2], Bonnie Cundill[1], Tom Drake[1], Akindeh Nji[2], and Wilfred Mbacham[2]

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WHO guidelines on malaria treatment recommend parasitological confirmation in all febrile patients before treatment is prescribed. This should ensure an efficient use of resources as patients receive appropriate treatment. Working with the Ministry of Health, basic and enhanced training programmes were designed to support the introduction of rapid diagnostic tests (RDTs). Both programmes sought to equip health workers with the knowledge and skills needed to diagnose and treat malaria, though the enhanced programme contained additional activities and used interactive methods to promote changes in prescribing practices.

A three-arm cluster-randomized trial was conducted to assess the cost-effectiveness of introducing RDTs with basic or enhanced training compared to current practice, and an enhanced 3-day training compared to a basic 1-day training package. RDTs with training were evaluated in Cameroon at public and mission facilities where microscopy was available. Individual patient data were collected from facility records and an exit survey. The primary outcome was the proportion of patients attending facilities that report a fever or suspected malaria and receive treatment according to guidelines. This required patients to be tested for malaria, ACT to be prescribed for confirmed cases, and no antimalarial to be prescribed for patients with a negative test result. Financial and economic costs of interventions were estimated using project reports. Start-up costs were annualized using a 3% discount rate, assuming the training materials would remain relevant for a minimum of 4 years. The cost of malaria diagnosis and treatment was estimated for each individual from a societal perspective, in the local currency (CFA) and converted to US dollars at 2011 prices. The analysis applies the latest methods for estimating cost-effectiveness in cluster-randomized trials.

The enhanced 3-day participatory training was not only more effective, but also more cost-effective than the 1-day basic training: preliminary analysis indicates the cost per patient treated according to guidelines was $22.51 in the basic-arm and $9.74 in the enhanced-arm, when compared to control-arm. Upon scale up, it is estimated that introducing RDTs with enhanced training would cost-effective and save $1.28 per patient treated according to guidelines, compared to current practice.

2. Incremental cost-effectiveness analysis of introducing rapid diagnostic testing for malaria into registered drug shops in Uganda

Presenter: Kristian Schultz Hansen

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Universal access to diagnostic testing for malaria before use of artemisinin-based combination therapy (ACT) for positive cases is recommended by the WHO. It is common in Uganda for people to seek treatment for malaria outside the formal health care sector often with private drug shops as their first choice. Parasitological diagnosis to guide malaria treatment is not usually offered in drug shops. A recent cluster-randomised trial in Mukono District, Uganda, demonstrated that testing with malaria rapid diagnosis tests (RDTs) in drug shops is feasible, can be associated with high provider compliance and resulted in significant increase in appropriate treatment compared to presumptive treatment. The incremental cost-effectiveness analysis of introducing RDTs in drug shops (intervention) as compared to current practice of presumptive diagnosis (control) was evaluated using a decision analytical approach. Provider costs incorporated the cost of community sensitisation, training of drug shop vendors, development of training material and the commodity costs of RDTs used and ACTs dispensed. Since treatment correctly targeted to malaria cases should result in more appropriate drug purchases and possibly improved ACT adherence, it is essential to estimate societal costs in order to assess the impact of potential savings arising from reduced expenditure and time lost on subsequent treatment seeking on the overall cost-effectiveness of the intervention. Household costs of health care seeking were captured in a sample of drug shop customers who were interviewed in their homes after their initial visit to a drug shop, to estimate all household costs incurred during a two-week period after the drug shop visit, including out-of-pocket expenditure for travelling, fees, diagnosis and drugs for the first and any subsequent treatment visits as well as the opportunity cost of lost time. The incremental cost and effects of introducing RDTs to increase appropriate ACT treatment in private, registered drug shops will be presented. Sensitivity analysis will be performed to identify factors influencing the incremental cost-effectiveness ratio of the intervention, such as provider adherence to test result, accuracy of the test, customers' willingness to purchase an RDT, and cost of different resource input.

