Original Article

The Use of Laypersons to Support Tuberculosis Screening at a Kenyan Referral Hospital

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Abstract

Background: The former Nyanza Province of Kenya bore the brunt of HIV-driven tuberculosis (TB); 62% of the 19,152 cases in 2010 were HIV co-infected. The use of laypersons to improve TB case finding in community settings has shown rewarding results in other countries. We have no documented Kenyan experience in health facility settings. We evaluated the benefit of using laypersons to support TB screening and referrals at the former Nyanza Province of kenya province's largest regional referral facility. **Methods:** In 2010, five high school graduates were trained on symptomatic recognition of TB suspects and assisted sputum production by the region's District's TB and Leprosy Coordinator. They then identified and referred TB suspects (from hospital patients and visitors) at waiting-areas and wards to clinicians and documented their TB screening and referral outcomes. We describe results from one waiting-area with complete documentation between January and December 2011. **Results:** Of the 217 TB suspects identified, majority were male (55%); their median age was 36 (range 1–70) years. 11% (23) were aged <15 years; 65% (15) were diagnosed with TB by, a combination of sputum microscopy and chest X-rays (5) followed by chest X-ray alone (50), then sputum microscopy alone (1), and TB score chart (4). Of those aged 15+ years, 72% (140) were diagnosed with TB by a combination of sputum microscopy and chest X-rays (75) followed by sputum microscopy alone (38), and chest X-ray alone (27). Excluding cases that transferred out, this process contributed to 33% of Jaramogi Oginga Odinga Teaching and Referral Hospital's annual TB case burden. **Conclusions:** TB case detection in high TB burden regions can be supported the use of laypersons in hospital settings.

Keywords: *Cough monitors, referrals, tuberculosis identification*

Background

Tuberculosis burden in the former Nyanza province of Kenya

Kenya, located in East Africa, is ranked 10th among 22 high tuberculosis (TB) burden countries that contribute 80% of the global TB burden.[1] Kenya, with a population of approximately 39 million had a TB case notification rate (CNR) of 264 per 100,000 in 2011. The former Nyanza province, where 14% of the Kenyan population reside, was ranked 2nd among 12 provinces in contributing to the TB case burden in 2011. The TB CNR in the province was 325 per 100,000 populations. It came second to Nairobi province, which had a TB CNR of 428 per 100,000 populations.[2,3]

Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH), (formerly the New Nyanza Provincial General Hospital) is the largest public health facility in the former Nyanza province of Kenya and is also a regional referral hospital.[4] The former Nyanza province of Kenya has 345 TB treatment sites. This large facility contributed to only 2.4% of the provincial TB case burden in 2010, and this raised concerns that additional cases may have been missed (Timothy Malika, Nyanza Province Deputy Provincial TB and Leprosy Coordinator, Personal Communication, 30th October 2012).

Active case finding

Active (Intensified) case finding is a strategy that aims to improve case finding for a particular disease among people who have not sought diagnostic services. The ability of an intensified case finding (ICF) strategy to identify the undiagnosed cases of an infectious illness early in its course, so as to prevent further infection, is of epidemiological and public health importance.[5]

Use of laypersons to support tuberculosis intensified case finding

The use of laypersons to improve active TB case detection in community settings

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through household surveys has shown rewarding results in rural Ethiopia,[6,7] Hunan, China,[8] and in slum settings in Kampala Uganda.[9]

The use of laypersons, sometimes referred to as "cough monitors" or "TB ambassadors", to support TB screening among hospital patients and visitors is on-going in some health facilities in Kenya; however, published data on the contribution of this activity to the country's TB CDR is unavailable.

Objective statement

We assessed the additional yield of using laypersons to support TB screening and referrals in a hospital setting (the JOOTRH) in a high TB burden area, beyond that which is routinely conducted by clinicians.

