1 Appendix D: Evidence Tables – Infection Control (RQs AA to DD)

A.1 RQs AA and BB – Infection control in congregate settings.

A.1.1 Behrman and Schofer, 1998

Bibliographic reference	Tuberculosis exposure and control in an urban emergency department. Ann Emerg Med 1998, 313(3); 370-375
Study type	Prospective interventional cohort study
Study quality	The method of allocation to treatment groups was unrelated to potential confounding factors? *yes* Attempts were made within the design or analysis to balance the comparison groups for potential confounders *yes* The groups were comparable at baseline, including all major confounding and prognostic factors *yes* The comparison groups received the same care apart from the intervention(s) studied *n/a* Participants receiving care were kept 'blind' to treatment allocation *unclear* All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *yes* How many participants did not complete treatment in each group? The groups were comparable for treatment completion *unclear* For how many participants in each group were no outcome data available? The groups were comparable with respect to the availability of outcome data *unclear* The study had an appropriate length of follow up *yes* The study used a precise definition of outcome *yes* A valid and reliable method was used to determine the outcome *yes* Investigators were kept 'blind' to participant's exposure to the intervention *unclear* Investigators were kept 'blind' to other important confounding and prognostic factors *unclear*
Number of patients	Cycle 1 = 5,697 (5,609 OHEs and 88 ED staff) Cycle 2 = 4,346 (4,266 OHEs and 80 ED staff)

Bibliographic reference	Tuberculosis exposure and control in an urban emergency department. Ann Emerg Med 1998, 313(3); 370-375
	Cycle 3 = 3,064 (3,000 OHEs and 64 ED staff)
Participant characteristics	

Risk Factor	ED Staff No (%)	OHEs No (%)
BCG History		
Yes	5(5.1)	562(10.3)
No	93(94.9)	4,915(89.7)
Ethnicity		
White	80(61.5)	4,411(61.5)
Black	46(35.4)	2,252(31.2)
Asian America	3(2.3)	445(6.2)
Hispanic American	1(0.8)	98(1.4)
Native American	0(0)	7(0.1)
Residence		
Low TB prevalence	66 (50.8)	3,833(50)
High TB prevalence	64 (49.2)	3,837 (50)
Country of Birth		
US	74 (97.4)	3,912(89.8)
Other	2 (2.6)	443(10.2)
Age	37.1±1.2	37±2
Length of Employment (yrs)	6.5 ±0.8	7.2±1

Bibliographic reference	Tuberculosis exposure and control in an urban emergency department. Ann Emerg Med 1998, 313(3); 370-375
	Inclusion: • All employees on the hospital were required to participate *Exclusion:* • Attending physicians were not included because complete data were not available for the OHE cohort • All ED staff including physicians were ruled out for active TB Participants Lost to Cycle 2: 8.5% of HCWs who left the hospital due to resignation, termination, or residency completion. Also could not be measured for the 18% of employees whose test results were already positive, nor for new employees and other employees without prior documented negative PPD results. *Other* TB evaluations were conducted by Occupational Medicine, a division of the Department of Emergency Medicine. City and county of Philadelphia had a 22.1/100,000 TB incidence at the beginning of the study; the number of new cases in Philadelphia decreased by 19% in 1996.
Intervention	New ED facility engineer modifications: 4 respiratory isolation rooms meeting CDC standards, 100% non-recirculated air in trauma area, improved ventilation with at least 25% fresh air in the ED area, laminar flow of air from registrars to patients, and acrylic plastic (Plexigas) droplet shields for registrars. Screen with standard intradermal dose of 5 tuberculin units of PPD, questioned about pulmonary and systemic symptoms of TB and surveyed for occupational and non- occupational risk factors for exposure Employees with and induration of 5mm or more at the site 48 to 72 hrs later or those who refused PPD placement received baseline chest radiograph and medical evaluation.
Approach to Analysis	Use of X^2 test for categorical data and Student's t test for continuous data. Use of Bonferoni adjustment for multiple comparisons; significance was defined as P< 0.008. Relative risks with 95% confidence interval were calculated.
Location	Department of Emergency Medicine. University of Pennsylvania Medical Center, Philadelphia, PA
Outcomes measures and effect size	(per protocol) Engineering: isolation rooms, etc.; effectiveness of new TB control measures

Bibliographic reference	Tuberculosis exposure and control in an urban emergency department. Ann Emerg Med 1998, 313(3); 370-375
Source of funding	None mentioned
Comments	PPD $^{+}$ status was defined as PPD induration of 10mmm or more and PPD^{-} was defined as an induration less than 5mm.
Abbreviations: BCG = bacilli Calmette-Gúerin vaccination, CDC = Center for Disease Control and Prevention, ED = all employees in the **e**mergency **d**epartment except physicians, OHE = other hospital employee, PPD = purified protein derivative, TB = tuberculosis.	

A.1.2 Behrman and Shofer 1998

Bibliographic reference	Tuberculosis exposure and control in an urban emergency department. Ann Emerg Med 1998, 313(3); 370-375
Study type	Prospective interventional cohort study
Study quality	The method of allocation to treatment groups was unrelated to potential confounding factors? *n/a* Attempts were made within the design or analysis to balance the comparison groups for potential confounders *n/a* The groups were comparable at baseline, including all major confounding and prognostic factors *yes* The comparison groups received the same care apart from the intervention(s) studied *n/a* Participants receiving care were kept 'blind' to treatment allocation *unclear if ED staff and OHEs knew about study, unlikely they were unaware of changes in the environment or TST results* All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *yes* How many participants did not complete treatment in each group? The groups were comparable for treatment completion *8.5% of HCWs left the hospital due to resignation, termination or residency completion. Follow up was done in 78% OHE and 89% ED PPD- cohorts respectively.* For how many participants in each group were no outcome data available? The groups were comparable with respect to the availability of outcome data *unclear* The study had an appropriate length of follow up *yes* The study used a precise definition of outcome *yes*

<table>
<tr><th>Bibliographic reference</th><th>Tuberculosis exposure and control in an urban emergency department. Ann Emerg Med 1998, 313(3); 370-375</th></tr>
<tr><td></td><td>A valid and reliable method was used to determine the outcome yes, although the effectiveness of the infection control measures was established simultaneously and it is difficult to assess which one in particular was more effective.
Investigators were kept ‘blind’ to participant’s exposure to the intervention unclear (but unlikely)
Investigators were kept ‘blind’ to other important confounding and prognostic factors unclear how confounding was dealt with.</td></tr>
<tr><td>Number of patients</td><td>Cycle 1 = 5,697 (5,609 OHEs and 88 ED staff)
Cycle 2 = 4,346 (4,266 OHEs and 80 ED staff)
Cycle 3 = 3,064 (3,000 OHEs and 64 ED staff)</td></tr>
<tr><td>Participant characteristics</td><td>
<table>
<tr><th>Risk Factor</th><th>ED Staff No (%)</th><th>OHEs No (%)</th></tr>
<tr><td>BCG History</td><td></td><td></td></tr>
<tr><td>Yes</td><td>5(5.1)</td><td>562(10.3)</td></tr>
<tr><td>No</td><td>93(94.9)</td><td>4,915(89.7)</td></tr>
<tr><td>Ethnicity</td><td></td><td></td></tr>
<tr><td>White</td><td>80(61.5)</td><td>4,411(61.5)</td></tr>
<tr><td>Black</td><td>46(35.4)</td><td>2,252(31.2)</td></tr>
<tr><td>Asian America</td><td>3(2.3)</td><td>445(6.2)</td></tr>
<tr><td>Hispanic American</td><td>1(0.8)</td><td>98(1.4)</td></tr>
<tr><td>Native American</td><td>0(0)</td><td>7(0.1)</td></tr>
<tr><td>Residence</td><td></td><td></td></tr>
<tr><td>Low TB prevalence</td><td>66 (50.8)</td><td>3,833(50)</td></tr>
<tr><td>High TB prevalence</td><td>64 (49.2)</td><td>3,837 (50)</td></tr>
</table>
</td></tr>
</table>

