

**NOTES FROM THE FIELD****Implementation of an active, clinic-based child tuberculosis contact management strategy in western Kenya**D. Szkwarko,^{1,2,3} P. Owiti,^{3,4} N. Buziba,⁵ C. Bigelow,⁶ C. B. Eaton,^{2,7} E. J. Carter^{3,8}<http://dx.doi.org/10.5588/pha.17.0119>

Tuberculosis (TB) is a leading cause of childhood mortality. Isoniazid preventive therapy significantly reduces progression to TB disease. The World Health Organization recommends that high TB burden countries conduct child contact management (CCM) to identify exposed child contacts aged <5 years for screening and appropriate treatment. An active, clinic-based CCM strategy incorporating transport/screening reimbursement, monitoring and evaluation tools, and health care worker education was implemented in western Kenya. Among 169 identified child contacts aged <5 years, 146 (86%) underwent successful screening, of whom 43 (29%) were diagnosed with active TB. We describe our CCM strategy and its potential for enhancing screening and treatment efforts.

Childhood tuberculosis (TB) is a major cause of morbidity and mortality worldwide.¹ Isoniazid preventive therapy (IPT) prevents TB disease progression.² The World Health Organization recommends child contact management (CCM) including: 1) identifying TB-exposed child contacts (CCs) aged <5 years, 2) screening/evaluating for active TB disease, 3) initiating either IPT or TB disease treatment, and 4) ensuring completion of therapy.³

Kenya is among 14 countries with the highest burden of TB, multidrug-resistant TB, and TB and human immunodeficiency virus (HIV) co-infection.⁴ In 2016, only 14% of eligible CCs aged <5 years initiated IPT in Kenya.⁵ Most CCM in high-burden countries is passive. Health care workers (HCWs) extend verbal invitations to bring CCs for screening, but there are few tracking tools or support to eliminate financial barriers. Active strategies are thus needed to translate CCM recommendations into practice,³ including clinic-based strategies and community-based strategies to link contacts to care.

AN ACTIVE, CLINIC-BASED CHILD CONTACT MANAGEMENT STRATEGY

At the USAID/AMPATH (United States Agency for International Development/Academic Model Providing Access to Healthcare) Partnership at Moi Teaching and Referral Hospital (MTRH) in Eldoret, Kenya, approximately 250 bacteriologically confirmed TB index cases (ICs) are registered annually. At the MTRH TB clinic, a child contact register has

been in place since 2011 to identify household CCs, but screening rates have remained at <1%.⁶

With support from the Stop TB Partnership TB Reach Initiative-Wave 2, we implemented an active clinic-based CCM screening strategy in 2012 which incorporated three components: transport/health care cost reimbursement, monitoring and evaluation (M&E) tools, and HCW education (Figure).

Transport/health care cost reimbursement

CCM costs were previously approximately US\$5/CC for transport/health care fees. Our strategy included a voucher system, which provided reimbursements for clinic registration, chest X-ray (CXR; paid directly to the hospital), and commensurate transport (for the initial evaluation of the IC and CC).

Monitoring & evaluation tools

Our CCM strategy introduced two tools:⁶ 1) a revised, more concise, table-format paper child contact register to record CC information for each bacteriologically confirmed IC, which includes the ICs' report of CCs' symptoms (cough, fever, night sweats, poor weight gain); and 2) a contact tracing form that is completed for each CC at screening, documenting symptoms, physical examination, diagnostic tests performed, clinical decision, and treatment initiation.

Health care workers education

HCWs previously had little experience/knowledge regarding IPT in children. HCWs were trained via a one-time, lecture-based didactics session by TB REACH team members. Topics included CCM importance, IPT effectiveness, and CCM M&E. Cough monitors are lay individuals trained to conduct case finding throughout AMPATH/MTRH. One cough monitor was assigned as the 'CCM champion', assisting MTRH TB Clinic HCWs to ask all ICs about CCs, screen them, and complete the child contact register and contact tracing forms.

