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Integrating Tuberculosis and Diabetes: Innovative Strategies to Enhance Healthcare Delivery for Communicable and Non-Communicable Diseases

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Abstract

Numerous evidence-based health interventions, especially within low-income contexts, have not yielded the anticipated outcomes. To tackle systemic obstacles in healthcare delivery, we devised the Adaptive Diseases Control Expert Programme (ADEPT) in Tanzania. Our focus was on examining the workability, acceptability, and effectiveness of this model using tuberculosis (TB) and diabetes mellitus (DM) as prototypes. This initiative followed an effectiveness-implementation hybrid type-3 design, which was executed in the Dar es Salaam, Iringa, and Kilimanjaro regions. The approach involved a gradual training methodology facilitated by web-based platforms that incorporated Gibbs' reflective cycle. We expanded health facilities providing TB services to encompass DM diagnostic capabilities, including glycated hemoglobin A1c (HbA1c) measurements. To ensure adherence, a clinical audit was employed as an evaluative tool. To evaluate the model's adherence, acceptability, and feasibility, we employed both retrospective and cross-sectional methodologies. Our findings from 2019 to 2021 demonstrated that health facilities implementing the ADEPT intervention consistently identified a greater number of individuals with both TB and DM (median of 8, IQR 6-19) compared to control facilities (median of 1, IQR 0-3) (p=0.02). Moreover, the application of HbA1c in TB/DM cases within intervention sites proved to be clinically valuable, reaching 63% (IQR: 35-75%), while control sites exhibited no utilization at any level. Although other aspects of the standard clinical management for patients with both TB and DM showed no significant differences, the positive impact of the ADEPT intervention was evident.

Keywords: Integration • Communicable and non-communicable diseases • Tuberculosis

Introduction

Discrepancies were not observed in health facilities when it came to screening for additional coexisting conditions like hypertension and malnutrition. The stepwise training approach involved a total of 46 nurse officers and medical doctors/specialists in web-based training, with 40 of them (87%) attending the subsequent workshop. Among these, 31 individuals (67%), consisting of 18 nurse officers and 13 medical doctors/specialists, moved on to the second training phase, where they trained others. This effort resulted in a total of 519 additional front-line healthcare workers being trained: 371 nurses and 148 clinicians. On the whole, both front-line healthcare providers and health facilities evaluated the feasibility of the ADEPT model positively according to the applied metrics. Despite significant advancements in science, technology, and innovation over the past decade aimed at addressing major infectious diseases like Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) in Low- and Middle-Income Countries (LMICs), the anticipated improvements in service quality have not been achieved [1]. The subpar service quality in LMICs leads to around 5 million deaths annually, accounting for roughly 15% of total deaths-a situation that can be deemed an epidemic in its own right [2,3]. Consequently, only 30% of patients with suspected MDR-TB were able to access the recommended diagnostics necessary for optimal clinical management. A lack of awareness, training with new tests and pathways, and challenges in obtaining essential consumables were among the common obstacles contributing to the under-implementation of solutions.

Description

Healthcare systems in sub-Saharan Africa (SSA) face formidable challenges in providing quality care not only for individuals with TB and HIV, but also in light of the concurrent surge of non-communicable diseases (NCDs) like diabetes mellitus (DM), hypertension, and chronic lung conditions. Typically, communicable diseases and NCDs are managed separately within the health system, but these divisions are equally vulnerable to emerging economic and biosecurity issues such as the COVID-19 pandemic, which further strains already fragile healthcare systems [4,5].

In Tanzania, the health system officially records an annual addition of 75,000-85,000 TB cases, of which 20-30% are co-infected with HIV. However, another significant driver of TB is DM, affecting 9-16% of TB patients in the country, often remaining undiagnosed [6]. While global efforts targeting TB and HIV have led to substantial shifts in recommendations and guidelines, such as the lipoarabinomannan diagnostic test and innovative TB preventive therapies, countries like Tanzania still encounter systemic hurdles in effectively disseminating these updated recommendations to front-line healthcare workers, along with the necessary implementation support. These guidelines also propose the integration of NCD services with TB and HIV care, an objective that remains unrealized in Tanzania. For example, despite the introduction of molecular diagnostics for Multidrug-Resistant (MDR)-TB in the country, the anticipated reduction in mortality seen elsewhere did not materialize, prompting a nationwide investigation into barriers and bottlenecks. This assessment unveiled a significant gap in the regular provision of continuous on-the-job medical education for most front-line healthcare providers in TB and HIV clinics, resulting in outdated knowledge and skills concerning international

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TB care standards. Specifically, 83% of front-line healthcare workers in TB and HIV clinics exhibited inadequate proficiency in the clinical application of molecular diagnostics endorsed by the World Health Organization (WHO).

While evidence suggests that integrating infectious disease and NCD care could enhance the number of individuals accessing healthcare, this integration might not necessarily translate to improved service quality or overall health outcomes for those seeking care. Consequently, we developed an intervention aimed at transforming healthcare delivery through three interconnected domains: (i) a progressive training methodology to enhance the knowledge and skills of front-line healthcare providers, (ii) adaptable service provision achieved by merging communicable and NCD care, using TB and DM as a case study, and (iii) ongoing learning and integration of combined communicable and NCD care, as previously described. This intervention was constructed based on a theory of change that envisions a self-correcting system, subsequently shifting healthcare delivery towards a more patient-centered approach. Our study focused on assessing the model's feasibility, acceptability, and effectiveness, evaluating the degree of integrated practice for patients with both TB and DM, and gauging pertinent individual health outcomes utilizing a clinical audit tool.

Conclusion

The application of a gradual training approach and clinical audit to facilitate the integration of TB and DM management was viable, proving to be well-received and impactful across diverse Tanzanian regions. Considering its adaptation to the Tanzanian healthcare system, this model holds the potential to enhance the overall quality of services.

Acknowledgment

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Conflict of Interest

None.

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