Bibliographic reference	Tuberculosis exposure and control in an urban emergency department. Ann Emerg Med 1998, 313(3); 370-375

Country of Birth US Other	 74 (97.4) 2 (2.6)	 3,912(89.8) 443(10.2)
Age	37.1±1.2	37±2
Length of Employment (yrs)	6.5 ±0.8	7.2±1

Inclusion:

- All employees on the hospital were required to participate

Exclusion:

- Attending physicians were not included because complete data were not available for the OHE cohort
- All ED staff including physicians were ruled out for active TB
- Participants Lost to Cycle 2: 8.5% of HCWs who left the hospital due to resignation, termination, or residency completion. Also could not be measured for the 18% of employees whose test results were already positive, nor for new employees and other employees without prior documented negative PPD results.

Other

TB evaluations were conducted by Occupational Medicine, a division of the Department of Emergency Medicine.

City and county of Philadelphia had a 22.1/100,000 TB incidence at the beginning of the study; the number of new cases in Philadelphia decreased by 19% in 1996.

Intervention	New ED facility engineer modifications: 4 respiratory isolation rooms meeting CDC standards, 100% non-recirculated air in trauma area, improved ventilation with at least 25% fresh air in the ED area, laminar flow of air from registrars to patients, and acrylic plastic (Plexigas) droplet shields for registrars. Screen with standard intradermal dose of 5 tuberculin units of PPD, questioned about pulmonary and systemic symptoms of

Bibliographic reference	Tuberculosis exposure and control in an urban emergency department. Ann Emerg Med 1998, 313(3); 370-375
	TB and surveyed for occupational and non- occupational risk factors for exposure Employees with and induration of 5mm or more at the site 48 to 72 hrs later or those who refused PPD placement received baseline chest radiograph and medical evaluation.
Approach to Analysis	Use of X^2 test for categorical data and Student's t test for continuous data. Use of Bonferoni adjustment for multiple comparisons; significance was defined as P< 0.008. Relative risks with 95% confidence interval were calculated.
Location	Department of Emergency Medicine. University of Pennsylvania Medical Center, Philadelphia, PA
Outcomes measures and effect size	(per protocol) Engineering: isolation rooms, etc.; effectiveness of new TB control measures
Source of funding	None mentioned
Comments	PPD^+ status was defined as PPD induration of 10mmm or more and PPD^- was defined as an induration less than 5mm.
Abbreviations: BCG = bacilli Calmette-Gúerin vaccination, CDC = Center for Disease Control and Prevention, ED = all employees in the emergency department except physicians, HCWs = health care workers; OHE = other hospital employee, PPD(+/-) = purified protein derivative, TB = tuberculosis; TST: tuberculin skin test	

A.1.3 Blumerg et al. 1995

Bibliographic reference	Preventing the nosocomial transmission of tuberculosis. Ann Intern Med 1995; 122: 658-663
Study type	Authors defined this study as a 'Descriptive case series'; there is one group that investigated the efficacy of expanded TB measures consisting primarily of administrative control pre intervention (8 months) and post intervention (28 months). For the evidence purpose, this study is treated like a prospective interventional cohort.
Study quality	The method of allocation to treatment groups was unrelated to potential confounding factors? *n/a (one group)* Attempts were made within the design or analysis to balance the comparison groups for potential confounders *n/a*

Bibliographic reference	Preventing the nosocomial transmission of tuberculosis. Ann Intern Med 1995; 122: 658-663
	The groups were comparable at baseline, including all major confounding and prognostic factors *n/a* The comparison groups received the same care apart from the intervention(s) studied *n/a* Participants receiving care were kept 'blind' to treatment allocation *unclear but highly unlikely* All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *no, the group was observed 8 months prior and 28 months after infection control measures were implement*ed How many participants did not complete treatment in each group? The groups were comparable for treatment completion n/a For how many participants in each group were no outcome data available? *n/a* The groups were comparable with respect to the availability of outcome data The study had an appropriate length of follow up *the length of time was appropriate* The study used a precise definition of outcome, *yes* A valid and reliable method was used to determine the outcome, *yes* Investigators were kept 'blind' to participant's exposure to the intervention, *unclear but unlikely* Investigators were kept 'blind' to other important confounding and prognostic factors *unclear, unclear how confounding was dealt with.*
Number of participants	Admissions in the 3yr of the study: 752 of which 461 were AFB and culture positive. HCWs = 3579 in 1992 (beginning of the study) / 5153 in 1994 (end of the study)
Participant characteristics	*Inclusion: not specified* *Exclusion: not specified* *Other:* *Age: 39.3; 334 (44.4%) were HIV seropositive; 289 (38.4%) were HIV seronegative, and 129 (19.2%) refused or were not offered HIV testing, tuberculosis admissions per month (n) 20.9, respiratory AFB smear positive TB admissions per month (n), 12.8*
Intervention	Implementation and expansion of infection control measures at the engineering, personal and administrative levels.

Bibliographic reference	Preventing the nosocomial transmission of tuberculosis. Ann Intern Med 1995; 122: 658-663
Control	n/a
Approach to Analysis	The number of TB exposure episodes and the number of exposure days per months were evaluated using the chi-square and the Wilcoxon rank-sum test, respectively. Skin tests were evaluated using chi-square analysis for trend and proportions (Mantel extension method) a *p* value of less than 0.05 was considered statistically significant
Location	Grady Memorial Hospital, public university affiliated, 1000 bed inner city hospital in Atlanta
Outcomes measures and effect size	1.AFB, During the 3 years of the study 461/752 admissions (61%) had respiratory specimens that were AFB smear positive and culture positive for M tuberculosis and were considered to be potentially infectious 2. Tuberculosis exposure episodes The number of TB exposure episodes (that is, the number of hospitalized patients not placed in respiratory isolation on admission but subsequently having a diagnosis of AFB smear positive pulmonary TB during that admission or within 2 weeks of discharge) occurring during the two time periods were: in the 8 months prior the number of exposures were 35 or 4.4. per month, compared to 18 episodes (average 0.6 episodes per month) after policy implementation. 3. Review of medical records and evaluation of isolation rooms -35 (34%) of 103 potentially infectious patients with TB were not appropriately isolated, compared with 18(5%) of 358 patients with positive smears under the new policy (OR 9.72; 95% 4.99-19.25 p0.001) Tuberculin Skin Testing, Conversions rates decreased steadily from 3.3% (118 tuberculin skin test conversions among 3579 HCWs) to 0.4% (23 conversions among 5153 workers) p < 0.001) Control measures (administrative, engineering, personal) Window fans were placed in respiratory isolation rooms. Airflow testing by smoke tube test method was done seven times and rooms were found not to be under negative pressure an average of 16.5% of the time. The number of air changes in a single room was determined to be 4.6 per hour.
Source of funding	In part by National Institutes of Health grant K07 HL030778-01, Georgia Department of Human Resources contracts 427-93-41861, and the Robert Wood Johnson Foundation

