Feasibility of using teleradiology to improve tuberculosis screening and case management in a district hospital in Malawi

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Problem Malawi has one of the world’s highest rates of human immunodeficiency virus (HIV) infection (10.6%), and southern Malawi, where Thyolo district is located, bears the highest burden in the country (14.5%). Tuberculosis, common among HIV-infected people, requires radiologic diagnosis, yet Malawi has no radiologists in public service. This hinders rapid and accurate diagnosis and increases morbidity and mortality.

Approach Médecins Sans Frontières, in collaboration with Malawi’s Ministry of Health, implemented teleradiology in Thyolo district to assist clinical staff in radiologic image interpretation and diagnosis.

Local setting Thyolo district’s 600,000 inhabitants are mostly subsistence-level or migrant farmers living in extreme poverty. Health facilities include one public hospital and 38 primary health centres. Understaffing and the absence of a radiologist make the diagnosis of tuberculosis difficult in a population where this disease affects 66% of patients with HIV infection.

Relevant changes From September 2010–2011, 159 images (from 158 patients) were reviewed by teleradiology. Teleradiology changed patient management in 36 cases (23.5%). Two (1.3%) of them were cases of pulmonary tuberculosis not previously suspected by clinical staff. In addition, the radiologist’s review corrected the misdiagnosis of tuberculosis and averted inappropriate treatment in 16 patients (10.5%).

Lessons learnt Teleradiology can improve tuberculosis diagnosis and case management, especially if criteria to identify the patients most suitable for referral are developed and the radiologist is conversant with local resources and health problems. Designating a clinical focal point for teleradiology ensures sustainability. Staff need time to adapt to a new teleradiology programme.

Abstracts in 中文, Français, Русский и Español at the end of each article.

Background

Approximately 600,000 people inhabit Thyolo district in southern Malawi. Most are subsistence-level or migrant farmers who live in extreme poverty and have very little formal education. Thyolo district has one public hospital and 38 primary health centres. Although Malawi’s public health-care facilities provide care free of charge, staffing levels, particularly for higher-level clinical cadres, remain exceptionally low. The World Health Organization (WHO) recommends a ratio of 228 health professionals per 100,000 population. However, in 2010, Thyolo district had a health worker density of only 100 to 150 per 100,000 population.

Médecins Sans Frontières (MSF) has been supporting Thyolo District Hospital and other health-care facilities in the surrounding area since 1997 with a focus on the care of patients with human immunodeficiency virus (HIV) infection and tuberculosis. Malawi has one of the highest prevalences of HIV infection in the world. Approximately 10.6% of the country’s population between the ages of 15 and 49 years is HIV-positive, and the infection rate in the southern region is especially high at 14.5%. Of patients in Malawi who are HIV-positive, an estimated 66% also have tuberculosis. However, diagnosing tuberculosis in HIV-infected patients remains difficult, especially among children or patients with sputum-smear-negative or extrapulmonary tuberculosis. At Thyolo District Hospital tuberculosis detection rates fall below expected WHO estimates due to lack of diagnostic capacity, including expert X-ray interpretation.

Lack of accurate radiologic interpretation, which is common in countries of the African region, ultimately results in higher patient morbidity and mortality. In sub-Saharan Africa, 14 countries, including Malawi, do not have a single radiologist in public service. In light of staff shortages and in the absence of an in-hospital radiologist in Thyolo District Hospital, MSF implemented a teleradiology programme to improve the quality, timeliness and accessibility of tuberculosis screening among patients with or without HIV infection. The objective of the present study was to assess the feasibility of conducting such a programme in a low-resource setting. The authors describe the effect of teleradiology on diagnostic rates and patient management, with a focus on tuberculosis.

Methods

Teleradiology initiative

In September 2010, MSF implemented teleradiology in Thyolo District Hospital after the district health authority granted permission for its use and approved the credentials of the radiologist reading the images tele-transmitted for teleradiologic diagnosis. Cases were proposed for teleradiology by three expatriate physicians working at the hospital (one employed by MSF and two by Voluntary Services Overseas), none of whom was a radiologist, and by 27 Malawian clinical officers (three employed by MSF and 24 by the Ministry of Health).
The expatriate physician working with MSF was appointed as the teleradiology focal person, responsible for the final selection of cases for teleradiology referral and for the transmission of digitized radiographic images. The antiretroviral technical supervisor, one of the Malawian clinical officers, was assigned the task of digitizing the selected radiographic images. All hospital inpatients undergoing radiologic testing as part of routine medical care were eligible for teleradiology referral, irrespective of their HIV status. However, only images that clinical staff felt unable to accurately interpret were sent for teleradiology. Patients signed a medical release form authorizing tele-transmission of their X-ray images. These were sent anonymously after being assigned a unique identification number. An electronic database was created to record teleradiology request forms, digital images and summaries of patient histories.

