

## ORIGINAL RESEARCH



# Bedside paediatric HIV testing in Malawi: Impact on testing rates

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## Abstract

### Background

Provider initiated testing and counselling (PITC) is recommended for all inpatients in Malawi if they have not been tested in the previous 3 months. However testing rates remain low among children. We audited the effect of implementing a bedside diagnostic HIV testing service to determine if it would improve testing rates amongst paediatric inpatients.

### Methods

We audited the existing HIV testing service to determine the numbers of children being tested for HIV. This was followed by the introduction of a bedside diagnostic service followed by re-audit. Bedside testing was facilitated by health systems strengthening measures including identification of suitable counsellors, appropriate supervision and remuneration.

### Results

In the initial audit in March-April 2014, 85 (63%) of 135 children had documented HIV tests. Following implementation of the bedside HIV testing service, there was a significant increase in the proportion of children whose HIV status was known. On re-audit in July 2015, 110 (94.8%) of 116 children had documented HIV tests ( $p < 0.001$ ). Of those with documented tests, 94.5% had been tested within the last 3-months compared to 61% in 2014. Following the introduction of the service, the proportion of children tested for HIV during admission increased from 31.9% to 68.1% ( $p < 0.001$ ).

### Conclusions

Implementation of a bedside testing service at Queen Elizabeth Central Hospital significantly increased HIV testing among paediatric inpatients. This has important implications in establishing earlier treatment, reducing HIV-associated morbidity and mortality.

## Introduction

HIV prevalence in children under the age of 15 in Malawi in 2015 was estimated to be 84,000.<sup>1</sup> Sixty-one percent of children eligible for antiretroviral therapy (ART) actually received this intervention, compared to 27% in 2011.<sup>2</sup> Although coverage is improving, the majority of eligible children are still not receiving ART because their HIV status remains unknown.<sup>3</sup> In the absence of prevention of mother to child transmission (PMTCT) interventions, HIV testing and timely ART initiation, one third of infants living with HIV die before their first birthday, and half die before the age of 2 years.<sup>4</sup> Early ART initiation significantly delays the onset of HIV-associated morbidity and mortality.<sup>5,6</sup>

An important recommendation from the 2011 and 2014 Malawi Integrated Guidelines on 'Clinical Management of HIV in Children and Adults' was expansion of HIV testing with linkage to prevention, care and treatment services. These guidelines recommended provider initiated testing and counselling (PITC) for all patients attending a health facility for any reason if they had never been tested, more than 3 months had passed since a previously negative test, or claimed to have been tested any time in the past but lacked documentation.<sup>7</sup>

It remains unclear how best to configure PITC services to maximise the proportion of children tested. When PITC was adopted as national policy in Malawi in 2012 and

implemented in Queen Elizabeth Central Hospital (QECH), patients were referred for testing in the HIV counsellor's office away from the ward. We hypothesised that a bedside testing service would make it easier for patients and families to access testing. The objective of our study was to see if bedside diagnostic testing improved PITC.

## Methods

### Setting

QECH is a large government tertiary referral and teaching hospital in Blantyre, Southern Malawi. The paediatric department admits 28,000 children per year. Rapid HIV testing for children over one year uses the Determine HIV-1/2 test for screening and Uni-Gold test for confirmatory testing. DNA PCR testing is used for children under one year. Standard practice at the time of the initial audit was for clinicians to document a request for HIV testing in the patient's notes. The patient and guardian were then referred by nursing staff to attend the HIV counsellor's office, situated in a room approximately 100 metres from the Paediatric Emergency Department, or to another room approximately 50 meters from the main paediatric inpatient ward. HIV testing was not done at the bedside. Children and their guardians had to walk to the testing room. Counselling and testing was done by 4 trained volunteer counsellors who received reimbursement of their travel costs, but no salary.