Bibliographic reference	Preventing the nosocomial transmission of tuberculosis. Ann Intern Med 1995; 122: 658-663
Comments	Study conducted between July 1 1991 and June 30 1994. Skin test was mandatory for HCWs and done annually, but after policy implementation testing was done every 6 months
Abbreviations: AFB = acid fast bacilli; HCWs = health care workers; HIV = human immunodeficiency virus; TB = tuberculosis; TST = tuberculin skin test; OR = odds ratio	

A.1.4 Chamie et al 2013

Bibliographic reference	Household ventilation and tuberculosis transmission in Kampala, Uganda. Int J Tuberc Lung Dis, 2013, 17(6): 764-770.
Study type	(a subgroup derived from an RCT form an initial cohort) – this is a nested case - control
Study quality Unit of study were the households	The study addresses an appropriate and clearly focused question? *Adequately addressed* The cases and controls are taken from comparable populations *Not addressed* The same exclusion criteria are used for both cases and controls *Not addressed* What was the participation rate for each group (Cases and controls)? *Not reported* 'Participants and non-participants' (prevalent and non prevalent households) are compared to establish their similarities or differences *Adequately addressed* Cases are clearly defined and differentiated from controls *Adequately addressed* It is clearly established that controls are not cases *Adequately addressed* Measures were taken to prevent knowledge of primary exposure from influencing case ascertainment *Not applicable* Exposure status is measured in a standard, valid and reliable way *Adequately addressed* The main potential confounders are identified and taken into account in the design and analysis *Not reported* Have confidence intervals been provided? *No*

<table>
<tr><th>Bibliographic reference</th><th>Household ventilation and tuberculosis transmission in Kampala, Uganda. Int J Tuberc Lung Dis, 2013, 17(6): 764-770.</th></tr>
<tr><td>Number of household</td><td>61 households enrolled, 94 rooms measured.
44/61 (72%) index cases available for the household ventilation study
64/82 (79%) household contacts available for the household ventilation study</td></tr>
<tr><td>TB index case and households characteristics</td><td>
<table>
<tr><td></td><td>TB index case
n (%)</td><td>Household contacts n (%)</td></tr>
<tr><td>N</td><td>61</td><td>208</td></tr>
<tr><td>Age years, median [IQR]</td><td>30</td><td>14 [7-24]</td></tr>
<tr><td>Male</td><td>32(52)</td><td>87 (42)</td></tr>
<tr><td>HIV-infected</td><td>32 (52)</td><td>Overall 9(4)
Adults: 8/81 (10)</td></tr>
<tr><td>AFB smear positive</td><td>48/59 (81)</td><td>n/a</td></tr>
<tr><td>Unemployed
Education (among adults)
No education
Completed primary school
Completed secondary school</td><td>9/61 (15)

6 (10)
30 (49)
8 (13)</td><td>16/81 (20)

3 (4)
49 (60)
17 (21)</td></tr>
<tr><td>Adults
Time spend in the home
Days/week median
Hours/weekday median [IQR]
Hours/weekend day median [IQR]</td><td>

7
11[9-13]
12[10-15.5]</td><td>

7
10[8-12]
12[9-15]</td></tr>
</table>
</td></tr>
</table>

Bibliographic reference	**Household ventilation and tuberculosis transmission in Kampala, Uganda. Int J Tuberc Lung Dis, 2013, 17(6): 764-770.**

Residence in home for ≥ 2 years	*35(80)*	*55(86)*
Residence in home for < 6 months	*7(16)*	*5(8)*
Adult contact with health care visit for TB evaluation in past 2 years	*n/a*	*19(30)*
Adult contact diagnosed and treated for TB evaluation in the past 2 years	*n/a*	*5(8)*
Child contact diagnosed and treated for TB in the past 2 years	*n/a*	*8/127(6)*

The average number of residents was 5.4 people/home, and the majority of the homes (54%) had one room.

58/61 homes (95%) closed all windows and doors overnight, reasons being security (64%) and mosquitoes/malaria (36%)

16/94 (17%) rooms had no windows, or windows that did not open.

78/94 had windows that opened in which the mean ventilation change after opening was an increase of 7 ACH

Intervention	Evaluation of household ventilation and its association with TB was measured in household contact that reported diagnosis and treatment for active TB; those diagnosed with TB during the 2 years before enrolment were considered homes with co-prevalent TB.
Control	Household contacts without co-prevalent TB
Approach to Analysis	Pearson X^2 test for Fisher's exact test and means using Student's *t*-test. For each CO_2 decay measure, ACH was determined by subtracting the final $lnCO_2$ from the peak $lnCO_2$ and dividing by the time to go from peak to final lnCO2 measure. The median ventilation rates of index cases' sleeping rooms were compared in homes with and those without co-prevalent TB using Wilcoxon rank-sum test to test the hypothesis that sleeping room ventilation rates are lower in homes that reported co-prevalent TB and those that did not.
Location	Kampala, Uganda

Bibliographic reference	Household ventilation and tuberculosis transmission in Kampala, Uganda. Int J Tuberc Lung Dis, 2013, 17(6): 764-770.
Outcomes measures and effect size	Homes reporting co-prevalent TB had a significant greater number of residents, rooms, and total area (m^2) compared to homes not reporting co-prevalent TB in a household contact The median ventilation room for the 94 rooms measured in the 61 homes was 14 ACH (IQR 10-18). The 12 homes reporting co-prevalent TB had lower median index case sleeping room ventilation rates (12 ACH, IQR 8-15) than homes without co-prevalent TB (15 ACH, IQR 11-18) (p=0.12). Among 48 homes with AFB smear-positive index cases, the median ventilation rates in homes reporting co-prevalent TB remained lower than in homes without co-prevalent TB (11 ACH, IQR 8-14 vs 15 ACH, IQR 11-19, p = 0.06) Among 36 homes with AFB smear positive index cases reporting stable residence (12 months/year) in the home, median ventilation rates were significantly lower in homes reporting co-prevalent TB than in homes without co-prevalent TB (11 ACH, IQR 9-14 vs 16 ACH, IQR 12-9, p=0.04).
Source of funding	This work was supported by the National Institutes of Health/National Institute of Mental Health, the Traineeship in AIDS Prevention Studies, National Institute of Mental Health, and the National Institute of Allergy and Infectious Disease
Comments	The term ‘co-prevalent TB’ was used because two or more residents in a home may acquire TB due to distinct non-household transmission events originating from separate source cases.
Abbreviations: AFB = acid fast bacilli; CDC = centre for disease control; CXR: chest x-ray; HIV: human immunodeficiency virus: HCWs = health care workers; IQR = interquartile range; N/A not applicable; PBT = pulmonary tuberculosis; SD: standard deviation: TB = tuberculosis; TST = tuberculin skin test; HR hazard ratio	