Methods

Study design and setting

A retrospective medical record review was conducted at the JOOTRH, the largest public health facility in the former Nyanza province of Kenya, and a referral hospital which also serves parts of the former Western and Rift Valley provinces of Kenya. It is a regional referral hospital serving 250,000 outpatients and 21,000 inpatients yearly.[4] The integrated HIV clinic at the hospital is supported by the research and public health collaboration between the Kenya Medical Research Institute and the Centers for Disease Control and Prevention (KEMRI/CDC) (Dennis Bii, Program Coordinator, HIV care and Treatment Program, HIV Implementation Sciences and Services, KEMRI, Personal communication, October 30, 2012).

Study population

All patients and visitors at the JOOTRH between January 2011 and December 2011 were eligible for inclusion in this activity.

Study procedures

In December 2010, 5 high school leavers recruited by KEMRI's community activities coordinator, the nursing officer in-charge at JOOTRH HIV clinic, and the region's District's Tuberculosis and Leprosy Coordinator (DTLC), underwent a 5-day training on symptomatic recognition of TB suspects and assisted sputum production led by the DTLC.

Lay persons

The high school leavers were recruited to be TB ambassadors through an advert which required them to be HIV negative since they would not be at risk of TB infection when working with contagious TB patients. They worked on weekdays only since these outpatient areas are not as crowded on weekends and were paid a nominal wage of $96 USD/month.

Positions for placement

Outpatient areas and wards where each ambassador was placed included; TB/HIV clinic, Laboratory and the Maternal Neonatal and Child health clinics, consultant clinic and pharmacy, and cough monitors were also placed in each of the following locations: male medical ward, female medical ward, and the pediatric ward.

Identification, referral, and tracking of tuberculosis suspects

From January 2011, they identified TB suspects from different outpatient waiting areas and wards using a syndromic approach; patients who had radiographic films were also approached and screened. TB suspects were then referred to clinicians and tracked to document TB screening and referral outcomes. The, then, National TB Care guidelines in Kenya were used to guide the clinical management of TB suspects.[10,11]

Data collection

The cough monitors collected demographic and clinical information from the TB suspects, i.e., ages, gender, types of TB diagnostics tests done and their results, whether TB was diagnosed and TB treatment initiated.

Data analysis

Patients or visitors were then identified as "TB suspects" if they answered yes to a TB syndrome screen. TB suspects aged 15 years and older were characterized as adults.

Descriptive statistics and proportions were used to summarize patient characteristics. Chi-square statistics were used to compare the proportions of TB suspects who were diagnosed with TB among the different age groups and the proportions of TB patients at the JOOTRH before and after the introduction of "laypersons".

Ethical considerations

Ethical approval to conduct this study was granted by the Kenya Medical Research Institute Ethics Review Committee (SSC. No. 1525).

Results

The total number of tuberculosis suspects identified

Between January and December 2011, 1245 suspected TB cases were identified from outpatient areas and wards at JOOTRH.

More than half of the suspected TB cases were females (n = 648; 52%) and aged 15 years or older, i.e., adults (n = 1160; 93.2%).

Results from selected areas with complete documentation of demographic and clinical data

About one-fifth of TB suspects (n = 226, 18%) were identified from selected outpatient areas (outside TB/HIV clinic, lab and OPD/MCH clinic). The median age of those with age documentation (*n* = 217) was 30 years (range 1–70 years). Among those with documented age, majority of TB suspects were male (*n* = 120; 55%) and aged 15 years or older (*n* = 194; 89%) [Table 1].

Tuberculosis diagnosis among all tuberculosis suspects (*n* = 217)

Of the TB suspects identified, the vast majority (*n* = 155; 71%) were diagnosed with TB after a clinicians review. Among all TB suspects, there was a higher proportion male TB suspects compared to female TB suspects (72% vs. 71%) and among adults compared to children (72% vs. 65%) diagnosed with TB; however, this was not statistically significant ($P > 0.05$) (data not shown)

Tuberculosis diagnosis in adults (*n* = 194)

A majority of TB suspects were male (111/194; 57%).