For digitization, the antiretroviral technical supervisor placed X-rays on a standard light box and photographed them using a Sony 10.1 megapixel digital camera (settings: flash OFF, self-timer, auto-exposure, exposure compensation set manually to +1.3EV) fixed to a tripod placed 70 cm from the light box exactly perpendicular to the film (Fig. 1). Photographs were downloaded to a computer as 100–200 KB JPEG digital images. JPEG images and patient histories, which included differential diagnoses proposed by Thyolo District Hospital clinical staff, were transmitted electronically from the teleradiology focal person to a radiologist (co-author in the University of Virginia, United States of America. Information was exchanged initially via e-mail and subsequently through a web-based telemedicine service (Médecins Sans Frontières/Swinfen Charitable Trust) that allowed data uploading and downloading directly to and from a web site with e-mail notification of postings by the telemedicine service.

For interpretation, all images were optimized using Adobe Photoshop CS4 on a Macintosh computer and viewed on a 69-cm monitor (1920 × 1200 pixel display) by the radiologist. Image manipulation included conversion of colour images to greyscale, edge enhancement/sharpening and brightness and contrast controls to “window” radiographic images for optimal viewing of lungs, soft tissues and bones. A teleradiology report based on image characteristics and patient history was returned by the radiologist in the United States to the physician from MSF free of charge by e-mail or text entry on the telemedicine web site. The expatriate physician from MSF notified the clinical staff member attending to the patient that the teleradiology report was available; this staff member then presented all patient information, including the teleradiology report, at a clinical meeting where final case management decisions were reached. Ours is one of very few studies assessing teleradiology services using JPEG image formats for tuberculosis screening in routine health-care service delivery.\(^{10–13}\)

**Analysis**

We carried out a descriptive analysis of data for patients in Thyolo District Hospital whose radiologic images were referred to teleradiology between September 2010 and September 2011. We used Microsoft Excel 2003 and Stata 9.0 (Stata Corporation, College Station, USA) for data entering and analysis. Descriptive analyses included means and interquartile ranges for numerical variables, frequencies and proportions for categorical variables. Binomial and Fisher’s exact tests were used to generate 95% confidence intervals (CIs) and P-values, respectively. The data entered included patients’ routine demographic variables, the radiologist’s assessment of radiologic image quality (good or poor based on lung, soft tissue and bone visibility) and interpretability (conclusive or inconclusive for a definite diagnosis), and rate of agreement between the clinicians’ and the radiologist’s diagnoses. If the radiologist and clinical staff coincided on at least one differential diagnosis, we classified that as a diagnostic agreement. After presenting a case at the clinical meeting, the treating clinician in Thyolo District Hospital made a final treatment decision based on all available data (e.g. patient histories, clinical examinations, laboratory results and the teleradiology report). The clinician was free to base his final choice of treatment on his own clinical judgment, even if not supported by the radiologist’s diagnosis. Thus, all clinical staff worked as a team towards decision-making, and the radiologist was seen as a member of the team. We categorized final treatment decisions as being consistent with the radiologist’s diagnosis (i.e. clinical staff agreed with the diagnosis proposed by the radiologist and treated the patient accordingly) or consistent with the clinical staff’s diagnosis (i.e. the staff and the radiologist did not agree on any differential diagnosis or selected one diagnosis from several proposed by the radiologist but treated the patient in light of additional information, such as new symptoms or laboratory results not present before teleradiology referral).

Clinical patient outcomes, evaluated from 48 hours to 4 weeks after hospital admission and treatment initiation, were defined as follows: “improved after initiating treatment”; “unchanged after initiating treatment”; “death” or “transfer”. Transfers were sent to Queen Elizabeth Central Hospital, outside of Thyolo district, when tests or treatments unavailable within the district were required. We also assessed the days that transpired between the taking of the X-rays and the request for teleradiology, and between the request and the receipt of the teleradiology reading.