A.1.5 Da Costa et al. 2009

Bibliographic reference	Administrative measures for preventing Mycobaterium tuberculosis infection among healthcare workers in a teaching hospital in Rio de Janeiro, Brazil. J Hosp Infect. 2009: 72 (1): 57-64
Study type	Prospective interventional cohort
Study quality	The method of allocation to treatment groups was unrelated to potential confounding factors? *n/a study does split*

<table>
<tr><th>Bibliographic reference</th><th>Administrative measures for preventing Mycobaterium tuberculosis infection among healthcare workers in a teaching hospital in Rio de Janeiro, Brazil. J Hosp Infect. 2009: 72 (1): 57-64</th></tr>
<tr><td></td><td>participants by level of exposure/work location in the analysis but it has one group

Attempts were made within the design or analysis to balance the comparison groups for potential confounders n/a

The groups were comparable at baseline, including all major confounding and prognostic factors n/a

The comparison groups received the same care apart from the intervention(s) studied n/a

Participants receiving care were kept ‘blind’ to treatment allocation unclear, but unlikely participants were unaware of new policies

All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) n/a - only one group

How many participants did not complete treatment in each group? Unclear, but authors stated that 737 HCWs were lost to follow up

For how many participants in each group were no outcome data available? The groups were comparable with respect to the availability of outcome data n/a one group only

The study had an appropriate length of follow up yes, rational is given as follow: authors state they ‘arbitrarily considered that minimum of 3 years would be necessary for the control measures to be effective

The study used a precise definition of outcome yes

A valid and reliable method was used to determine the outcome yes

Investigators were kept ‘blind’ to participant’s exposure to the intervention unclear (and unlikely)

Investigators were kept ‘blind’ to other important confounding and prognostic factors unclear , no indication of confounding factors</td></tr>
<tr><td>Number of participants</td><td>Period I = 406 and Period II =193</td></tr>
<tr><td>Participant characteristics</td><td>
<table>
<tr><td>Characteristics</td><td>1999-2001(percentage)</td><td>2002-2003 (percentage)</td><td>p-value</td></tr>
<tr><td>Age (years (mean ±SD)</td><td>37.3 ± 10</td><td>36.4±11.7</td><td>0.334</td></tr>
</table>
</td></tr>
</table>

Bibliographic reference	Administrative measures for preventing Mycobaterium tuberculosis infection among healthcare workers in a teaching hospital in Rio de Janeiro, Brazil. J Hosp Infect. 2009: 72 (1): 57-64

Gender			0.024
Male	142 (35%)	49(25.4%)	
Female	264(65%)	144(74.6%)	
Employment duration (years (mean ± SD)	12.5 ± 6.3	10.3 ± 8.4	<0.001
Occupation			
Administrative clerk	139 (34.5%)	50 (25.9%)	0.04
Nurse	101 (24.9%)	75 (38.9%)	<0.001
Physician	67 (16.5%)	18 (9.3%)	0.187
Housekeeping	41 (10.1%)	26 (13.5%)	0.221
Social Worker	32 (7.9%)	9 (4.7%)	0.145
Laboratory/radiology technician	26 (6.4%	15 (7.8%)	0.535
Work Location			
Administration	171 (42.1%)	53 (27.5%)	<0.001
Clinical ward	94 (23.2%)	59 (30.6%)	0.052
Surgery ward	65 (16%)	25 (13%)	0.329
Outpatient clinics	33 (8.1%)	5 (2.6%)	0.009
Radiology/laboratory/pharmacy	26 (6.4%)	15 (7.7%)	0.535
Intensive care unit	17 (4.2%)	18 (9.3%)	0.012

Inclusion: not specified

Bibliographic reference	Administrative measures for preventing Mycobaterium tuberculosis infection among healthcare workers in a teaching hospital in Rio de Janeiro, Brazil. J Hosp Infect. 2009: 72 (1): 57-64
	Exclusion: not specified *Other:* The hospital has 560 clinical and surgical beds and employs ~ 3400 persons. There is a high turnover of HCWs, with a mean of 60 new employees hired every year The HCWs' TST conversion rate before the study was 8.7% per year from 1994 to 1997. This was considered high risk when compared to the general population so a TB control programme was created in 1998. From 1999 to 2001, 197 pulmonary TB cases were diagnosed in the hospital, and 272 in 2002-2003.
Intervention	Implementation of new infection control measures starting 1998 following CDC guidelines. It included: - the creation of a mycrobacteriological laboratory, -fast isolation of individuals of whom sputum for acid fast bacilli smear and/or culture was taken, - conversion of rooms into isolation rooms, -placing of patients with productive cough in isolation, -patients known to have HIV and abnormal CXR were isolated. -individuals entering the rooms were required to wear an N-95 respirator and patients leaving the room for diagnostic test were required to wear surgical mask, and -educated on cough etiquette and respiratory hygiene by the ward nurse. An educational programme on TB was offered to HCWs, and the hospital established a 'one-stop service' at the outpatient clinic, offering registration, pharmacy supplies, accounting and chest radiograms in the same place.
Control	n/a; There was only one group in this study; however the 'administrative' group which included workers from finance, data processing, accounting, medical records, human resources, mailroom, telecommunications, pharmacy, purchasing, and central supply sectors was considered the non-exposed group.
Approach to Analysis	Rates of TST conversion were analysed by work sector and occupation of the HCW. Person-days of follow up were calculated, Differences in TST conversion rates between the two study periods were compared using the exact mid-P probabilities. HR (crude and adjusted) were also calculated by univariate and multivariate analyses.