The most common diagnostic test utilized in adults was a combination of sputum microscopy and chest X-rays (*n* = 94; 49%) followed by sputum microscopy alone (*n* = 64; 33%), then chest X-ray alone (*n* = 30; 15%). The remaining patients (*n* = 6; 3%) did not have any diagnostic tests done.

One hundred and forty adults (72%) adults were diagnosed with TB. Proportions of adults diagnosed with TB varied by diagnostic modality used: This was 90% (*n* = 27) among patient who had Chest X-rays only, 80% (*n* = 75) for adults who had sputum microscopy and chest X-rays, 59% (*n* = 38) for adults who had sputum microscopy only and 0% (*n* = 0) for patients who had no diagnostic tests done [Table 1].

Tuberculosis diagnosis in children (*n* = 23)

A majority of TB suspects were female (14/23; 60%).

The most common diagnostic test utilized in children was chest X-rays (*n* = 7; 30%), followed by a combination of sputum microscopy and chest X-rays (*n* = 6; 26%), then sputum microscopy alone (*n* = 5; 21%) and TB score chart (*n* = 4; 17%). The remaining patient (*n* = 1; 3%) did not have any diagnostic tests done.

Fifteen of the twenty-three children (65%) were diagnosed with TB. Among children who had a score chart used for TB diagnosis, all (*n* = 4; 100%) were diagnosed with TB. This was 83% (*n* = 5) for children who had sputum microscopy and chest X-rays done, 71% (*n* = 5) among children who had Chest X-rays only, 20% (*n* = 1) for children with sputum microscopy, and 0% (*n* = 0) for the child who had no diagnostic tests done [Table 1].

Contribution of laypersons to the hospital's Annual tuberculosis burden

Excluding patients who transferred out to other TB clinics, 155 of 465 cases (33%) at the JOOTRH in 2011 were initially identified by cough monitors from selected outpatient areas.[3] (Data not shown).

Comparing the annual tuberculosis Burden in Kenya, the former Nyanza province and Jaramogi Oginga Odinga Teaching and Referral Hospital in 2010 and 2011

Kenya' TB burden in 2010 was 106,083 and in 2011, the TB burden was 103,981. Similarly, there was a decrease in Nyanza province's TB burden from 19,152 in 2010 to 18,327 in 2011.[3]

JOOTRH's TB burden in 2010 was a total of 590 (half were female) and similarly in 2011, the TB burden was 463 (with 56% were female cases). About 12% were children for both 2010 and 2011. The contribution of JOOTRH to the provincial TB case burden in 2010 and 2011 was 3.0% and 2.5%, respectively [Table 2]. In addition, the proportion of TB patients who had a sputum microscopy done increased from 48% to 55% and the proportion of patients with TB who had microbiologic diagnosis increased from 38% to 40% between 2010 and 2011.[3] (Data not shown).

Discussion

Our evaluation revealed that laypersons contributed to one-third of the TB cases diagnosed at JOOTRH that year. This proportion was much higher than that observed in Nigeria which had a diagnostic rate of 4%–24%[12] and lower than that observed in Tanzania (38%–70%).[13] The varied contribution of lay workers in Nigeria was attributed to the type of training the TB monitors had undergone and their motivation for performing the referrals.[12] It is possible that cough monitors at JOOTRH, whose remuneration was fixed, may have also received more comprehensive training. In Tanzania, traditional healers and pharmacist were trained in identification of TB suspects; in addition, sputum fixers were also trained and placed in the communities, and this may have contributed to this higher rates.[13]

The low diagnostic yield among adult TB suspects who had only sputum microscopy done could be attributed to the low sensitivity of sputum microscopy. It is possible that the use of more sensitive diagnostic tests may have resulted in a higher TB diagnostic rate.[14] The TB Score chart had the highest diagnostic yield in children since it is comprised of a number of signs and symptoms and laboratory and radiological investigations which may have improved its yield. Sputum microscopy had the lowest diagnostic yield (20%) due to difficulties in expectoration of quality sputum in children and children most often have paucibacillary disease.[11,15]

