

Improving case detection of tuberculosis in hospitalised Kenyan children

Introduction

The World Health Organization recommends use of Xpert® MTB/RIF (Xpert®) as a first-line TB diagnostic test. By 2018 there were 183 machines in Kenya in public hospitals across the country. However, despite the availability of these testing kits and efforts by the National TB Programme to provide training and guidelines; under detection of TB in children and underuse of TB diagnostic tests in Kenya is still quite high. For example, 75% of TB cases identified in a recent survey had visited health facilities in Kenya with suggestive symptoms but were never diagnosed. The failure to detect tuberculosis in patients who are already admitted in hospital represents a missed opportunity to provide optimal care.

Researchers at KEMRI-Wellcome carried out a study to design a contextually appropriate and theory-informed intervention to improve case detection of TB in children in Kenyan hospitals. The study employed the Behaviour Change Wheel (BCW), due its recognition that individual and collective behaviour change is key to implementing new practices and to improve health outcomes. In addition, it naturally incorporates context, which is key to effective design and implementation of interventions.

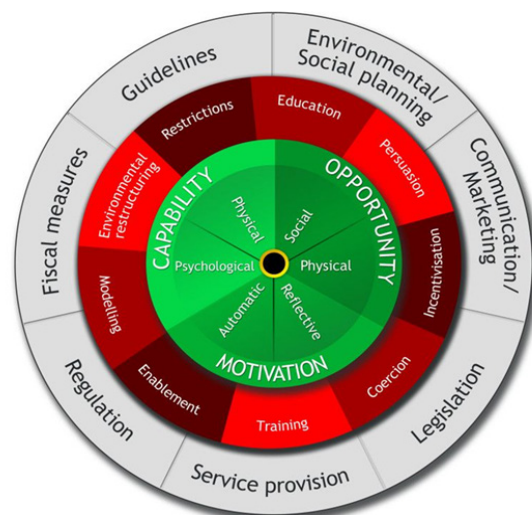
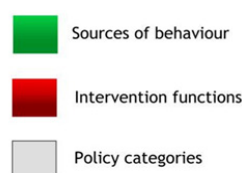
Methods

The Behaviour Change Wheel process involves evidence-based progression from behavioural analysis of a problem to intervention design employing behaviour change theory to bring about desired change. The BCW is made up of three layers as shown in **figure 1**. The core is formed by the Capability, Opportunity and Motivation Behavioural (COM-B) theoretical model which explains conditions internal to individuals and within their social and physical environment necessary for healthcare workers to enact a desired behaviour, which in this case was to correctly diagnose TB in children. COM-B is the starting point used by the BCW for understanding behaviour in the context in which it occurs. Surrounding the core are interventions which mainly target individuals e.g. education, coercion; or act at policy level e.g. guidelines, fiscal measures.

Key Messages

- Tuberculosis is a leading cause of illness and death in children. The World Health Organization estimates that there were over 1.12 million incident child TB cases and over 205,000 deaths in 2018.
- Kenya is one of the 30 TB high-burden countries, with a prevalence of 426 per 100,000 with children representing 9-10% of the notified cases.
- The true burden of TB in children remains unknown partly due to challenges in diagnosis. It is estimated that 65% of TB in under-five children remains undetected each year.
- Despite the availability of TB testing kits, guidelines to guide TB clinical decision-making and regular periodic training on these guidelines by the National TB Programme every year; under detection of TB in children and underuse of TB diagnostic tests in Kenya remains quite high.
- For example, though half of all paediatric admissions in Kenyan county hospitals exhibit signs and symptoms suggestive of TB, it was rarely considered as a differential diagnosis. Only 1% of children meeting the criteria for diagnostic testing had a TB test carried-out.
- To remedy the above situation, there is need to re-evaluate the strategies adopted by the existing National TB Programme especially its approach to identifying children with TB.
- There is need to review the approach to training; we suggest a shift to practical child TB training as it addresses difficulties with specimen collection; in addition, this training should be preferably conducted in the hospitals.