Bibliographic reference	Administrative measures for preventing Mycobaterium tuberculosis infection among healthcare workers in a teaching hospital in Rio de Janeiro, Brazil. J Hosp Infect. 2009: 72 (1): 57-64
	Finally, the probability of remaining TST negative during both periods was calculated using the Cox regression model.
Location	Clementino Fraga Hospital – north of Rio de Janeiro (area with 140 per 100,000 inhabitants TB rate)
Outcomes measures and effect size	1.Tuberculin skin testing by Mantoux technique (when possible a two-step was performed) Number of conversions observed / month- Conversions/ 1000 person month; 95% CI Period I: 25/4307 - 5.8; 4.9-6.7, Period II 15/3858 -3.7;2.8-4.6 Adjusted HR (95% CI): Period II: 0.24 (0.10-0.54) 2.Exposure to pulmonary TB case in hospital Number of conversions observed / month- Conversions/ 1000 person month; 95% CI Period I: 11/1661 - 6.6;5.1-8.1 Period II: 8/1997 4;2.7-5.3 - Adjusted HR (95% CI): 0.31 (0.13-0.73)
Source of funding	The study was supported by NIH (ICOHRTA No U2R TW006883-02), by Conselho Nacional de Ensino e Pesquisa-CNPq-Process: 524523/96-7; and by the Academic Tuberculosis Program at Federal University of Rio de Janeiro
Comments	
Abbreviations: AFB = acid fast bacilli; CDC = centre for disease control; CI: confidence interval; CXR: chest x-ray; HIV: human immunodeficiency virus: HCWs = health care workers; SD: standard deviation: TB = tuberculosis; TST = tuberculin skin test; HR hazard ratio	

A.1.6 Gonzalez- Angulo et al 2013

Bibliographic reference	Knowledge and acceptability of patient-specific infection control measures for pulmonary tuberculosis. American Journal of Infection Control 2013; 41: 717-22.
Study type	Prospective questionnaire-based study (two groups)
Study quality	The method of allocation to treatment groups was unrelated to potential confounding factors? n/a *Method of group allocation was related to where the patients were in terms of diagnostic and treatment of the disease.* Attempts were made within the design or analysis to balance the comparison groups for potential confounders *n/a* The groups were comparable at baseline, including all major confounding and prognostic factors *yes* The comparison groups received the same care apart from the intervention(s) studied *yes* Participants receiving care were kept 'blind' to treatment allocation *unlikely, participants would be aware of their diagnosis or potential diagnosis TB* All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *yes (18 months)* How many participants did not complete treatment in each group? The groups were comparable for treatment completion *n/a* For how many participants in each group were no outcome data available? n/a The groups were comparable with respect to the availability of outcome data The study had an appropriate length of follow up *yes* The study used a precise definition of outcome *yes* A valid and reliable method was used to determine the outcome *yes* Investigators were kept 'blind' to participant's exposure to the intervention *unclear how blinding was dealt - but unlikely* Investigators were kept 'blind' to other important confounding and prognostic factors *unclear how blinding and /or confounding was dealt*
Number of participants	100 participants recruited (50 TB suspects and 50 TB patients)
Participant characteristics	*Inclusion* • *TB suspects (adults) (previously undiagnosed person undergoing investigation for possible TB disease)*

Bibliographic reference	**Knowledge and acceptability of patient-specific infection control measures for pulmonary tuberculosis. American Journal of Infection Control 2013; 41: 717-22.**

- *TB patients (adults) who were beginning a course of TB treatment (persons with a new diagnosis of sputum smear-positive pulmonary TB)*

Exclusion:

- *Unclear*

Other:

- All participants were co-enrolled either in a study of TB diagnostics (TB suspects) or a clinical trial of a modified TB drug regimen (TB patients)

Variable and attribute(s)	TB suspects	TB patients	Total	*P* value
Language, n (%)				*.629*
IsiXhosa	10 (20)	12(24)	22	
Afrikaans	40 (80)	38 (76)	78	
Gender, n (%)				*.071*
Females	28(56)	19(38)	47	
Males	22(44)	31(62)	53	
Age, median (range), years	33 (18-54)	33 (19-54)	--	*.526*
Housing conditions, n (%)				*.42*
Total people in home				
≥5 people	20(40)	24(48)	44	
<5 people	30(60)	26(52)	56	

Bibliographic reference	**Knowledge and acceptability of patient-specific infection control measures for pulmonary tuberculosis. American Journal of Infection Control 2013; 41: 717-22.**

Total people/room, median (range)	2 people (2-9)	2 people (2-7)	--	*1.000*
Sleep alone, n (%)	11(22)	7 (14)	18	*.298*
Working status, n (%)				
Currently working	29(58)	27(54)	56	*.687*
Working indoors	14(48)	7(26)	21	*.084*
Working outdoors	15(52)	20(74)	35	

Intervention – TB cases	Although TB education was not formalized per protocol, all participants were instructed on infection control procedures to reduce the risk of *Mycobacterium tuberculosis* transmission. The reason for, and importance of, these infection control measures was continually explained at a study visits. Information provided by health service and research staff was judged to represent a level of health education that might be achieved under optimal programmatic conditions
Intervention II – TB suspects	Same as above
Approach to Analysis	Proportions and differences in proportions with 95% CI were calculated for categorical data. The chi-square test or Fisher exact was used to compare differences in proportions. Analogue psychometric scales were devised to describe core knowledge and acceptability of infection control measures. All attributes in the questionnaire were assigned a value of (1) for correct answers and zero (0) for incorrect answers. Cut off points for knowledge (score >12) and acceptability (score >10 points) were derived from the minimum and maximum number (range) of possible positive answers at baseline. Spearman correlation analysis was applied to determine bivariate relationships between knowledge and acceptability scores. The level of statistical significance was set at 5%.
Location	Participants were recruited from TB clinics near Worcester, in the Western Cape province of South Africa
Outcomes measures and	Structured questionnaire with closed and open-ended questions was designed. Questions covered core knowledge about TB transmission and about a range of potential patient-specific infection control measures in health facilities, at home, and in

Bibliographic reference	Knowledge and acceptability of patient-specific infection control measures for pulmonary tuberculosis. American Journal of Infection Control 2013; 41: 717-22.
effect size	work settings. Times: baseline and TB patients underwent a second interview on completion of TB chemotherapy. General 44% of participants lived in a household of 5 or more people, and 74% shared a room with at least 2 other persons; 9% of new sputum smear positive TB patients shared a room with children under the age of 5 years. Knowledge about TB transmission at baseline 57% of participants reported that they knew the cause of TB; only 25% of respondents correctly identified that TB was caused by a microbe. More TB suspects (38%) reported that TB was a microbial disease, compared with TB patients (12%) (p 0.003) and more TB suspects (54%) believed that TB transmission could be prevented by completing a course of anti-TB treatment compared with TB patients (28%) (p value - 0.008). Only 49% of all participants reported that they knew of infection control measures to limit TB transmission **Acceptability of TB infection control measures at baseline** Personal cough hygiene in all 3 settings was almost universal (98%). However, although 89% of all participants were prepared to use face masks in health care settings, only 54% were prepared to use them at home and only 58% were prepared to use them at work. Use of face masks was more acceptable to TB patients than TB suspects; 68% of all participants would accept cohorting and separation from non-TB patients in health facilities, and 68% of them also accepted avoidance of cosleeping with uninfected household members; 65% were willing to stop working until they had completed 2 weeks of TB treatment or until sputum smear microscopy was negative. Loss of income was the most common factor influencing disagreement with this measure (18%). **Acceptability of TB infection control measures at the end of treatment** • proportion of respondents who reported knowing the cause of TB increased from 56% to 88% (p = .001); • proportion reporting that TB was transmitted by close person-to-person contact with an infectious TB patient increased from 46% to 90% (p<.001); and • proportion of patients reporting awareness of the importance of TB infection control measures increased from 39% to 80% (p <.001).