Strategy design

HCWs interviewed bacteriologically confirmed ICs early in their treatment course and recorded all CCs aged <15 years in the child contact register. All CC aged <5 years and any symptomatic CCs aged 5–15 years were advised to visit the clinic for screening. Once the CCs returned for screening/evaluation, active TB was diagnosed using the Kenyan National TB Program (NTP) scoring system.⁷

Following screening/evaluation, CCs were registered in the NTP registers, either for active TB treat-

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ment or IPT. Treatment followed national guidelines. Routinely collected data during the 15-month period immediately following strategy implementation were de-identified and entered into Microsoft Excel (Microsoft Corp, Redmond, WA, USA). Statistical analysis was performed using Stata v 14 (Stata Corp, College Station, TX, USA).

Ethical approval

Collection of de-identified data for program review and dissemination was approved by the MTRH Institutional Research and Ethics Committee (Eldoret, Kenya) and the Institutional Review Boards of Lifespan Health System, Providence, RI, USA, and the University of Massachusetts (Worcester, MA, USA).

RESULTS

Between April 2012 and June 2013, 169 CCs aged <5 years were identified: 85 (50%) were female, 120/126 (95%) were reported by the IC to be HIV-negative, and

50 of 140 children (30%) were reported by the IC to have TB symptoms (Table).

Of 169 CCs aged < 5 years, 146 (86%) were brought to the clinic for screening. Of 121 CCs queried, 49 reported TB symptoms at both the HCW interview and screening. In bivariate analyses, compared to CCs who were not screened, screened CCs were more likely to have been reported as symptomatic by ICs during the HCW interview ($P = 0.003$). Of 146 CCs screened, 43 (29%) were diagnosed with active TB disease. Among the 103 IPT-eligible CCs, 92 (89%) were documented as having initiated IPT.

DISCUSSION

Pre-strategy, <1% of TB-exposed CCs were brought in for screening,⁶ while post-strategy, 86% of CCs aged <5 years identified were screened. This suggests that an active clinic-based strategy addressing challenges such as transport/health care costs, lack of M&E tools,

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Stop TB Partnership TB REACH
TB Care and Projects Office—AMPATH

Do you have smear positive tuberculosis?

Keep your children HEALTHY!!!

TB is spread through the air & children under 5 are at great risk to get sick once exposed to TB!

If your child is <5 and you are smear positive:

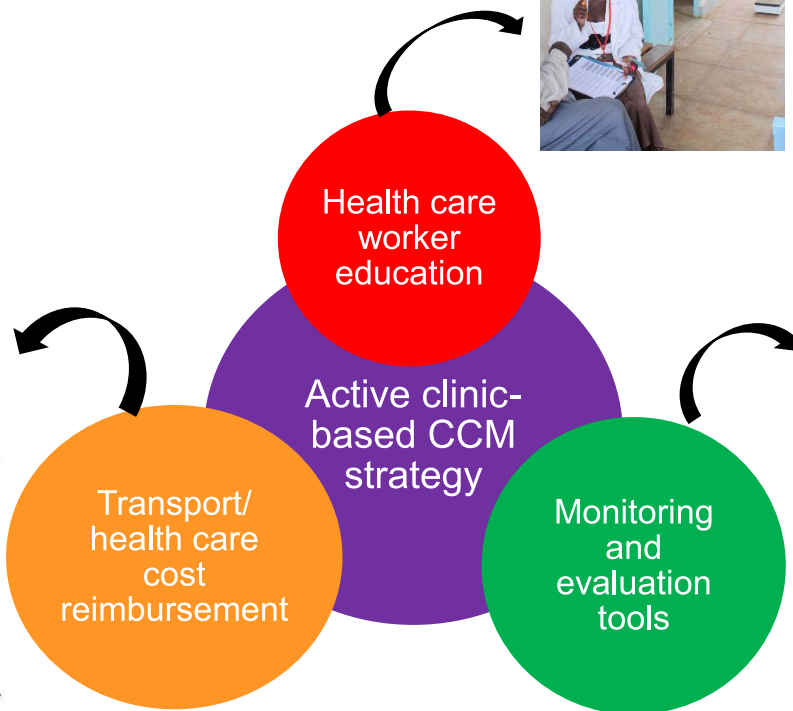
- 1) Bring your treatment card to the MTRH TB Clinic
- 2) Bring your child
- 3) Bring THIS FLYER