Figure 1: The Behaviour change Wheel



Michie et al 2011

Identifying intervention options, content and implementation options

An iterative process was used, going back and forth from the quantitative and qualitative empiric data to reviewing literature, and applying the BCW guide. The guiding questions were:

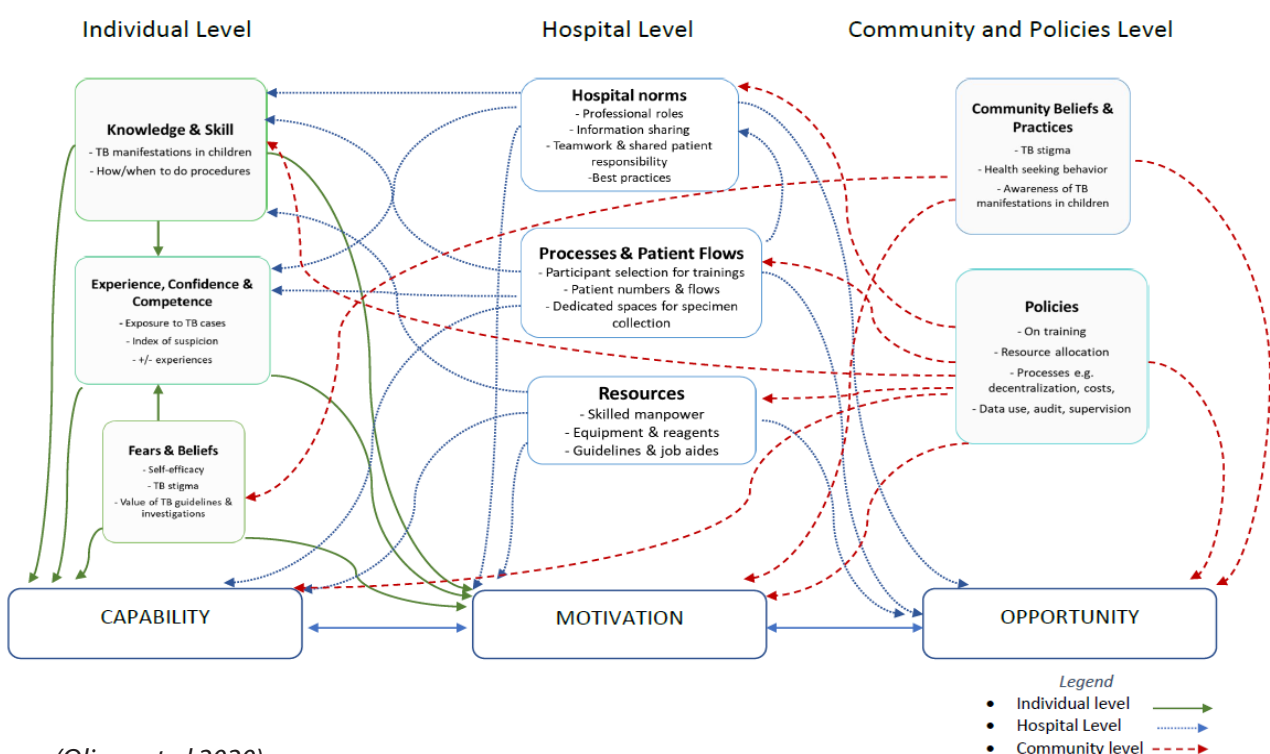
1. what problem are we trying to solve;
2. what behaviours are we trying to change and in what way;
3. what will it take to bring about desired change;
4. what types of interventions are likely to bring about desired change;
5. what should be the specific intervention content and how should this be implemented

Findings

Within the BCW framework, quantitative and qualitative data was collected in three main stages, stage one involved understanding behaviour and challenges with cases detection; while stage two and three entailed, identifying intervention options, content and implementation options. The study found that at national level, there was under-detection of TB in children and underuse of available TB diagnostic tests. At hospital level, more than half of all paediatric admissions in Kenyan county hospitals had signs and symptoms suggestive of TB, but in most, TB was not considered as a differential diagnosis. Only 1% of these children meeting criteria for diagnostic testing had an Xpert® MTB/RIF assay performed, which was available in all the hospitals.

