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Early View

Research letter

Impact of radiographic screening of more than 34000 asylum seeker children

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Impact of radiographic screening of more than 34 000 asylum seeker children

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Take home message:

Radiographic screening of >34 000 asylum seeker children in the Netherlands shows that, after introducing universal screening for latent TB infection, only children ≥ 12 years old from certain high-endemic countries require a chest X-ray upon entry.

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To the Editor:

Europe is facing a refugee crisis in which hundreds of thousands of displaced persons, often originating from tuberculosis (TB) high-endemic countries, risked their lives for a safer and better future in the European Union (EU) [1]. Among these asylum seekers a

considerable proportion were accompanied or unaccompanied minors [2,3]. Screening practices for TB and latent TB infection (LTBI) among refugees are highly variable in the EU [4,5]. Details of practices, including mandatory radiographic screening for intrathoracic TB among children of all ages, and aggregate yield of TB entry screening among asylum seekers in the Netherlands from 2012 to September 2015 have been described [1,6]. Entry screening for LTBI was not routine. We present the results of radiographic TB screening among >34 000 asylum seeker children in the Netherlands 2013-2017 (age groups suggested by the authors) and discuss options for policy changes.

In the Netherlands, asylum seekers must apply at the national reception centre in the province of Groningen. Mandatory radiographic screening for TB (since the 1960's for all immigrants from high-endemic countries) is performed and read on the second day after arrival [1]. If relevant chest X-ray (CXR) abnormalities are discovered (suggestive of active TB, suggestive other active pathology, or suggestive of a previous episode of TB), medical follow-up is initiated, consisting of a standardised questionnaire through telephone translators, on indication (induced) sputum collection for bacteriology or, after consultation with a paediatrician, a tuberculin skin test (TST) and/or interferon gamma release assay (IGRA) for additional information [1].

Between 2013-2017, a total of 34 157 minor asylum seekers (based on their self-reported date of birth) were screened for intrathoracic TB (age group 0-4 years: 7 402; 5-11 years: 14 192; 12-17 years 12 563). The most common countries of origin were Syria (11 651 children), Eritrea (7 275 children), Somalia (3 419 children), Afghanistan (1 937children) and Iraq (1 694 children). For 684 children (2,0%), as a consequence of

the result of the CXR, the questionnaire was taken. From 81 children sputum could be collected and in 15 of these children *Mycobacterium tuberculosis* complex was cultured. Age-specific data are presented in Table 1. TB was diagnosed in 21 children: 15 older children (≥12 years; 10 from Eritrea, 3 from Somalia, 1 from Kazakhstan and 1 from Chad) with culture-confirmed (predominantly) pulmonary TB, 2 older children (from Somalia and Eritrea) with hilar or mediastinal lymph node TB, 2 older children (≥12 years; from Somalia and Eritrea) with pleural TB, and 2 younger children (<12 years old; both from Somalia) with primary TB. The empirical intrathoracic extrapulmonary TB diagnoses were based on a combination of radiographic, clinical and IGRA findings.

TB was not diagnosed among children <5, and only two cases were found among 14 192 children aged 5-11 years. All children with pulmonary TB were ≥12 years, all but two originating from countries with a World Health Organization (WHO) estimated (or suspected - based upon entry screening prevalence) TB incidence rate of ≥200 cases per 100 000 population. The TB prevalence rate for children ≥12 years was 151 cases per 100 000 screened.

In 2018, beyond the scope of this report, TB was diagnosed among 30 of 495 unaccompanied minor asylum seekers from Eritrea, upon or shortly after arriving in the Netherlands (prevalence rate 6 061 TB cases per 100 000 children), after spending many months in poor and overcrowded conditions in Libya. Because intense TB transmission in Libya was suspected, attempts were made to examine all other 465 unaccompanied minors from Eritrea with TST, followed by IGRA when positive (TST≥ 5mm), to prevent progression to active TB in more children, most likely occurring

within the first two years after entry, through prophylactic treatment, Results are being compiled for analysis.

Based on the results of our study it seems opportune to adjust recent Dutch guidelines, introducing LTBI screening for asylum seekers <18 years [7], and make TB screening for intrathoracic TB among children in the Netherlands more efficient and effective, by limiting radiographic screening to children between 12-17 years old, coming from countries with an estimated TB incidence rate of >100 cases per 100 000 population (Table 1). The Dutch definition for a TB risk group among asylum seekers is an estimated TB incidence rate of more than 50 cases per 100 000 population in the country of origin, or a number needed to screen (NNS) to find one patient of less than 2 000 individuals. Only children aged 12-17 years old met these criteria with an NNS of 1 068 and 368 (coming from countries with a TB incidence rate of 100-199 and ≥200 per 100 000 population respectively).