Bibliographic reference	**Knowledge and acceptability of patient-specific infection control measures for pulmonary tuberculosis. American Journal of Infection Control 2013; 41: 717-22.**
	Statistically significant changes in attitudes to patient-specific TB infection control measures over time were noted for household settings. • acceptability of face mask use at home increased from 63% to 85% (p = 0.023), • acceptability of improving natural ventilation increased from 90 to 98%; and • acceptability of improving artificial ventilation increased from 56% to 78%. However, the proportion of patients who were prepared to use face masks at work did not increase significantly. No statistical significant improvements were noted for acceptability of cohorting and isolation measures in health care facilities (68% vs 63%, respectively; p = .80) or for avoidance of coleeping with uninfected household members (68% vs 80%, respectively; p = .18)
Source of funding	Study supported by SATBAT Masters Scholarship (grants 5U2RTW007370 & 5U2RTW007373; to Y.G.A.), a SATVI Masters Scholarship, and by NIH grant 1R01AI075603; to M.H. and W.H.)
Comments	TB suspects were defined as previously undiagnosed undergoing investigation for possible TB disease; TB patients were defined as persons with a new diagnosis of sputum smear positive pulmonary TB who were beginning the course of treatment.
Abbreviations: CI = confidence interval; TB = tuberculosis;	

A.1.7 Hubad et al 2012

Bibliographic reference	**Inadequate hospital ventilation system increases the risk of nosocomial Mycobacterium tuberculosis. Journal of Hospital Infection; 2012; 80: 88-91**
Study type	Prospective interventional study
Study quality Unit of analysis are the areas in the TB hospital	The method of allocation to treatment groups was unrelated to potential confounding factors? n/a Attempts were made within the design or analysis to balance the comparison groups for potential confounders *n/a* The groups were comparable at baseline, including all major confounding and prognostic factors *n/a*

Bibliographic reference	Inadequate hospital ventilation system increases the risk of nosocomial Mycobacterium tuberculosis. Journal of Hospital Infection; 2012; 80: 88-91
	The comparison groups received the same care apart from the intervention(s) studied *n/a* Participants receiving care were kept 'blind' to treatment allocation *unclear and unlikely* All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *yes* How many participants did not complete treatment in each group? The groups were comparable for treatment completion *n/a* For how many participants in each group were no outcome data available? n/a The groups were comparable with respect to the availability of outcome data The study had an appropriate length of follow up *yes* The study used a precise definition of outcome *yes* A valid and reliable method was used to determine the outcome *yes* Investigators were kept 'blind' to participant's exposure to the intervention *unclear how blinding was dealt with but unlikely* Investigators were kept 'blind' to other important confounding and prognostic factors unclear how blinding was dealt with but unlikely
Number of locations	Three areas (i.e. the ward for patients with active TB, a diagnostic laboratory for *M tuberculosis*, and an area where the likelihood of TB was low) all measures were taken in one occasion
Location characteristics	*Inclusion:* The inclusion of this facility was due to its role in diagnosis and treating patients with TB and the proximity to the national reference diagnostic laboratory for *M tuberculosis.* *Other:* At the time of sampling the unit had single and double –bed rooms but none meeting the isolation standards.
Intervention	Cell equivalents of airborne *M tuberculosis* were determined. The air in each location was sampled for 8 hours during one working day using a filter system composed of vacuum pump and a flow controller set at 11.5 L/min of airflow. A membrane filter (PES with 0.22 um pore size; Sartorious) was mounted inside the one-side opened plastic housing, oriented upward and positioned 1.2 m above the floor.
Control	n/a

<table>
<tr><th>Bibliographic reference</th><th>Inadequate hospital ventilation system increases the risk of nosocomial Mycobacterium tuberculosis. Journal of Hospital Infection; 2012; 80: 88-91</th></tr>
<tr><td>Approach to Analysis</td><td>After sampling the filters were removed and DNA was extracted with SmartHelix Complex Samples DNA Extraction Kit.
PCR: in real-time PCR SybrGreen assay primers targeting IS6110 were used.
The number of M tuberculosis cell equivalents per cubic meter was calculated from IS6110 copy number with the assumption that an average M tuberculosis genome in Slovenia has IS6110 elements.
Assuming 10 L/min as an average person breathing rate, 10 m tuberculosis cells as infectious dose and based on the qPCR results, the time after which it is almost certain that a person would have been exposed to the infectious dose was determined.</td></tr>
<tr><td>Location</td><td>Slovenia. This is the location were TB patients are hospitalized. The unit of the hospital is reserved exclusively for TB patients. A Slovenian national reference diagnostic laboratory for M tuberculosis is also locate there, but on a different floor of the hospital</td></tr>
<tr><td>Outcomes measures and effect size</td><td>
<table>
<tr><th>Sampling Location</th><th></th><th>Environmental controls</th><th>Respiratory controls</th><th>IS6110 copy number per m^3 of air</th><th>Calculated M tuberculosis cell equivalents per m^3 of air</th><th>Calculated time (h)[a]</th></tr>
<tr><td>Tuberculosis Ward</td><td>Patient Room</td><td>Ventilated by window opening</td><td>Respiratory mask upon entering the room</td><td><10</td><td>--</td><td>-</td></tr>
<tr><td></td><td>Corridor</td><td>Low possibility for window opening, no ventilation system</td><td>None, enclosed ward for visitors</td><td>177 ±32</td><td>19±3-</td><td>1</td></tr>
<tr><td></td><td>Room for collection of induced sputum</td><td>Six air changes per hour, negative pressure</td><td>Respiratory mask, double door room</td><td><10</td><td>--</td><td>--</td></tr>
<tr><td>Reference diagnostic</td><td>Incubation room</td><td>None</td><td>None</td><td>187±49</td><td>20±5</td><td>1</td></tr>
</table>
</td></tr>
</table>

Bibliographic reference	**Inadequate hospital ventilation system increases the risk of nosocomial Mycobacterium tuberculosis. Journal of Hospital Infection; 2012; 80: 88-91**

laboratory	Corridor Laboratory room, dedicated for daily handling of M tuberculosis cultures	None Biosafety cabinet (class II.A), exhaust fume hood for staining of smears	None None	55±22 <10	6±2 --	3 --
Non-tuberculosis areas	Corridor Biochemical laboratory room Biochemical laboratory room	Window None None	None None None	98±30 <10 <10	10±3 -- --	2 -- --

A the time after which it is believed that a person would have been exposed to an *M tuberculosis* infectious dose

The time after which it is almost certain that a person would have been exposed to the infectious dose was determined assuming 10L/min as an average person breathing rate, 10 M tuberculosis cells as infectious dose and based on the qPCR results.