**Ethics**

The use and evaluation of teleradiology at Thyolo District Hospital were approved by the Ministry of Health of Malawi. The analysis was presented to MSF’s ethics review board and not considered for further ethical review, since routinely collected programme data were used.

**Results**

From September 2010 to September 2011, 159 X-ray images from 158 pa-
Patients at the Thyolo District Hospital were sent for teleradiology. The characteristics of the patients and images are listed in Table 1. Of the X-rays sent for teleradiology, 95.6% were chest radiographs, 3.8% were spine radiographs and 0.6% was not documented in the database as either chest or spine. Only four X-rays had to be repeated to improve image quality; 83.6% of the images were of good quality and 58.2% were considered conclusive for a final diagnosis based on image alone.

Overall, 70.9% of the radiologist’s diagnoses coincided with at least one diagnosis proposed by clinical staff.

Teleradiology changed the patient management initially proposed by Thyolo District Hospital clinical staff in 36 patients (23.5%); some had tuberculosis and others had other ailments (e.g., pulmonary fibrosis, cancer, chronic obstructive pulmonary disease). Two patients (1.3%) were diagnosed with pulmonary tuberculosis not suspected by clinical staff before teleradiology. Both were initiated on anti-tuberculosis treatment. In addition, the radiologist’s review corrected a misdiagnosis of tuberculosis and averted inappropriate treatment in 16 patients (10.5%).

Overall, 1.9% of the patients were lost to follow-up before treatment initiation (1 died; 1 left; 1 was transferred to Queen Elizabeth Central Hospital for further diagnostics and the final treatment received was unknown). Treatment was consistent with the diagnosis made by the radiologist in 85.3% of the patients and with the diagnosis made by the physician from MSF and by clinical staff at Thyolo District Hospital in 14.7% of the patients. In 1.9% of these patients anti-tuberculosis treatment had been initiated before the radiologist’s reading and could not be suspended because according to Malawi’s national health policy, patients on anti-tuberculosis treatment must complete the full course of therapy even if data pointing to a different diagnosis become subsequently available. Patients who had been placed on anti-tuberculosis treatment before hospital admission showed no improvement. Thus, in these cases teleradiology still proved valuable in identifying the correct ailment. Additional information became available following the radiologist’s reading for another 1.9% of patients. In 7.0% of the cases, clinical staff disagreed with the radiologist’s reading and decided on patient treatment on the

Table 1. Characteristics of patients studied and teleradiology images, Thyolo District Hospital, Malawi, 2010–2011

<table>
<thead>
<tr>
<th>Variable of interest</th>
<th>No.</th>
<th>%</th>
<th>95% CI</th>
</tr>
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<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>&lt; 15</td>
<td>22</td>
<td>13.9</td>
<td>–</td>
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<tr>
<td>15–24</td>
<td>15</td>
<td>9.5</td>
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<td>25–34</td>
<td>40</td>
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<td>35–44</td>
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<td>45–54</td>
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<td>–</td>
</tr>
<tr>
<td>55+</td>
<td>20</td>
<td>12.7</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
<td>–</td>
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<tr>
<td><strong>Sex</strong></td>
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<tr>
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<td>0.6</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
<td>–</td>
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<td><strong>HIV status</strong></td>
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<td></td>
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</tr>
<tr>
<td>HIV-infected</td>
<td>112</td>
<td>70.9</td>
<td>–</td>
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<tr>
<td>HIV-negative</td>
<td>39</td>
<td>24.7</td>
<td>–</td>
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<tr>
<td>Unknown</td>
<td>7</td>
<td>4.4</td>
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<tr>
<td><strong>Type of X-ray</strong></td>
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<tr>
<td>Chest</td>
<td>152</td>
<td>95.6</td>
<td>–</td>
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<tr>
<td>Spine</td>
<td>6</td>
<td>3.8</td>
<td>–</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>0.6</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>159</td>
<td>100.0</td>
<td>–</td>
</tr>
<tr>
<td><strong>Diagnostic agreement</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>112</td>
<td>70.9</td>
<td>63.1–77.8</td>
</tr>
<tr>
<td>No</td>
<td>46</td>
<td>29.1</td>
<td>22.2–36.9</td>
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<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
<td>–</td>
</tr>
<tr>
<td><strong>Image quality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>133</td>
<td>83.6</td>
<td>77.0–89.0</td>
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<tr>
<td>Poor</td>
<td>26</td>
<td>16.4</td>
<td>11.0–23.0</td>
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<tr>
<td>Total</td>
<td>159</td>
<td>100.0</td>
<td>–</td>
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<tr>
<td><strong>Image interpretability</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Conclusive</td>
<td>89</td>
<td>58.2</td>
<td>49.9–66.1</td>
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<tr>
<td>Inconclusive</td>
<td>64</td>
<td>41.8</td>
<td>33.9–50.1</td>
</tr>
<tr>
<td>Total</td>
<td>153</td>
<td>100.0</td>
<td>–</td>
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<tr>
<td><strong>Treatment</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Consistent with radiologist’s reading</td>
<td>133</td>
<td>85.3</td>
<td>78.7–90.4</td>
</tr>
<tr>
<td>Consistent with reading by TDH clinical staff</td>
<td>23</td>
<td>14.7</td>
<td>9.6–21.3</td>
</tr>
<tr>
<td>Total</td>
<td>156</td>
<td>100.0</td>
<td>–</td>
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<tr>
<td><strong>Patient outcome</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Improved with treatment</td>
<td>99</td>
<td>65.1</td>
<td>57.0–72.7</td>
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<tr>
<td>Unchanged with treatment</td>
<td>0</td>
<td>0.0</td>
<td>0.0–2.4</td>
</tr>
<tr>
<td>Death</td>
<td>23</td>
<td>15.1</td>
<td>9.8–21.8</td>
</tr>
<tr>
<td>Transfer</td>
<td>30</td>
<td>19.7</td>
<td>13.7–27.0</td>
</tr>
<tr>
<td>Total</td>
<td>152</td>
<td>100.0</td>
<td>–</td>
</tr>
</tbody>
</table>