**Table 1: HIV testing and status pre- and post-intervention**

	Pre-intervention	Post-intervention
<b>HIV status known at time of audit</b>	85/135 (63%)	110/116 (94.8%)**
HIV tested before admission	42/135 (31.1%)	31/116 (26.7%)
HIV tested during admission	43/135 (31.9%)	79/116 (68.1%)**
<b>HIV status of those with known result</b>		
Reactive or Exposed	18/85 (21.2%)	15/110 (13.6%)
Non-reactive or Non-Exposed	67/85 (78.8%)	95/110 (86.4%)

Chi-squared pre- vs post-intervention; \*\* p <0.001

### Study design

The design was a quality improvement process which included an initial (2014) audit comparing current clinical practice with best practice, followed by an intervention, and re-audit (2015) to measure the impact of the implemented interventions. Best practice was for HIV status to be known in all patients, as per national guidelines.

An audit of HIV testing rates was conducted on 7 separate weekdays at random, between 21st March and 22nd April 2014. Case notes and health passports of all patients in four paediatric wards were reviewed for documented evidence of HIV testing. Patient duplication was avoided by recording patient identification numbers. The following variables were recorded: age; date/length of admission; documented HIV test/status, date of test or requested test. If the patient had been admitted on the same day as the audit, this was recorded as day 0. A 'reactive' result was defined as testing positive for HIV; a 'non-reactive' result as testing negative; an 'exposed' result was defined as a child under 1 year born to or breastfeeding from an HIV-infected mother, and 'non-exposed' to a non-infected mother.

### Intervention

#### Bedside testing

Following the results and recommendations from the initial audit, two new full-time HIV counsellors were introduced in January 2015 to provide a bedside diagnostic HIV testing service, replacing the previous service. A documented request by the clinician was no longer required for the patient or guardian to be offered testing.

#### Counsellor remuneration

Volunteer counsellors were replaced with salaried employees (local salary 55,000 kwacha per month). They were given a written job description which included routinely offering bedside HIV testing in the paediatric medical wards as appropriate during working hours Monday through Friday.

#### Counsellor supervision

Line management structures were clarified so that the counsellors came under the remit of the matron on the ward who supervised the quality of their counselling and the number of tests completed each day.

A re-audit assessed the effectiveness of this intervention. Data were collected in the same manner as the first audit over 4 consecutive days from July 21st to 24th 2015. Bed occupancy rates and length of stay were similar during the periods of both audits.

### Ethical considerations

Ethical approval was not required as this was a quality improvement audit project. Data were recorded onto a Microsoft Excel spreadsheet. Descriptive statistics were calculated for most variables. Chi-square and Fishers exact tests were performed using Stata version 13.1 (StataCorp, College Station, TX, USA).

### Results

Results are summarised in Table 1.

#### Audit 2014

The initial audit identified 136 patients. One patient was omitted from analysis due to missing case notes and health passport.

Median patient age was 1.7 years (IQR 7 months – 4.9 years). 85 (63%) of the 135 patients had a documented HIV test result. Of those with documented tests, 54 (63.5%) had been tested within 3 months prior to the audit, 43 of who were tested for the first time this admission.

Of the 85 patients with documented tests, 13 (15.3%) were reactive, 5 (5.9%) exposed, 43 (50.6%) non-reactive, and 24 (28.2%) non-exposed. New diagnosis consisted of 5 reactive children and 1 exposed infant.

Of the 50 patients with no documented test, 19 had been admitted for <24 hours, leaving 31 who had been admitted for >24 hours and not tested. There was documentary evidence that testing had been requested in 13 patients and not requested in 37 patients. There was a significant difference in the duration of admission between those who had been tested and those that had not - mean duration of admission amongst tested 7.1 days, not tested 3.4 days, p<0.01.

#### Audit 2015

Following the intervention there was an increase in the proportion of children whose HIV status was known. Median patient age was 2 years (IQR 5 months – 7.5 years). 110 (94.8%) of 116 patients had a documented HIV test result. Of those with documented tests, 104 (94.5%) were tested within 3 months prior to the audit, 79 of who were tested for the first time this admission.

