



PERSPECTIVES

Development of tuberculosis infection control guidelines in a pediatric HIV clinic in sub-Saharan Africa

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Setting: A well-established pediatric human immunodeficiency virus (HIV) clinic in Lesotho with initial infection control (IC) measures prioritizing blood-borne disease. In line with international recommendations, services have been expanded to include the management of patients with tuberculosis (TB). The creation of comprehensive IC guidelines with an emphasis on TB has become a priority.

Objective: To provide a model for developing and implementing IC guidelines in ambulatory care facilities in limited-resource settings with high HIV and TB prevalence.

Activities: An IC plan that includes guidance covering both general IC measures and TB-specific guidelines was created by integrating local and international recommendations and emphasizing the importance of administrative measures, environmental controls, and disease-specific precautions. An interdisciplinary committee was established to oversee its implementation, monitoring, and evaluation.

Discussion: Development and implementation of IC guidelines in resource-limited settings are feasible and should be a priority in high HIV and TB prevalence areas. Education should be the cornerstone of such endeavors. Many interventions can be implemented with minimal expertise and material resources. Administrative support and institutional investment are essential to the sustainability of an effective IC program.

Health services continue to expand and evolve for people living with human immunodeficiency virus (HIV) infection in sub-Saharan Africa. Initial efforts focused on providing antiretroviral therapy to as many people as possible. In recent years, clinical and public health responses to the epidemic have transitioned from acute stabilization to a model of chronic care. Sub-Saharan Africa also carries a large proportion of the global tuberculosis (TB) burden.¹ TB is among the most common opportunistic infections and a leading cause of death among HIV-infected people in resource-limited settings.² Recognizing the high prevalence of HIV-TB coinfection, international guidelines recommend the integration of TB and HIV services at all levels of the health system. With limited resources available to support the integration of care, TB services have frequently been absorbed into existing HIV programs.

TB transmission to at-risk patients and health care workers (HCWs) can be minimized through coordinated infection control (IC) strategies. The absence or

limited application of these measures has been linked to TB outbreaks, while effective implementation is associated with reduced transmission.^{3–7} Common barriers to the implementation of TB-specific IC measures include inadequate infrastructure, understaffing, poor adherence to recommendations, misuse of personal protective equipment, and lack of awareness about nosocomial infections.^{8–10}

To complement the integration of TB and other services, we developed an expanded IC plan that addresses general and disease-specific measures and integrates local and international guidelines. Administrative measures, environmental controls, and disease-specific precautions were implemented and monitored by an interdisciplinary committee that required minimal additional resources. In the present article, we hope to provide a model for developing and implementing IC guidelines in ambulatory care facilities in limited-resource settings with high HIV and TB prevalence.

SETTING

Lesotho has the second highest rate of HIV in the world, with 23.1% of its population infected.¹¹ TB incidence in Lesotho is 630 per 100 000 population.¹² The Baylor College of Medicine Children's Foundation–Lesotho (BCMCF) is a non-governmental pediatric HIV clinic that is open 5 days per week and provides comprehensive primary health care services to HIV-infected children and adolescents, mothers and their exposed infants, and pregnant women. BCMCF is a free-standing ambulatory care facility in close proximity to the national referral hospital and to the only dedicated TB clinic in the area, which focuses on the diagnosis and treatment of drug-resistant TB. Routine (non-drug-resistant) TB cases in children and adults are managed by practitioners in a variety of clinical settings, including BCMCF. BCMCF has therefore included the care of HIV-TB coinfecting patients in its activities, and is striving to provide that care paying close attention to IC.

BCMCF was founded in 2005. In its initial year, 750 patients were enrolled. BCMCF has grown steadily, with a cumulative enrollment of 10 394 patients, of whom 4223 are active. BCMCF has integrated TB care and treatment into its existing service model, and the number of TB cases identified by BCMCF has gradually increased from 20 in 2006 to 154 in 2013.

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ACTIVITIES

Development of infection control guidelines

Drawing from local and international guidelines,^{13–17} BCMCFL created infection prevention and control guidelines tailored to its context. A draft IC policy was disseminated via e-mail and in print copy to administrative and clinical staff. Facility-wide didactics on the importance of TB IC and how new IC policies might be implemented in our facility were concurrently provided to all clinic staff and HCWs. Feedback suggested that expanded IC guidelines, incorporating a TB control framework, were a feasible priority. It was also apparent that implementation, education, and monitoring and evaluation would be best overseen by a dedicated and interdisciplinary committee.

Between October 2013 and January 2014, comprehensive infection prevention and control guidelines (ICG) were developed, and an Infection Control Committee (ICC) was formed.

Tuberculosis infection control

The TB section of BCMCFL's ICG was designed with the following goals: early detection of patients with infectious TB, adherence to airborne precautions, and treatment of people with presumptive or confirmed TB disease. A tiered approach was employed, including administrative measures, environmental controls, and personal protection measures.