If we look the national, provincial, and JOOTRH's TB case load in 2010 and 2011, we notice a decrease of approximately 3000 cases in the country's TB burden, a decrease of close to 1000 cases in the provincial TB case burden and a decrease of approximately 100 cases in the hospital's TB

Table 1: Characteristics of tuberculosis suspects identified from one outpatient area at the Jaramogi Oginga Odinga teaching and referral hospital, 2011

Participant characteristics	Total (*n*=217), *n* (%)	Diagnosed with TB after a clinical consultation (*n*=155; 71%), *n* (%)	Not diagnosed with TB after a clinical consultation (*n*=62; 29%), *n* (%)
Age (years)			
<15	23 (11)	15 (65)	8 (35)
15+	194 (89)	140 (72)	54 (29)
Gender			
Male	120 (55)	86 (72)	34 (28)
Female	97 (45)	69 (71)	28 (29)
TB diagnostic modality used			
Adults	194	140	54
Chest X-ray only	30 (15)	27 (90)	3 (10)
Chest X-ray and sputum smear microscopy	94 (49)	75 (80)	19 (20)
Sputum smear microscopy only	64 (33)	38 (59)	26 (41)
None	6 (3)	0	6 (100)
Children	23	15	8
Tb score chart	4 (17)	4 (100)	0
Chest X-ray and sputum smear microscopy	6 (26)	5 (83)	1 (17)
Chest X-ray only	7 (30)	5 (71)	2 (29)
Sputum smear microscopy only	5 (21)	1 (20)	4 (80)
None	1 (4)	0	1 (100)

TB=Tuberculosis

Table 2: TB case load in Kenya, 2010 and 2011

	Number of TB cases*	
	2010	2011
Kenya	106,083	103,981
Nyanza province	19,152	18,327
JOOTRH	590	463

JOOTRH=Jaramogi Oginga Odinga Teaching and Referral Hospital, TB=Tuberculosis

burden before and after the introduction of TB ambassadors. In a climate of declining TB CDR in the country and the region/province, detecting the reported number of cases in NNPGH 2010 and 2011 could probably indicate a higher yield. It is not clear whether a similar number of cases would have been detected in the absence lay cough monitors.[3] Similar results have been observed with community health workers in Tanzania where there was an increase in the overall TB detection rate but not the TB incidence.[16] This could be attributed to the absence of modification to the TB diagnostic processes. The use of laypersons to improve TB screening and referrals also enhanced the identification, screening, and diagnostic evaluation of TB suspects within the facility; a higher proportion of patients had a sputum microcopy done after the introduction of laypersons. Similar results have been among health workers in Edendale hospital in KwaZulu Natal (Dr. Kong, iTeach program, Personal communication, 7th May 2016).

Limitations

There were a few limitations. It was difficult to assess the additional benefit of using laypersons to augment TB ICF because the data collected from other outpatient areas and wards were incomplete so the contribution of layperson to the TB case burden in 2011 may have been higher if this was considered. The data presented did not categorize TB suspects as either patients or hospital visitors. Patients who were identified by cough monitors as suspected TB cases had presented to the hospital for a consultation and would have still undergone ICF in the hands of a clinician.

Conclusions

However, from the results shown, we can conclude that laypersons with training can successfully identify persons needing TB screening and possibly treatment. The contribution by laypersons to support TB case detection rate (CDR) (33% of the CDR in 2011) illustrates that this process supports TB CDR in high TB burden regions.

Recommendations

To address the limitations and more fully assess the role of lay persons on TB CDR by the facility, the input of other outpatient areas and wards should be quantified, and the data should be segregated by the status of hospital patients or hospital visitor.

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Conflicts of interest

There are no conflicts of interest.

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