CI, confidence interval; HIV, human immunodeficiency virus; TDH, Thyolo District Hospital.

* One patient presented with two distinct medical conditions on hospital admissions five months apart.
* Whether the radiologist reported at least one diagnosis also proposed by clinical staff.
* Diagnostic agreement not documented for one case.
* Whether the radiographic image alone allowed for a definitive diagnosis.
* Image interpretability not documented for six cases.
* Clinical staff agreed with the radiologist’s diagnosis.
* Clinical staff reached a diagnosis that disagreed with the radiologist’s.
* Three patients lost to follow-up before treatment initiation.
* Outcome of seven patients unknown.
Lessons from the field
Teleradiology for tuberculosis screening in Malawi

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Box 1. Summary of main lessons learnt

- Staffing shortages in sub-Saharan Africa, particularly the absence of radiologists, often result in the delayed and inaccurate diagnosis of tuberculosis, leading to improper case management and increased morbidity and mortality.
- In rural, resource-limited settings with a high rate of tuberculosis among patients infected with HIV, teleradiology can help to promptly confirm or correct diagnoses, enhance quality and equity in patient care and facilitate clinical staff training.
- To maximize the potential of teleradiology, we recommend: (i) establishing criteria to help clinical staff identify patients most likely to benefit from referral; (ii) collaborating with a radiologist who is familiar with local resources and with the most frequent health problems in the population of interest; (iii) assigning the role of teleradiology focal point to a senior clinical officer at the health-care facility; and (iv) allowing enough time for clinical staff to adapt to the new teleradiology programme.

HIV, human immunodeficiency virus.

basis of their own clinical experience with similar complex cases in Malawi. In another 3.8% of the cases, clinical staff agreed with one of the differential diagnoses proposed by the radiologist and treated the patients accordingly.

Overall, 65.1% of patients improved with treatment, 15.1% died and 19.7% were transferred to the central hospital.

The mean number of days between the X-ray and the request for teleradiology was 3.3 (interquartile range, IQR: 0–4.5). The mean number of days between the request for teleradiology and the teleradiology reading was 0.4 (IQR: 0–1).

Discussion

In our experience, teleradiology changed patient management in some cases by reducing the time to a definite diagnosis and preventing misdiagnosis. Thus, teleradiology enhanced the quality of patient care. It also served as an educational tool during clinical meetings and training sessions contributed to its acceptability.

Our analysis adds to the sparse body of literature demonstrating the feasibility of using teleradiology, which requires simple equipment, for tuberculosis screening during routine health-care service delivery in rural Africa. Our findings are consistent with those of other studies in resource-limited settings.10–12,14

Our study has several limitations. We established no specific criteria for requesting teleradiology. Clinicians selected cases for teleradiology according to their level of confidence in their own X-ray interpretation. This could have influenced the results by making consultation a function of clinician self-assurance rather than case complexity. However, the physician from MSF who was appointed as the focal point for teleradiology made the final selection of cases for referral, potentially reducing this effect.