Source of funding	This work was supported by the European Union, European Social Fund (grant number P-MR 07-55)
Comments	

Abbreviations: AFB = acid fast bacilli; CI = confidence interval; DNA = deoxyribonucleic acid HCWs = health care workers; IS6610 – a *m tuberculosis* complex specific insertion sequence; *m tuberculosis* = mycobacterium tuberculosis; m^3= cubic meters: qPCR = quantitative PCR; TB = tuberculosis; PCR = polymerase chain reaction

A.1.8 Lygizos et al 2013

Bibliographic reference	Natural ventilation reduces high TB transmission risk in traditional homes in rural KwaZulu-Natal, South Africa. BMC Infectious Diseases, 2013; 13: 300
Study type	Prospective interventional study
Study quality	The method of allocation to treatment groups was unrelated to potential confounding factors? n/a Attempts were made within the design or analysis to balance the comparison groups for potential confounders *n/a* The groups were comparable at baseline, including all major confounding and prognostic factors *n/a* The comparison groups received the same care apart from the intervention(s) studied *n/a* Participants receiving care were kept 'blind' to treatment allocation *n/a* All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *yes* How many 'participants' did not complete treatment in each group? The groups were comparable for treatment completion *n/a* For how many participants in each group were no outcome data available? n/a The groups were comparable with respect to the availability of outcome data The study had an appropriate length of follow up *yes* The study used a precise definition of outcome *yes* A valid and reliable method was used to determine the outcome *yes* Investigators were kept 'blind' to participant's exposure to the intervention *unclear how blinding was dealt with -but unlikely* Investigators were kept 'blind' to other important confounding and prognostic factors *unclear how blinding was dealt with but unlikely*
Number of households	218 ventilation measurement taken in 24 traditional homes
Houses characteristics	*Inclusion:* traditional Zulu homes in Tugela Ferry, either a round shaped home with thatched roof or box-shaped home with metal roof.

Bibliographic reference	Natural ventilation reduces high TB transmission risk in traditional homes in rural KwaZulu-Natal, South Africa. BMC Infectious Diseases, 2013; 13: 300
	Exclusion: unclear *Other:* The area is an impoverished rural area of approximately 180,000 people with high rates of HIV and drug susceptible and resistant TB Traditional homes, housing multiple family members, are typically one-room round or box-shaped structures, composed of mud or occasionally plaster walls, wooden doors, and topped with a cone-shaped thatch roof or slanted sheet of metal. Windows if present are usually small compared to the size of the home.
Intervention	Measurement of air exchange, natural ventilation impact and transmission risk in household or community (traditional Zulu homes) settings.
Control	n/a
Approach to Analysis	Descriptive statistics summarized the data; box plots of ACH were created for each ventilation condition. Evaluation and percent of TB risk were performed using mixed effects regression modelling, where each home was treated as a random effect and the repeated nature of the observations within a home was taken into account. A variance inflation factor (VIF) was used to assess multi-colinearity between variables in the multivariate models. Generalized estimating equations were utilized to evaluate significant predictors of the probability of achieving ACH >12. Significance was established with alpha = 0.05 and adjusted for multiple comparisons using the Bonferroni approach.
Location	Tugela Ferry, a rural area of South Africa
Outcomes measures and effect size	Several things were measured in this study; •Cross-ventilation was defined as pairs opposing windows or windows across from the door. In round homes, windows and doors were considered opposing if at an angle of greater than 135 degrees relative to each other. •Environmental measurements: (recorded at the initiation of experimentation and hourly) outside and inside temperature; wind speed at the door, window, and 10 meters from the home where wind flow was unobstructed; relative humidity, and direction of air flow at the door. An AZ 8912 anemometer was used to measure all variables with the exception of direction of air flow, which was visualized using the smoke from burning incense sticks •Ventilation measurement; a carbon dioxide (CO_2) concentration-decay technique was used to measure ACH during late summer through winter.

Bibliographic reference	Natural ventilation reduces high TB transmission risk in traditional homes in rural KwaZulu-Natal, South Africa. BMC Infectious Diseases, 2013; 13: 300
	•*TB risk estimation: Wells-Riley equation [C= S (1-e –lqpt/Q)]. Time of exposure (t) as 10 hours, based on the amount of time a person might spend inside a home overnight in close contact with an infectious TB patient a) Risk of TB transmission after 10 hours of exposure to an infectious TB patient with windows and door closed was 55.4% (SD+27.8%) b) Risk of TB upon opening windows 21.5%, SD 14.1% (p <0.001) c) Risk of TB upon opening windows and door together was 9.6%, SD 4.7 (p <0.001) The estimated risk of TB infection increased in parallel to exposure time (p <0.001) No statistical significant differences in estimated TB transmission risk under any condition between the two main home types. The estimated risk with 2 hours of exposure in a closed room approximates that at 24 hours with windows and doors open Multivariate analysis identified factors predicting ACH, including ventilation conditions (windows/doors open) and window to volume ratio. Expanding ventilation increased the odds of achieving ≥ 12 ACH by 60 fold
Source of funding	ML received funding from the Doris Duke Charitable Foundation. SVS received funding from Fogarty International Clinical Research Fellowship, Gilead Foundation, the President's Emergency Plan for AIDS Relief, and the National Institute of Allergy and Infectious Diseases. JCMB received support from the National Institute of Allergy and Infectious Diseases and the Einstein/Montefiore Center for AIDS Research. AB received support from Charles Howland Foundation. GHF received founding from the Irene Diamond Fund, Gilead Foundation and the President's Emergency Plan for AIDS Relief. DZ, YD, VN were supported by NRCC CTSA UL1 RR024139
Comments	Although several things were measured in this study, this guideline will only report on TB risk estimation
Abbreviations: ACH: air changes per hour; AFB = acid fast bacilli; CI = confidence interval; HIV = human immunodeficiency virus; SD = standard deviation; TB = tuberculosis; *Outcome of interest for this review	

A.1.9 Nardell et al 2008

Bibliographic reference	Safety of upper-room ultraviolet germicidal air disinfection for room occupants: results from the tuberculosis ultraviolet shelter study, 2008, 123(1): 52-60
Study type	Double blind, placebo-controlled field trial
Study quality The unit of analysis were the shelter/lamps	An appropriate method of randomisation was used to allocate participants to treatment groups (which would have balanced any confounding factors equally across groups) *no randomization of participants but treatment lamps* There was adequate concealment of allocation (such us investigators, clinicians and participants cannot influence enrolment or treatment allocation) *n/a* The groups were comparable at baseline, including all major confounding and prognostic factors *no – the shelter were the lamps were placed differed in structure and location, no indication of how confounding was addressed.* The comparison groups received the same care apart from the intervention(s) studied *All shelters received the same intervention* Participants receiving care were kept 'blind' to treatment allocation *yes, participants in the shelters were unaware of lamp/placebo lamp installation* Individuals administering care were kept 'blind' to treatment allocation *yes (with the exemption of the one who assigned each shelter to either a placebo or active phase)* All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *yes* How many participants did not complete treatment in each group? *Unclear ,due to the nature of population who reside in shelters, according to authors, this is a potential source of bias* The groups were comparable for treatment completion (that is, there were no important or systematic differences between groups in terms of those who did not complete treatment) *yes* For how many participants in each group were no outcome data available? *unclear* The groups were comparable with respect to the availability of outcome data (that is, there were no important or systematic differences between groups in terms of those for whom outcome data were not available) *yes* The study had an appropriate length of follow up *yes* The study used a precise definition of outcome *yes*