Of the 110 patients with a documented result, 8 (7.3%) were reactive, 7 (6.3%) exposed, 66 (60%) non-reactive, and 29 (26.4%) non-exposed. New diagnosis consisted of 2 reactive children, and 6 exposed infants.

The 6 patients with no documented test had a mean stay of 2 days (range 0 – 7 days). 2 had been admitted for <24 hours, leaving 4 who had been admitted for >24 hours and not tested. Testing was requested for 3 patients and not requested for 3 patients.

No guardian refused to have their child tested during either audit.

The total proportion of inpatients with documented HIV test results increased from 63% in 2014 to 94.8% in 2015 following the introduction of the bedside diagnostic service ( $X^2(1, N=251)=36.55, p<0.001$ ). The proportion of children

tested during admission increased from 31.9% to 68.1% ( $X^2(1, N=251)=32.82, p<0.001$ ). The proportion of children with reactive/exposed test results did not significantly alter following the introduction of the service (21.2% vs. 13.6% ( $X^2(1, N=195)=1.939, p=0.16$ ).

## Discussion

We found that introducing a bedside HIV testing service provided by properly supervised and remunerated counsellors significantly increased HIV testing rates. Inpatient testing rates increased from 31.9 to 68.1%; with a known HIV status of 94.8% compared to 63%. These results are important because HIV testing is a crucial first step towards the use of antiretrovirals that greatly improves survival and the quality of life among the HIV-infected.<sup>8</sup>

Our intervention involved three elements – testing by the bedside without the requirement for the test to be requested by a clinician, improved counsellor supervision and remuneration. The original HIV testing service was provided by voluntary counsellors with expenses paid from a non-government organization (NGO). The line management structure governing their work in QECH was unclear. We were unable in this audit to separate the effect of each element of the intervention on testing rates, but believe all three components were important.

There are a number of barriers to the provision of HIV testing to inpatients including a possible reluctance amongst clinicians to ask about HIV status/testing, the stigma associated with discussing the results in an open ward and difficulties in finding the HIV testing facility in a busy hospital with poor signposting. We achieved a test acceptance rate of 100%, higher than the 87.4% reported from a similar bedside-testing service in Lusaka, Zambia,<sup>9</sup> and similar to that of a service using private rooms in Lilongwe, Malawi (97.8%),<sup>10</sup> suggesting that testing on the open ward may not be a major barrier to care. Unlike the service offered in Lilongwe, we did not require additional staff in the form of patient escorts to achieve a high testing rate.

Of those tested, the proportion testing reactive/exposed fell (21.2% to 13.6%) and the proportion testing non-reactive/non-exposed rose (78.8% to 86.4%), but not significantly ( $p=0.16$ ). A larger sample size may have resulted in a statistically significant difference. Knowing the HIV status of every child is important in a setting of high HIV prevalence as it improves the accuracy of the differential diagnosis for all children, in addition to the benefit of early treatment for HIV-infected children.

We acknowledge that although we improved HIV testing rates, we have not studied or demonstrated an increase in the proportion of children accessing effective HIV care as a result of being tested. However others have demonstrated improved linkage to care as a result of inpatient HIV testing.<sup>11</sup> Currently our inpatients identified as being HIV-reactive are sent to a HIV care clinic for on-going treatment. This clinic is very busy and situated on the other side of the hospital. A similar intervention such as patient advocates escorting inpatients to clinic may increase effective treatment uptake rates.

## Conclusions

Routine bedside diagnostic HIV testing service performed by appropriately supervised and remunerated counsellors significantly improves paediatric inpatient testing rates. We recommend such a service be implemented in all facilities where PITC is the recommended standard of care.

## Competing interests

All authors declare that they have no competing interests related to this work.

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