Operational research on implementation of tuberculosis guidelines in Mozambique

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8. General discussion
The translation of research evidence, often presented in the form of guidelines, into health care practice poses considerable challenges. The process of developing these guidelines consists of several steps: composition of the development group, the development itself, dissemination, implementation, and the evaluation of the guidelines. Through several case studies from Mozambique we assessed parts of this process and addressed two research questions: 1) How can assessment of guideline implementation and its evaluation contribute to health care decision-making? and 2) Which factors are critical for failure or success in guideline implementation? We further discuss remaining challenges and implications for guideline implementation and further research.

Role of routinely available data in guideline implementation evaluation and health care decision-making

Glasgow states that the translation of research into practice is often slow and difficult because of insufficient attention for the pragmatic aspect of interventions: does it work under usual conditions? He suggests pragmatic research that addresses specific practice needs and questions, is relatively simple, and has attention for issues of health care workers, policy makers and patients, amongst others. The evaluation of guideline implementation can contribute to the identification of these needs, questions, and issues. A pragmatic approach in such evaluation is the use of routinely available data.

The use of routinely available data showed that some delay in a CD4+ cell count result would not lead to missing an opportunity to initiate ART (chapter 2). This finding presently has lost its relevance because the ART guidelines were revised since this study and now recommend to initiate ART in all HIV-infected TB patients as soon as possible irrespective of CD4+ cell count. However, the finding may still be valid for countries that wish to continue using CD4+ cell count for reasons such as priority setting. Furthermore, new evidence emerged showing that deferring ART until TB treatment is finished does not affect mortality in HIV-infected TB patients with a CD4+ cell count of more than 220 cells/µL compared with initiation of ART during TB treatment. This finding may influence future recommendations on when to initiate ART in HIV-infected TB patients.

The use of routinely available data also showed that HIV programmes are better positioned than TB programmes to assess ART coverage (chapter 3). In addition we found reporting on ART coverage at the same time the TB programme reports notified TB cases provides a timely but incomplete picture. Despite this limitation, the global recommendation now is to report on ART coverage at the same time as reporting TB notifications.

The use of routinely available data using a benchmark tool showed potential under-diagnosis of smear-negative pulmonary and extrapulmonary TB (chapter 4). The tool is also capable of assessing potential over-diagnosis as Figure 8 shows.

The WHO recognised that more can be done with the TB data collected by national programmes and published a document on how to use TB data. Though the document is very useful for national programmes it may have limited value for local TB workers because of the methods used. Furthermore, if such documents came with ready-made tools for (part of the) data-analysis such as spreadsheets or apps for mobile devices, data analysis for local workers would be much easier. The advantage of developing tools is that these would be useful for many countries because almost all countries record and report TB data following the WHO standard. One of the tools presented in the document on using TB data is similar to our benchmark tool.
Note: the black lines refer to the values of the whole country that were chosen as the reference value.

*Figure 8 Benchmarking data for selected Mozambican provinces on diagnosis of smear-negative and extrapulmonary TB 2007-2009*

The benchmark tool does not proof under- or over-diagnosis but alerts TB programme staff that in a certain setting the performance is different from similar settings. Further assessment is necessary to identify reasons for this difference and potential solutions. Insufficient guideline implementation may lead to inadequate performance of programmes. The focus group discussions and the implementation status studies identified several factors related to implementation of guidelines.

**Factors critical for failure or success of guideline implementation**

**Availability of material and guidelines**

For health care workers as users of guidelines, the non-availability of guidelines and material hindered effective guideline implementation (chapters 5 and 6). Not all TB officers and health care facility managers had guidelines for identification and diagnosis of (presumptive) TB patients. Because of lack of material such as N95 respirators for respiratory protection, health care workers could not use them.

The availability of guidelines is the result of the dissemination process much more than the implementation itself. Absence of guidelines at the health care facility does not necessarily mean that individual health care workers do not have or use the guidelines. Dissemination of guidelines in sub-Saharan Africa often occurs through trainings where health care workers receive a copy of the guidelines which they consider this their personal copy.

Non-availability of material hindering implementation of TB infection prevention and control measures is reported in other sub-Saharan African settings. This applies to other health care areas as well. A study evaluating follow-up for HIV-exposed infants found that health care system challenges such as irregular availability of consumables affected improvement of follow-up for these children. Non-availability of material also negatively influences motivation of health care workers.
Consistency

Health care workers found it difficult to apply some of the recommendations of guidelines in their daily practice. This was related to recommendations conflicting with other recommendations or with expected professional conduct (chapter 5); to limited applicability in their setting (chapter 2); and to insufficient clarity of the recommendations (chapters 5, 6 and 7). These aspects we call the consistency of the guidelines.