Administrative measures are policies that prevent non-infected individuals from being exposed. These measures are often the most cost-effective measures for preventing the spread of TB within facilities; however, they require significant institutional investment and behavioral changes. Administrative measures include assigning staff responsibilities for TB IC; training and educating HCWs and patients regarding TB with specific focus on prevention, transmission, and symptoms; implementing effective work practices for the management of patients with presumptive or confirmed TB disease; strategic scheduling of appointments to avoid exposing susceptible persons to TB; ensuring the availability and timely receipt of laboratory processing, testing, and results; and screening and evaluating HCWs exposed to TB.

Environmental controls minimize the amount of TB in the air. These measures range from low-resource interventions to infrastructural changes requiring engineering expertise and considerable cost. Environmental controls include improving natural ventilation, retrofitting facilities with air purification systems that are more effective at removing TB from the air than general ventilation strategies, and separating people with presumptive or confirmed TB from those who are susceptible to TB.

Personal protection measures provide physical barriers between patients with infectious TB and others. These measures include providing disposable masks for patients with presumptive or confirmed TB disease to reduce the expulsion of TB-containing droplet nuclei into the air, and providing all clinical staff with properly fitted N-95 respirators for use when caring for any patient with presumptive or confirmed TB.

General infection control

BCMCFL's ICG also includes instructions on hand hygiene; protocols for contact, droplet, and airborne precautions; a summary of Lesotho's immunization schedule, which highlights exceptions pertinent to those with HIV; recommendations for routine de-worming; guidance on maintenance and sanitation of facilities; instructions for disposal of health care waste; and a section on employee health that includes occupational exposures and post-exposure prophylaxis.

Implementation of infection control guidelines

The ICC is led by clinical staff and composed of at least one representative from each BCMCFL department. In addition to implementation, monitoring, and evaluation, the ICC regularly updates the ICG to comply with evidence-based guidelines with context-specific constraints in mind. The ICC organizes staff and patient education to improve adherence and ensure sustainability of practices. The ICC is accountable to BCMCFL management.

DISCUSSION

Development and implementation of IC guidelines are feasible in areas with high HIV and TB prevalence and limited resources. However, we recognize the fact that BCMCFL is a non-governmental organization and that there may be additional barriers to the creation and implementation of ICG unique to clinics that are entirely public/governmental. BCMCFL functions in coordination with and serves as an advisor to the Lesotho Ministry of Health (MOH). As such, there is significant overlap in how coordinated HIV-TB care is provided at BCMCFL and entirely public clinics serving a similar population. We suspect that our ability to create and implement new initiatives within our institution is less onerous than in an entirely public setting, but if accepted as a priority by MOH officials, we would speculate that barriers to the implementation of this model would be similar in the public setting. Regardless of setting, best practice guidelines are often circulated among clinicians, but are frequently not institutionalized as policy or HCW education. Infection prevention and control requires facility-wide cooperation for success, and formalizing IC guidelines is an important step towards quality improvement.

BCMCFL's resource-limited context is a challenge to ICG implementation. The implementation of strategic appointment scheduling that avoids exposing susceptible persons to TB has been particularly challenging. Ideally, certain appointment times or specific days of the week should be designated for patients who have presumptive or confirmed TB. However, the majority of BCMCFL's clients are children who often travel long distances to the clinic unaccompanied, balancing school schedules with frequent clinic visits, and relying on unpredictable public transportation. BCMCFL therefore serves patients on a first-come, first-served basis, and has not yet been able to implement this element of the ICG.

Furthermore, the creation of an airborne isolation waiting area and examination rooms and the installation of high-efficiency particulate air filtration systems require financial resources and technical expertise that are currently unavailable. BCMCFL has instead relied on natural ventilation strategies and personal protection measures, and has asked high-risk patients to wait outside the confines of the facility. BCMCFL has collaborated with MOH partners to advocate for infrastructure enhancement resources.

TB symptom screening takes place in the triage area after patient registration, ensuring that patients are screened at every encounter. If a patient screens positive, he/she receives further education regarding cough etiquette and respiratory hygiene and a paper mask; the patient's file is flagged for expedited evaluation and prompts clinical staff to wear an N-95 respirator.

To avoid further stigmatization of an already vulnerable population, patient education regarding respiratory hygiene, cough etiquette, and airborne isolation, including the need for high-risk patients to wait outside the confines of the facility, has been expanded and integrated throughout clinical care. BCMCFL staff provides daily patient education in the local language, Sesotho,

informing patients about the changes in the registration and triage processes. Patients have the opportunity ask questions to clarify the rationale and minimize any misunderstanding. Integrating this information into the clinic's standard morning announcements appears to have increased adherence to IC procedures.

Education, as supervised by the ICC, is the cornerstone of BCMCFL's IC initiative. Patient education occurs daily, as described above. As patients are evaluated in clinic no less than once every 3 months, nearly every patient will have engaged in IC education at least once after only 3 months of implementing this initiative. Staff education efforts have been conducted on a monthly basis and include didactics and skills training sessions. These sessions have been well-received, and after initial implementation, BCMCFL observed immediate changes in clinical practice, specifically with enhanced screening and triage practices that allow safer and more expeditious evaluation of symptomatic TB. The clinic now routinely monitors TB activities and screens >99% of patients for TB symptoms, with subsequent triage.