Qualitative interviews found that there were 25 themes, representing the factors that influence TB case detection in children. These themes were then grouped into eight broad analytic categories, illustrating how they had potential to impact Capability, Motivation and/or Opportunity to diagnose TB in children, and whether the influences were at individual, hospital or community level. Knowledge, skill, competence and experience, as well as beliefs and fears impacted on capability (*physical & psychological*) as did motivation (*reflective*) to think of TB as a differential diagnosis in children and use diagnostic tests at individual level as indicated in **figure 2**. On the other hand, hospital level influences included hospital norms, processes & patient flows and resources which affected how individual health workers attempted to diagnose TB in children by impacting on their capability (*physical & psychological*), motivation (*reflective & automatic*) and opportunity (*physical & social*). At the wider system level, community practices & beliefs, and implementation of TB programme directives impacted some of the decisions that health workers made through capability (psychological), motivation (*reflective & automatic*) and opportunity (*physical*).

Figure 2: Emerging themes showing connections with each other and COM-B elements



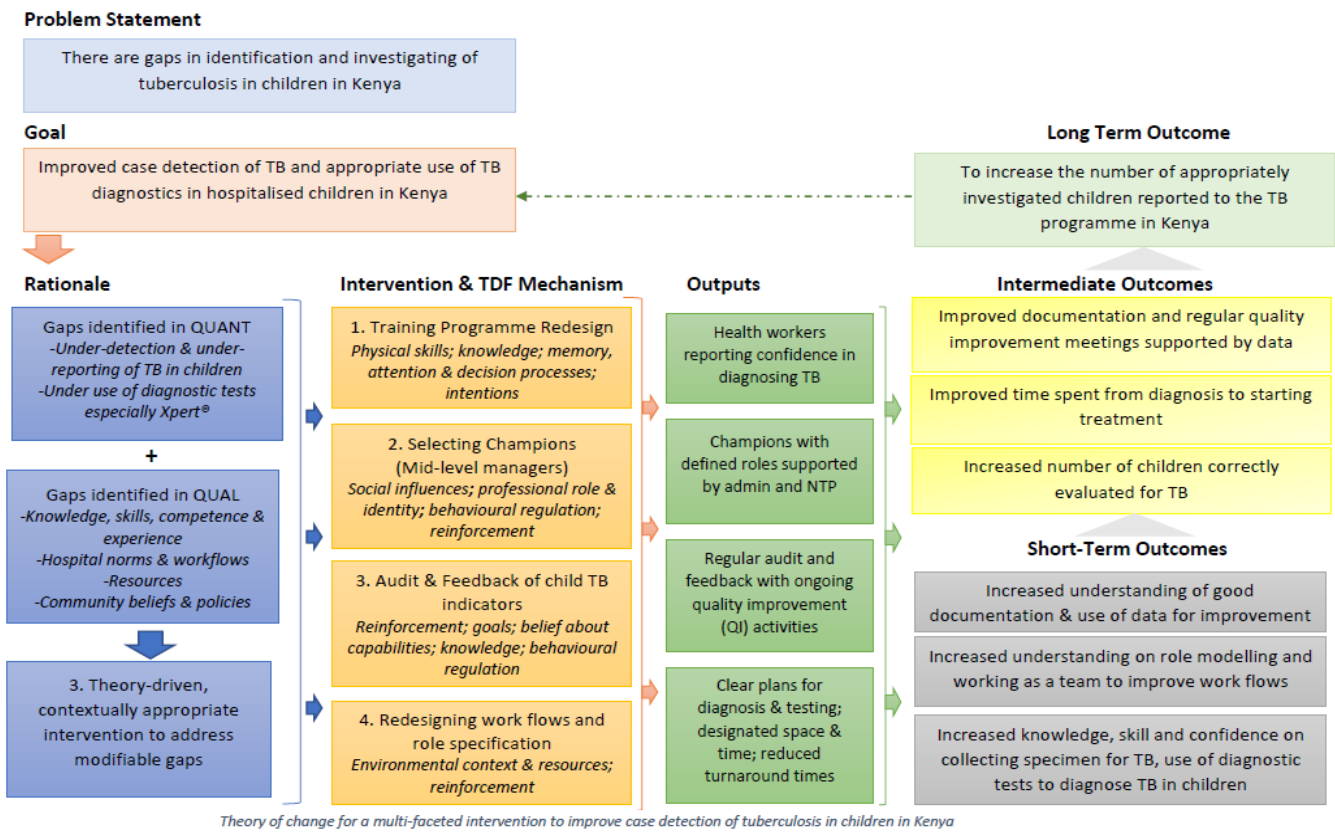
Source: (Oliwa, et al 2020)