The Netherlands lacks robust data of LTBI entry screening among asylum seeker children but LTBI prevalences have been reported in Sweden of 6.8% and 26-32% in a cohort of unaccompanied minors from Afghanistan and the Horn of Africa (Eritrea, Somalia, Ethiopia) respectively and in Germany of 6.8% in a cohort of asylum seeker children, similar for children originating from high- or low-TB incidence countries [2,3]. This makes LTBI screening opportune of all asylum seeker children from countries with a TB incidence rate of more than 50 per 100 000, irrespective of age group, with a TST and IGRA validation when positive (TST≥ 5mm). In addition, only children 12-17 years old, coming from countries with a TB incidence rate of ≥100 per 100 000 population, require radiographic screening upon entry as active TB screening.

The optimal algorithm for such LTBI screening procedure deserves further thoughts [8]. Screening at the national reception centre is logistically difficult, due to limited time of residence (4 days) before people are transferred to residential centres, restricting the use of triage with TST and IGRA validation of TST results ≥5mm. Apart from difficulties in obtaining blood for the IGRA, especially in very young children, test results must be forwarded to the Public Health TB Clinic nearest to the residential asylum seekers centre where the children have been transferred, with possible discontinuity of care. Conceptually, by testing at the reception centre, very recent infections (<2 months) might be missed. Testing the children in their residential centres 2 months after arrival also requires an administrative system informing the Public Health TB Clinic in their residential area of inviting these children for testing. Since children ≥12 years, originating from countries with an estimated TB incidence rate of ≥100 TB cases per 100,000 population are screened by CXR upon arrival, the risk seems minimal that cases of active TB, especially infectious pulmonary TB, will be missed in these first two months, as these events are rare. Children <12 years old with an undetected, often asymptomatic [5], extrapulmonary intrathoracic TB upon entry might be diagnosed quickly when their TST is ≥5mm, requiring CXR examination, although TST might be false-negative in cases of active TB.

We expect that annually, thousands of children must be examined for LTBI, with several hundred children requiring preventive treatment, often well tolerated. The Dutch Public Health TB Clinics network can absorb these numbers. Financial obstructions for clients should be marginal as in the Netherlands health care for children is free. Even when asylum is denied, children often stay in the Netherlands for many years.

We endorse the new Dutch screening procedure for asylum seekers <18 years old, introducing testing for LTBI, in (young) children often representing recent infections with a higher risk of progression to active disease [2,9]. This benefits children and TB control, but we suggest limiting radiographic screening to children ≥12 years from high-incidence countries (≥100 TB cases per 100 000 population).

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TABLE 1 Number and results of asylum seeker children screening upon arrival in the Netherlands, 2013-2017.										
Age (years)	**Number of children screened**	**Number of questionnaires taken/ total number of children per age group (%)**	**Number of positive/total number of TST[#] (%)**	**Number of positive/total number of IGRA[¶] tests (%)**	**Number of positive/total number of sputum cultures for *Mycobacterium tuberculosis* (%)**	**Number of intrathoracic TB cases (prevalence rate per 100 000 screened)**	**Number needed to screen (NNS[+]) related to TB incidence rate in country of origin**			
							TB incidence/100 000			
							<50	50-99	100-199	>200
0-4	7 402	81 (1,1)	4/41 (9,8)	0/1 (0)	0/0 (0)	0 (0)	n.a.*	n.a.	n.a.	n.a.
5-11	14 192	132 (0,9)	4/28 (14,3)	2/2 (100)	0/19 (0)	2 (14)	n.a.	n.a.	n.a.	2250
12-17	12 563	471 (3,7)	13/15 (86,6)	4/6 (66,7)	15/62 (24,2)	19 (151)	n.a.	n.a.	1068	368
Total <18	34 157	684 (2,0)	21/84 (25,0)	6/9 (66,7)	15/81 (18,5)	21 (61)				

[#]: Tuberculin Skin Test (Mantoux test); [¶]: Interferon Gamma Release Assay (the discrepancy between 9 known IGRA results and 21 positive TST results can be due to referral or transfer-out, bacteriological results known before IGRA was planned, or no IGRA performed in BCG-vaccinated asymptomatic children with marginal TST results but chest-X-ray repeated after 4-6 weeks); [+]: Number Needed to Screen (number of individuals screened with a chest X-ray to find one TB case); *: Not applicable