We found conflicting recommendations on how to correctly separate coughing patients. The recommendation to initiate ART in HIV-infected TB patients depending on CD4+ cell count results at the start of TB treatment,\textsuperscript{12} was difficult to apply in Mozambican health care facilities without CD4+ cell count equipment. Lack of clarity of guidelines existed for separation of (presumptive) TB patients, for the use of N95 respirators and on how and where to measure airspeed when assessing ventilation using a vaneometer.

Consistency of guidelines is not always achieved. A study in South Africa evaluated the process of implementation of provider initiated HIV testing and counselling in clinics for sexually transmitted infections (STI).\textsuperscript{13} The intervention used a patient-centred counselling style that did not align easily with the communication style used in the STI clinics. The conflicting styles reduced the efficient integration of the new intervention. Health care workers are more likely to use guidelines if these are in line with their expected professional conduct.

The TB infection prevention and control guidelines are not clear on how to assess ventilation in health care facilities.\textsuperscript{14} The framework for implementing this guideline suggests using a vaneometer but does not provide specific instructions on measuring the air velocity in terms of the position of the vaneometer and the frequency of the measurements.\textsuperscript{15} The findings from our study on assessing ventilation using a vaneometer suggest that clearer instructions for measuring air velocity are possible (chapter 7). A single measurement in any position in the opening is sufficient. However, the study did not compare the vaneometer method with other methods of assessing ventilation. In addition, recommendations on air changes per hour for natural ventilation do not exist. Some of the values of the air changes per hour in Mozambican facilities seem quite high (more than 100) compared to the level for adequate ventilation of 12 air changes per hour. This recommendation is for mechanically ventilated high-risk areas,\textsuperscript{16} and similar recommendations for natural ventilation are lacking.

Role of patients

Recommendations in guidelines target mostly receivers of care, clients or patients (hereafter referred to as patients). Patients have their own values or limitations that may result in them making a decision differently from the professional recommendations.\textsuperscript{17} Our findings showed that patients followed advice on cough hygiene, but socioeconomic factors hindered patients to follow recommendation on receiving daily treatment at the facility (chapter 5). A study in Kenya explored attitudes of discordant couples to early ART initiation of the HIV-infected partner, i.e. initiating ART as soon as HIV-infection is diagnosed irrespective of the CD4+ cell count, as recommended by the WHO.\textsuperscript{18} The study found that participants were interested in early ART initiation because of health reasons but had great reservations because of side effects, the lifelong duration of the therapy, and stigma. In addition to these, they perceived ART as medication for the last stage of the disease, when the patient “is nearing the grave”. These personal values may act as a hindering factor more than the health reasons are facilitating factors for following the recommendation.
The motivation to change by health care workers

The motivation to change practice is crucial for the implementation of guideline recommendations. In the focus group discussions on TB infection prevention and control measures this was clearly elicited from the participants (chapter 5). The earlier mentioned factors availability of guidelines and material and the consistency, and the role of patients influenced health care workers’ motivation. The irregular availability of N95 respirators influenced negatively the motivation to use these even if available. Health care workers were not clear on the recommendations on separation of patients resulting in them feeling confused and uncertain in their actions. Health care workers were content with the correct practice of cough hygiene as a result of their health education activities.

Motivation to change has in several studies been recognised as a major factor in implementing change. A study from Kenya listed difficulties in accepting change and the lack of motivation among the barriers for implementing guidelines. A qualitative study from Uganda found that positive approaches such as feedback would motivate health care workers more than negative approaches such as penalties. A South African study on implementation of TB infection prevention and control practices showed that motivation and behavioural skills were associated with better self-reported practice, but having the correct information was not.

We identified these critical factors through studies in Mozambique. We consider the findings relevant for similar settings such as sub-Saharan Africa. In sub-Saharan Africa TB and HIV programmes base their national guidelines on the WHO guidelines. The national disease programmes determine the activities at regional, district and health care facility level. Other studies on guideline implementation showed similar results. An evaluation of the effect of guidelines on the implementation of health care programmes in Uganda showed that more than 60% of the guidelines developed by the Ministry of Health were not available at the level of service provision. A study evaluating the use of maternal health guidelines found that the use of the guidelines in practice was limited. The study suggested presenting the guidelines in a different format to increase the applicability. In Kenya researchers identified limited resources, difficulties to accept change, lack of motivation, and conflicting attitudes and beliefs among the reasons for insufficient implementation of guidelines. In relation to infection prevention and control the findings are relevant globally. A recent systematic review revealed availability of material and resources and appropriate use of guidelines among the factors contributing to the prevention of health care associated infections.