A second limitation is that most diagnoses of tuberculosis were presumptive for lack of confirmatory non-radiologic diagnostic methods, such as sputum culture, which is unavailable in Thyolo District Hospital. However, most patients improved with treatment, which suggests that the presumptive diagnoses made after the teleradiology reading were accurate. A third limitation is that image quality could have reduced diagnostic accuracy. JPEG compression, essential for transmission with slow or unreliable internet connections, decreases image file size, which leads, in turn, to poor image quality. Notably, several studies have demonstrated that JPEGs obtained by digital photography of film radiographs using limited image compression are sufficient for diagnosis in most instances; additionally, rates of discrepancy between radiologists are the same whether teleradiology images or regular X-ray images are being interpreted.16,12,13 In our experience, most images were classified as good and conclusive. Importantly, final diagnoses and case management were not based solely on the radiologist’s report. Rather, they involved complex decision-making processes using all available data.

Lessons learnt

In summary, our findings demonstrate the feasibility and utility of teleradiology in a hospital in rural Malawi and suggest that other resource-limited settings, particularly those with a similarly high burden of patients with HIV and tuberculosis co-infection, may also benefit from this service. To inform others, we highlight several lessons we have learnt (Box 1). First, to maximize its full potential and enhance equity of care, we recommend establishing specific criteria to guide clinical staff in identifying patients most likely to benefit from teleradiology. Despite access to teleradiology, several of our patients died; this points to the need for prompt teleradiology referral by clinical staff, which would be facilitated by such criteria. Second, the collaboration of radiologists who are familiar with the resources available locally and with the health conditions seen most often in the population of interest is very important. Third, a focal point for teleradiology should be selected from among local senior clinical staff members. Finally, staff should be allowed enough time to familiarize themselves with teleradiology to improve the acceptability of the method.

Implemented judiciously, teleradiology appears to improve the diagnosis of tuberculosis, especially in settings with a high burden of HIV infection, where the increased likelihood of sputum smear-negative tuberculosis necessitates a combination of diagnostic measures that include X-rays.9

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Competing interests: None declared.
The objective of this study was to use remote radiology to improve tuberculosis screening and case management in a district hospital in Malawi.

The study was conducted at the Thyolo District Hospital in Malawi, one of the departments of the Malawi Tuberculosis Project. The hospital serves a population of approximately 600,000 people, including farmers who migrate to the city and live in extreme poverty. Health facilities include a public hospital and 38 primary health centers. In the southern region of Malawi, where Thyolo district is located, the largest burden (14.5%) of the population is infected with the human immunodeficiency virus (HIV). Tuberculosis is common among people with HIV, and the prevalence of tuberculosis is the highest in the country (10.6%). The World Health Organization and the Malawi Ministry of Health implemented a remote radiology service in Thyolo district to assist hospital staff in interpreting radiological images and establishing a diagnosis.

Changes between 2010 and 2011, 159 patients (23.5% of cases) were examined by remote radiology. Among them, 1.3% of patients were tuberculosis cases that had not been previously suspected by the clinical staff. Furthermore, remote radiology reviewed 36 patients (23.5% of cases), changing patient management. The diseases identified were pulmonary tuberculosis in 16 patients (10.5%) and inappropriate treatment in 16 patients (10.5%).

The results of the study indicate that remote radiology can improve tuberculosis screening and case management, especially in areas with limited resources and health problems. Staff members need time to adapt to the new remote radiology program.

References


Abstract

Remote radiology for tuberculosis screening in Malawi

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developés pour les patients les plus adaptés à une orientation vers des centres spécialisés, et que le radiologue connaît bien les ressources et les problèmes de santé locaux. Désigner un point de convergence clinique pour la télerradiologie assure la pérennité du projet. Le personnel a besoin de temps pour s’adapter à un nouveau programme de télerradiologie.

Резюме
Целесообразность использования телерентгенологии для совершенствования скрининга туберкулеза и ведение случаев заболевания в районной больнице в Малави

Вопрос В Республике Малави зарегистрирован один из самых высоких уровней заболеваемости вирусом иммунодефицита человека (ВИЧ) в мире (10,6%), причем наибольшее число инфицированных приходится на южную часть Малави, с расположенным там районом Тиоло (14,5%). Туберкулез, часто встречающийся у ВИЧ-инфицированных людей, требует рентгенодиагностики, однако, в государственной службе здравоохранения Малави пока нет врачей-рентгенологов. Это препятствует быстрой и точной диагностике и увеличивает заболеваемость и смертность.