You will receive the following:

- Transport money for you and your child to and from the clinic
- Free hospital registration
- Free chest x-ray for your child
- Free examination for your child

If your child has TB, treatment is free!

If your child does not have TB, he/she may be eligible for prevention medication



Pediatric TB Contact Tracing Form

Stop TB Partnership TB REACH
TB Care and Projects Office—AMPATH

Date: / / CHILD'S unique No. AMPATH No. AMPATH No.

Name of Child: Name of Parent/Guardian:

Date of Birth: / / Age: yrs mos Sex: See 2b/4b of Form

Physical Address: Nearest landmark: Contact Phone: (AMPATH, Local, Other)

Mother's HIV status: (Pos, Neg, Don't Know) Child's HIV status: (Pos, Neg, HIV exposed, status indeterminate, Don't Know)

Source Case: (Mother, Sister, Other household member, Other) Source TB ID: Source Clinic:

Does child sleep in the same room as source case? (Yes/No) Source Name:

Vitals: Wt: kg Temp: °C PR: /min RR: /min SpO₂: % Ht: cm

Symptoms screen

-Cough ≥2 weeks Y N NR -No night fever &/or night sweats ≥2 weeks Y N NR

-Weight loss/ poor weight gain Y N NR -Hctgm, reduced playfulness, loss appetite Y N NR

-Other(s):

Clinical exam

-Respiratory signs: Tachypnea Y N NR -Other signs of respiratory distress

-Auscultation: breath sounds reduced/ crackles Y N NR -No rales/ crackles/ wheezes/ rhonchi/ reduced/ breath sounds

-Lymphadenopathy: Y N NR NR NR NR -CNS symptoms: Y N NR NR

-Swollen abdomen/axillae: Y N NR -Swollen joints: Y N NR NR

-Other oral signs: Y N NR -Other(s):

Investigations

-CXR (no cost for review) (routine) suggestive non suggestive none noted (noting)

-Sputum collected for AFB: Y N (Results: none smear smear culture)

-IGRA (no cost for review) (routine) suggestive non suggestive none noted (noting)

-Other (IGRA, GeneXpert, etc.)

Clinical decision

-Active TB disease -> Notify a referral

-Not active TB -> Initiate IPT (with 2mg/kg)

-> Date of IPT (month/year):

-Refer for further assessment/initialise

Referral to clinic: Name: Month: Date: / /

Clinician: provider #: Number: provider #

Version 2.0 (Rev 1.0) 1/2012

FIGURE An active clinic-based child contact management (CCM) strategy.

TABLE Characteristics of child contacts aged <5 years, Moi Teaching and Referral Hospital Eldoret, Kenya, 2012–2013

	Total N	Child screened n (%)	OR (95%CI)	P value
Total	169	146 (86)		
Child contact characteristics				
Sex				
Female	85	75 (88.2)	1.4 (0.6–3.3)	0.48
Male	84	71 (84.5)	Reference	
Age, years				
0	20	17 (85.0)	Reference	0.63
1	37	34 (91.9)	2.0 (0.4–11.3)	
2	23	18 (78.3)	0.6 (0.1–3.2)	
3	44	39 (88.6)	1.4 (0.3–6.5)	
4	45	38 (84.4)	1.0 (0.2–4.2)	
HIV status				
Positive	6	6 (100)	*	0.54
Negative	120	108 (90.0)	Reference	
No data available	43			
Reported TB symptoms at HCW interview				
Yes	50	49 (98)	12.3 (1.6–94.8)	0.003†
No	90	72 (80)	Reference	
No data available	29			

*Relative odds is infinite.