Proposed Behaviour Change Interventions

Discussions with the various child TB stakeholders, gave rise to a multi-faceted intervention package composed of: i) redesigning of training to focus on practical skills; ii) selection of champions; iii) better use of audit and feedback; and, iv) workflow restructuring was proposed. Table 1 summarises the process that was followed in linking the proposed intervention package with theory while the logic model (Figure 2) conceptualises the theory of change of how the intervention package might work.

| Proposed Intervention | Target behaviour | Behaviour Change Technique | Mode of delivery | Major gaps using APEASE criteria A-Affordability P-Practicability E-Effectiveness A-Acceptability SE-Side Effects E-Equity |
|-----------------------------------|---|---|---|---|
| Training Programme Redesign | On-job training HCWs in child TB (specimen collection, interpreting CXRs) | Instruction on how to perform the behaviour Demonstration of the behaviour | Face-face to individuals and groups Print media (guidelines) | Low Practicability: Needs skilled staff to train and time off busy schedules |
| Purposeful selection of Champions | Providing clinical leadership, mentorship and supervision Building teamwork to ensure best practices | Demonstration of the behaviour Credible source Social support Goal setting Feedback on the behaviour | Face-face to individuals and groups | Low Practicability: low where staff are few and stretched and none willing to take up role |
| Audit & Feedback | Encourage better documentation of history and physical signs and symptoms suggestive of TB Encourage better documentation of tests ordered and date done Encourage better documentation of samples collected, when and test results | Adding objects (record forms) to the environment Feedback on the behaviour Prompts/cues | Face-face to individuals and groups Individually accessed computer-generated reports | Low Acceptability: may resist if not part of their culture Practicability: low where staff are few and stretched |
| Workflow restructuring | Reorganising patient flow and processes Ensuring samples get to the lab on time Ensuring results get back to each patients' file and gets reviewed by clinician | Restructuring of the physical & social environment Feedback on the behaviour Prompts & cues Demonstration of the behaviour | Group | Low Practicability and acceptability: may be low where staff are few and stretched |
| Resources | Ensuring availability of reagents, cartridges, specimen bottles, safety masks Ensuring availability and use of guidelines/job aides Providing personal protective equipment and encouraging consistent use | Restructuring of the physical environment Adding objects to the environment Feedback on the behaviour Demonstration of the behaviour Prompts & cues | Group Individual—in-charge: using reports | Low Affordability: cost prohibitive Low Acceptability: using masks Low Effectiveness: of procurement Low Availability: dependent on TB programme Low Acceptability: low where people prefer to use their acumen |

Figure 3: Theory of change for a multi-faceted intervention to improve case detection of tuberculosis in children in Kenya



Source: (Oliwa, et al 2020)

Summary and Recommendations

1. There is need to review the approach to training in terms of goals, content, pedagogy and participants with a suggestion that training should be conducted at hospitals themselves.
2. In addition to training, the National TB Programme should consider the following:
 - i. using child TB champions;
 - ii. the establishment of social norms like teamwork and mentorship
 - iii. group problem solving for quality improvement and to restructure workflows in the hospitals.

About this Research

Related Publication

This brief is adapted from a research paper published under the title, "Improving case detection of tuberculosis in hospitalised children in Kenya – employing the Behaviour Change Wheel to aid intervention design" [<https://implementationscience.biomedcentral.com/articles/10.1186/s13012-020-01061-4>]

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