Подход "Врачи без границ", в сотрудничестве с Министерством здравоохранения Малави, осуществили телерентгенологию в районе Тиоло в целях оказания помощи медицинскому персоналу в интерпретации рентгеновских изображений и диагностике.

Местные условия Шестисоттысячное население района Тиоло, в основном, состоит из ведущих натуральное хозяйство или мигрирующих крестьян, живущих в крайней нищете. Медицинские учреждения включают одну государственную больницу и 38 отделений скорой помощи. Недоукомплектованность штата и отсутствие врачей рентгенологов затрудняют диагностику туберкулеза у населения, у которого это заболевание поражает 66% ВИЧ-инфицированных пациентов.

Соответствующие изменения Начиная с сентября 2010 г. по 2011 г., с помощью телерентгенологии было изучено 159 снимков (158 пациентов). Благодаря телерентгенологии было изменено ведение пациентов в 36 случаях (23,5%). В двух случаях (1,3%) из этого числа были выявлены туберкулез легких, ранее не предполагаемый медицинским персоналом. Кроме того, благодаря проверке, проведённой врачами-рентгенологами, был исправлен ошибочный диагноз туберкулеза и предотвращено неправильное лечение у 16 пациентов (10,5%).

Извлеченные уроки Телерентгенология может улучшить диагностику туберкулеза и ведение пациентов, особенно, если разрабатываются критерии определения пациентов, наиболее подходящих для направления к врачу, и врачи-рентгенологи осведомлены о местных ресурсах и проблемах со здоровьем. Определение клинического фокуса для телерентгенологии гарантирует устойчивое развитие. Персоналу требуется время для адаптации к новой программе телерентгенологии.

Resumen
La viabilidad de las radiologías a distancia para mejorar el diagnóstico de la tuberculosis y la gestión de los casos en un hospital de distrito en Malawi

Situación Malawi presenta una de las tasas más altas (10,6%) de infección por el virus de la inmunodeficiencia humana (VIH) del mundo, y el sur de Malawi, donde se encuentra el distrito de Thyolo, es la zona más afectada del país (14,5%). La tuberculosis, muy habitual entre los infectados por el VIH, requiere un diagnóstico radiológico, pero Malawi no tiene radiólogos en su servicio público, lo que impide diagnosticar la enfermedad de manera rápida y exacta y aumenta la morbilidad y la mortalidad.

Enfoque Médecins sans Frontières, en colaboración con el Ministerio de Sanidad de Malawi, han aplicado la radiología a distancia en el distrito de Thyolo para ayudar al personal clínico en la interpretación de imágenes radiológicas y el diagnóstico.

Marco regional La mayoría de los 600 000 habitantes del distrito de Thyolo apenas pueden sustentarse o son granjeros inmigrantes que viven en la pobreza extrema. Las instalaciones sanitarias incluyen un hospital público y 38 centros de atención primaria. La escasez de personal y la ausencia de un radiólogo dificultan el diagnóstico de la tuberculosis en una población en la que dicha enfermedad afecta al 66% de los pacientes infectados por el VIH.

Cambios importantes Por medio de la radiología a distancia se examinaron 159 imágenes (provenientes de 158 pacientes) desde septiembre de 2010 a 2011. La radiología a distancia supuso un cambio en la gestión de 36 casos (23,5%). Dos de ellos (1,3%) resultaron ser casos de tuberculosis pulmonar de la que el personal clínico no había sospechado antes. Además, el examen del radiólogo corrigió el error de diagnóstico de la tuberculosis y evitó un tratamiento inadecuado en 16 pacientes (10,5%).

Lecciones aprendidas La radiología a distancia puede mejorar el diagnóstico de la tuberculosis y la gestión de los casos, en especial cuando se han desarrollado criterios para identificar a los pacientes más adecuados para derivarlos a un especialista y el radiólogo está versado en los recursos locales y los problemas sanitarios. La designación de un centro clínico de coordinación para la radiología a distancia garantiza la sostenibilidad. El personal necesita tiempo para adaptarse al programa de radiología a distancia.

References
Lessons from the field
Teleradiology for tuberculosis screening in Malawi
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