It is also worth noting that there is only one ICC responsible for general and TB-specific IC. In our experience, a single ICC has been able to adequately address issues and provide education relevant to both general and TB-specific IC. With limited staffing and resources we see this as a strength of our initiative, and if similarly adopted could improve efficiency and cost savings for clinics attempting to replicate the model. We are also now starting to explore the possibility of training and utilizing 'expert clients/peer educators' as an adjunct to the services already provided by the ICC.

Segregation of TB suspects and at-risk patients, providing masks to TB suspects, wearing an N-95 respirator while interacting with TB suspects, hand washing, and many other IC measures require minimal expertise and material resources. However, what they do require is a plan, administration committed to the plan, and targeted educational activities. Without administrative support and institutional investment, implementation of and adherence to the proposed ICG is dependent on individual HCWs. In our experience, having executive and clinical directors who undersigned and promoted the IC agenda at our clinic has created an environment of support and accountability. Furthermore, the ICC reports directly to the administration, further bolstering their authority and facilitating communication between HCWs and administration. Finally, while many IC measures can be implemented with little expertise or material resources, other measures will require infrastructural changes that are directly dependent on administrative involvement and financial investment.

It is hoped that BCMCFL's ICG can serve as a model for ambulatory clinics with similar resource constraints and patient populations. Although BCMCFL's ICG were only implemented recently, early program evaluation suggests improved general and

TB-specific IC practices. To further evaluate these effects, systematic impact assessments are planned and include observational studies of adherence to hand washing, use of masks/respirators, immunization rates, and employee TB infection rates before and after implementation of the ICG. Furthermore, as there is a paucity of pre-intervention data at BCMCFL, some of these studies will receive better testing as similar ICG are adopted across the network of Baylor Clinics in sub-Saharan Africa. The impact assessment of infection prevention and control guidelines will be critically important to inform future initiatives.

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Contexte : Une consultation pour le virus de l'immunodéficience humaine (VIH) pédiatrique bien établie au Lesotho avec des mesures de lutte initialement dirigées en priorité contre les maladies à transmission sanguine. En accord avec les recommandations internationales, les services se sont élargis pour inclure la prise en charge des patients tuberculeux. L'élaboration de directives complètes de lutte contre les infections (IC), avec un accent particulier sur la tuberculose (TB), est devenue une priorité.

Objectif : Fournir un modèle d'élaboration et de mise en œuvre de directives d'IC dans des structures de soins ambulatoires aux ressources limitées mais dans un contexte de prévalence élevée du VIH et de la TB.

Activités : Un plan d'IC, qui inclut une guidance couvrant à la fois les mesures d'IC en général et les directives spécifiques à la TB, a été

élaboré en intégrant les recommandations locales et internationales et en mettant l'accent sur l'importance des mesures administratives, du contrôle de l'environnement et des précautions spécifiques aux différentes maladies. Un comité interdisciplinaire a été établi afin de superviser sa mise en œuvre, son suivi et son évaluation.

Discussion : L'élaboration et la mise en œuvre de directives d'IC dans un contexte de ressources limitées sont faisables et devraient être une priorité dans des zones de prévalence élevée de la TB et du VIH. L'éducation devrait être la pierre angulaire de tels projets. De nombreuses interventions peuvent être mises en œuvre avec une expertise et des ressources matérielles minimales. Le soutien administratif et l'investissement des institutions sont essentiels à la pérennité d'un programme efficace d'IC.

Marco de referencia: Un consultorio reconocido de atención de la infección por el virus de la inmunodeficiencia humana (VIH) en los niños en Lesoto, cuyas medidas de control de las infecciones (IC) daban prelación a las enfermedades transmitidas por vía sanguínea. En concordancia con las recomendaciones internacionales, se ampliaron los servicios a fin de incluir el tratamiento de los pacientes con diagnóstico de tuberculosis (TB). En este contexto, la elaboración de directrices exhaustivas de IC con una atención especial en la TB se convirtió en una prioridad.

Objetivo: Aportar un modelo que facilite la elaboración y la ejecución de directrices sobre el IC en los establecimientos de atención ambulatoria cuyos recursos son limitados, en entornos con una alta prevalencia de infección por el VIH y TB.

Método: Se elaboró un plan de IC con orientaciones sobre las medidas generales de control además de las medidas específicas de la

TB, mediante la integración de las recomendaciones locales e internacionales y destacando la importancia de las medidas administrativas, los controles medioambientales y las precauciones específicas de determinadas enfermedades. Se estableció un comité interdisciplinario que supervisó la ejecución, el seguimiento y la evaluación del plan.

Conclusión: Es factible elaborar directrices sobre el IC y ponerlas en práctica en los entornos con recursos limitados. Esta iniciativa debe constituir una prioridad en las regiones con alta prevalencia de infección por el VIH y TB. La educación debe constituir la piedra angular de este tipo de iniciativas. Se pueden llevar a cabo muchas intervenciones con un mínimo de conocimientos técnicos y recursos materiales. El respaldo administrativo y la inversión institucional son elementos primordiales en la sostenibilidad de un programa eficaz de IC.