If simple tools for analysis of routine data as described in the first part of this chapter would be available, would the analysis positively influence implementation of guidelines? Table 12 provides an overview of the possible positive influences it may have on the factors that we identified as relevant for the implementation.

Guideline implementation is not a purpose in itself. The main purpose of guidelines is to improve care. In a review of 59 guideline evaluations, 55 improved the process of care. Though only 11 evaluations also assessed the outcome of care, which improved significantly in nine of them, it may mean that evaluation of the implementation of guidelines is a good proxy for improved care. It is possible to improve care through routine analysis of the available data. An evaluation of the use of an obstetric audit tool showed that such an approach does improve care. Every two to three weeks the staff of the facility met to discuss pre-
Table 12. Possible positive influences of local analysis and evaluation feeding into guideline development

<table>
<thead>
<tr>
<th>Factor</th>
<th>Influence</th>
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<tbody>
<tr>
<td>Availability of guidelines and the necessary material.</td>
<td>The analysis itself would not influence availability, but may identify non-availability.</td>
</tr>
<tr>
<td>Consistency</td>
<td>Identification of inconsistencies with other guidelines, expected professional conduct and unclear recommendations; suggestions on how to overcome these.</td>
</tr>
<tr>
<td>The role of patients</td>
<td>Health care workers interacting with patients may know what is acceptable to patients; if not they are in a position to ask patients what is acceptable to them.</td>
</tr>
<tr>
<td>The motivation to change by guideline users</td>
<td>Through taking into account health care workers’ concerns and suggestions, the motivation to change increases.</td>
</tr>
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</table>

selected cases of maternal deaths or severe pregnancy related complications. If the audit revealed that substandard care caused or contributed to the death or complication, the meeting would come up with recommendations such as refresher training or increased supervision on the ward. The effect of these recommendations was reported back to the audit meeting. A qualitative study on the perceptions of health care workers of the obstetric audit and its feedback found that health care workers valued the tool as a mechanism to improve care. The health care workers also appreciated the meetings as a learning opportunity. Learning serves as a motivator for health care workers, and as such the use of routinely available data may increase health care worker motivation to change.

Improved implementation of guidelines evaluated in this thesis could result in a lower risk for TB transmission for health care workers, patients and visitors of health care facilities; in reduced morbidity and mortality due to smear-negative and extrapulmonary TB; and in reduced mortality among HIV-infected TB patients because of timely initiation of ART in HIV-infected TB patients.

Implications for guideline implementation

When implementing guidelines, implementers need to take into consideration the availability of guidelines and the necessary material, the consistency of the guidelines, the possible role of patients and the motivation of health care workers to change their practice. Especially for the consistency of the guideline and the role of the patients it would be helpful to take these into account during the development of the guideline. Checking guidelines with other guidelines on the disease or care process can identify and prevent inconsistencies between guidelines. If recommendations are not applicable in some settings or situations, alternatives could guide health care workers in their actions. If certain values or attitudes of patients on the recommendations in a guideline were known, this knowledge would influence the implementation strategy. The implementation strategy is key in successful implementation of guidelines.
Remaining challenges and implications for further research

Operational research, sometimes called implementation research, as defined by Harries et al. as “research into strategies, interventions, tools or knowledge that can enhance the quality, coverage, effectiveness or performance of the health system or programmes in which the research is being conducted”, considers this research part of routine monitoring and evaluation. Future research should develop and evaluate pragmatic tools for systematic use of these tools as part of the routine monitoring and evaluation activities. These studies should assess whether the use of these tools facilitates the evaluation process and improves care. Because of different issues and questions at different levels in the health care system, the tools need to be flexible and easy adaptable to address these various issues and questions. A recently published pragmatic method of monitoring and evaluating TB case finding interventions using routine TB notification data in addition to data related to the specific intervention, provides a good example of how this can be done.

The challenge of the guideline implementation process is that it is influenced by various factors, each of which on their own would probably not increase implementation of the guidelines. The availability of N95 respirators would not have solved the fact that health care workers were not clear on how and when to use these and how to maintain these in-between use. Had health care workers been perfectly clear on how to separate patients, they may have encountered challenges from the patients considering separation embarrassing. Motivation of health care workers is a challenge in many resource-limited settings, and probably affects willingness to change. Further studies should assess what is the most effective method to address these factors and the effect on programme performance.

There is need to investigate which method is best to assess ventilation and under which conditions. In addition, we need evaluation whether the recommendations for air changes per hour for mechanical ventilation hold for natural ventilation.

Conclusion

This thesis identified several factors that influence guideline implementation. Evaluation of guideline implementation using routine data is a simple way to identify where implementation may be insufficient. Programmes should build such evaluations into their routine monitoring and evaluation systems as part of a continuous effort to improve programme performance.
References.