†Statistically significant.

OR = odds ratio; CI = confidence interval; HIV = human immunodeficiency virus; TB = tuberculosis; HCW = health care worker.

and HCW knowledge gaps may be an effective method in improving CC screening within the CCM cascade in similar settings. These challenges are consistent with those identified in a recent systematic review.³ The high number of diagnosed TB cases is likely explained by the Kenya NTP's recommended clinical diagnostic criteria for pediatric TB, which aim to treat all potential TB cases rather than miss opportunities.

The strategy was expanded to 14 AMPATH sites in 2013, and is currently extended through TB REACH Wave 5 (Fikia Project Centre for Health Solutions) to 100 facilities across the country with NTP support. The transport/health care reimbursement has evolved: 1) the use of mobile banking platforms is being trialed; 2) clinical care for children aged <5 years is now free unless a CXR is performed at a private facility; and 3) transport reimbursement is only provided to ICs who truly cannot afford to bring CCs in without initial support.

A major limitation of the study is our lack of completion outcomes. IPT registers had just been introduced at the time of our intervention, and documentation was unreliable. IPT completion analysis after strategy expansion is underway.

NTPs worldwide are also implementing active community-based strategies to improve CCM.⁸ Although household visits permit direct verification of a child's residence, CCs often still require facility-based screening (physical examination or CXR), so transport/health care cost barriers are not eliminated. Going forward, a potential, cost-effective solution is a combination of clin-

ic-based, facilitated transport for initial evaluation, with community home visits targeting CCs who are not brought in by facilitated invitation. Full (100%) CCM cascade completion may best be attained by combined, targeted approaches for our most vulnerable patients.

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La tuberculose (TB) est une cause majeure de mortalité des enfants. Le traitement préventif par isoniazide réduit significativement la progression vers la TB maladie. L'Organisation Mondiale de la Santé recommande aux pays durement frappés par la TB de réaliser une prise en charge des enfants contacts (CCM) afin d'identifier les enfants contacts âgés de <5 ans exposés en vue d'un dépistage et d'un traitement appropriés. Une stratégie active de CCM basée sur la

clinique incorporant le transport/le remboursement du dépistage, les outils de suivi et évaluation et l'éducation du personnel de santé a été mise en œuvre dans l'Ouest du Kenya. Sur 169 enfants contacts identifiés âgés de <5 ans, 146 (86%) ont eu un dépistage réussi, dont 43 (29%) ont eu un diagnostic de TB active. Nous décrivons notre stratégie de CCM et son potentiel d'amélioration des efforts de dépistage et de traitement.

La tuberculosis (TB) es una causa mayor de mortalidad en la niñez. El tratamiento preventivo con isoniazida disminuye de manera considerable la progresión hacia la enfermedad activa. La Organización Mundial de la Salud recomienda a los países con alta carga de morbilidad por TB que practiquen la gestión de los contactos pediátricos (CCM), con el fin de reconocer a los niños menores de 5 años de edad expuestos, realizar la detección de la TB y ofrecer el tratamiento apropiado. En Kenya occidental se introdujo en

los consultorios una estrategia activa de gestión de los contactos pediátricos, que comportaba el reembolso de los gastos de transporte y detección, instrumentos de supervisión y evaluación y educación de los profesionales de salud. De los 169 contactos pediátricos menores de 5 años de edad encontrados, se practicó una detección adecuada en 146 (86%) y se diagnosticó TB activa en 43 (29%). En el presente artículo se describe la estrategia CCM y se analiza su capacidad para fortalecer los esfuerzos de detección sistemática y tratamiento.