3. Cost–effectiveness analysis of test based versus presumptive treatment of malaria in under 5 children in rural Ghana.

Presenter: **Theresa Tawiah**

Team: Theresa Tawiah[1], Kristian Hansen[2], Frank Baiden[1], Seeba Amenga-Etego[1], Jayne Webster[2], Daniel Chandramohan[2], Seth Owusu-Agyei[1]

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Malaria still remains the number one cause of morbidity and mortality in the Brong Ahafo region in central Ghana. The availability of rapid diagnostic tests (RDTs) for malaria has made it possible for health facilities in the remote areas to parasitologically diagnose malaria where there are currently no microscopes to confirm malaria. Incremental cost effectiveness of RDTs (intervention) was compared to clinical judgement (control) for the diagnosis of uncomplicated malaria. A societal perspective was taken which included costs and benefits to all those affected by the interventions including children with fever and their carers. The provider perspective was also taken in assessing the cost implications for a District Health Management Team of introducing RDTs into their health centres. Effectiveness was measured in terms of health outcomes (presence of malaria or not as measured by research blood slides) and Disability Adjusted Life Years (DALYs). Cost data were collected at the household and facility level. At the household level, 100 children who were previously enrolled as participants in a recently completed trial (measuring the effects on malaria incidence of RDT-based diagnosis versus presumptive diagnosis), were randomly selected from 32 health facilities across 5 regions of Brong Ahafo. A structured questionnaire was used to collect data on direct costs (medical and non-medical) and indirect costs. Recurrent and capital costs were collected from purposely selected health facilities from each of the regions. Malaria treatment costs were estimated using both standard step-down costing and bottom-up costing methods. Sensitivity analysis was undertaken to examine the effects of varying uncertain variables on study findings as well as identifying the most important factors influencing the incremental cost-effectiveness ratio of the intervention.

4. Impact of RDTs and enhanced health facility-based care on costs and health outcomes in a high endemic area in Uganda.

Presenter: **Sarah Staedke**

Team: Eleanor Grieve[1], Catherine Maiteki-Sebuguzi[2], Deborah DiLiberto[1], Levi Mugenyi[2], Samuel Gonahasa[2], Florence Nankya[2], Kristian Hansen[1], Shunmay Yeung[1], Clare Chandler[1], Sarah Staedke[1 2].

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The ACT PRIME trial is designed to evaluate the impact of an intervention to enhance health facility care, including the introduction of malaria RDTs on malaria and febrile illnesses in children in Tororo, Uganda. Clusters were randomised to standard care or the health facility intervention, consisting of: (1) training in-charges in health centre management, (2) training of health workers in fever case management and use of RDTs, (3) training health workers in patient-centered services and (4) ensuring adequate supplies of artemether-lumefantrine and RDTs. While malaria RDTs should decrease overuse of antimalarial drugs, in an area of high malaria transmission, the cost-effectiveness of this strategy remains in doubt. This evaluation establishes the impact of RDTs and enhanced health facility-based care on costs and health outcomes in Tororo, an area of high malaria endemicity in Eastern Uganda.

Using outcome data collected from 1400 patient exit interviews and cost of resource use collected from household surveys, we adopt a decision analytic modelling approach to calculate the incremental cost-effectiveness ratio (ICER) of malaria cases appropriately treated in children under five, a primary outcome of the study. The appropriateness of treatment was assessed against an RDT performed by study personnel after the exit interview. Data on the costs of enhanced facility care and health facility were also collected.

As a method for summarising information on uncertainty in cost-effectiveness, cost-effectiveness acceptability curves (CEACs) will be generated using probabilistic sensitivity analysis. The CEAC indicates the probability that the health facility intervention is cost-effective compared with standard care, given the data observed and for a recommended cost-effectiveness threshold(s).

For policy makers to decide whether to scale-up such a programme, it is important to estimate the associated cost. Few studies report on costs of quality of care interventions. This presentation will estimate a full financial and economic costing to provide an estimate of the budgetary impact of a 'scale-up' to enhance public health facility-based care for malaria and febrile illnesses. We will examine a health service and societal perspective, the latter capturing both costs to the Ministry of Health and the (financial and opportunity) costs to patients and carers.