Bibliographic reference	Safety of upper-room ultraviolet germicidal air disinfection for room occupants: results from the tuberculosis ultraviolet shelter study, 2008, 123(1): 52-60
	A valid and reliable method was used to determine the outcome *unclear, questionnaire used and authors stated responses were in instances difficult to understand or figure out* Investigators were kept 'blind' to participants exposure to the intervention *yes* Investigators were kept 'blind' to other important confounding and prognostic factors *unclear*
Number of participants, shelters and lamps	3,611 staff and homeless residents, 14 homeless shelters. Approximately 1200 fixtures were installed, with annual lamp replacement, covering approximately 18,580 m^2
Participant characteristics	*Inclusion: "highly diverse indoor spaces" - unclear selection of shelters/ no description available.* *Exclusion: unclear* *Other:* UV fixture placement followed manufacturer's guidelines modified by on-the-spot analysis of room configurations by the consulting engineer. With the exception of one facility built specifically for use as a shelter during the study, all UV fixtures were retroffited. In most settings louvered wall or ceiling-mounted fixtures were selected that limited lower-room irradiation to less than 0.2-0.4 $\mu W/cm^2$. Fixtures were mounted at a height of no less than 2.13 m from the bottom of the fixture to the floor, allowing at least an additional 0.3m above the bottom of the fixture for air disinfection to occur. Safety precautions were taken. The equipment contained switches that deactivated fixtures when opened, and the UV systems were installed on dedicated electrical circuits that could be turned off only with special keys possessed by personnel The duration of the active and placebo time periods was not necessarily equal within each shelter, but among all shelters the total number of shelter days was nearly equal : 10,324 shelter days were active, while 10,314 were placebo
Intervention	Upper-room UVGI to reduce TB transmission in homeless shelters
Control	Placebo UV status (this was achieved either by installing specially manufactured placebo lamps or by inserting a piece for glass, impenetrable to UV, in the fixture in front of the active UV lamp)
Approach to Analysis	None stated.

Bibliographic reference	Safety of upper-room ultraviolet germicidal air disinfection for room occupants: results from the tuberculosis ultraviolet shelter study, 2008, 123(1): 52-60
Location	14 homeless shelters in 6 US cities from 1997-2004
Outcomes measures and effect size	Interviews and tuberculin skin tests. Interviews were conducted in three stages. Some questions got reviewed as study progressed. All safety questions focused on eye and skin symptoms. Because of the nature of the participants, considerable longer time elapsed between one interview and another one. The trial was inconclusive with regard to UVGI efficacy because of insufficient numbers of documented TB skin test conversion 223/3,611 interviews (6%) included a report of a skin or eye symptom 95/223 occurred entirely in active UV periods 92/223 occurred entirely in placebo UV periods 36/223 uncertain when symptoms occurred Cross-tabulation UV status (active vs placebo) by report of symptoms (no report of eye or skin symptoms vs any report of eye or skin symptoms) produces a Pearson Chi-square value of 0.066 (not statistically significant) Reports of symptoms during the active period revealed that most were unlikely to be caused by UV exposure i.e., they included comments such as “eczema” or “bacterial infection on face” One instance of UV-related keratoconjunctivitis occurred, caused by human error
Source of funding	None stated
Comments	UVGI consist primarily of shortwave (254 nm or UV-G) energy, for inactivating a wide range of aerosolized microorganisms.
Abbreviations: TB = tuberculosis; US = United States; UV = ultraviolet; UVGI = ultra violet germicidal irradiation (air disinfection); µm = micrometre or measure of wavelength or infrared radiation; µW/cm2 = intensity of micrometre electromagnetic radiation or watt per square centimetre	

A.1.10 Richardson et al 2014

Bibliographic reference	Shared Air: A renewed focus on Ventilation for the Prevention of Tuberculosis Transmission. PlosOne; 2014, 9(5), e96334
Study type	Prospective interventional cohort
Study quality	The method of allocation to treatment groups was unrelated to potential confounding factors? *n/a* Attempts were made within the design or analysis to balance the comparison groups for potential confounders *unclear, no information about confounders and how they were addressed* The groups were comparable at baseline, including all major confounding and prognostic factors *n/a, only one group* The comparison groups received the same care apart from the intervention(s) studied *n/a* Participants receiving care were kept 'blind' to treatment allocation *unclear and unlikely* as they had to carry the deviced All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *n/a* How many participants did not complete treatment in each group? The groups were comparable for treatment completion *n/a, information about drop outs or withdrawal from the study not provided* For how many participants in each group were no outcome data available? *n/a* The groups were comparable with respect to the availability of outcome data The study had an appropriate length of follow up yes, the length of the study seems appropriate to detect changes sought, *the study had an appropriate length of time* The study used a precise definition of outcome *yes* A valid and reliable method was used to determine the outcome *yes* Investigators were kept 'blind' to participant's exposure to the intervention *unclear how blinding was dealt with but unlikely* Investigators were kept 'blind' to other important confounding and prognostic factors *unclear how authors address blinding and confounding; unlikely blinding was achieved*
Number of participants	64 students / average number of students per class was 31
Participant characteristics	*Inclusion: unclear,* authors refer to vulnerability of older learners (15-19 years) given a smear positive rate of 427 per 100,000 and the significant amount of time send indoors which may be taken as the rational for inclusion.

Bibliographic reference	Shared Air: A renewed focus on Ventilation for the Prevention of Tuberculosis Transmission. PlosOne; 2014, 9(5), e96334
	Exclusion: unclear *Other:* • High schools are important locations for potential TB infection and thus appropriate targets for prevention efforts. • The force of infection for TB in Cape Town has been calculated to be at least 6% per annum in people aged 15-19. The effective contact number per case is determined by the ration of the force of infection (6%) and the prevalence of infectious TB cases [427/100,000]. For Cape Town was 14
Intervention	Measure of CO_2 in classrooms under non-steady state conditions. 64 students carrying individual monitors over 91 school days throughout and entire school year (509 class hours) for estimating the threshold for TB transmission
Control	n/a
Approach to Analysis	Study used the Rudnick and Milton equation for estimating the threshold for TB transmission; *q* was estimated using the value obtained in previous studies combined with the logic that q would not be at the high levels found in some hospitals outbreaks. Authors also assumed that infectious cases would overlap with the same individual for up to 175 hours of class time (i.e. 35 school days at 5 indoor hours per day) before diagnosis. The rebreathed fraction was calculated.
Location	Non mechanical ventilated classrooms in a high TB burden community under varying natural conditions. Cape Town, South Africa
Outcomes measures and effect size	The study measure several outcomes -*Estimation of Transmission Risk: threshold for TB transmission was estimated using the carbon dioxide-based risk equation developed by Rudnick and Milton. The rebreathed fraction of carbon dioxide carbon which correlated with an indoor CO_2 concentration of 1000ppm. - Using portable carbon dioxide detection devices, CO_2 in non-mechanically ventilated classrooms was monitored in parts per million (ppm) every 60 seconds as well as GPS locations By substituting the values the rebreathed fraction of 1.6%, which correlates with an indoor CO_2 concentration of 1000ppm. A ventilation rate of 6-8//s per person. Using the value 8.g l/s per person converts to between 5 and 6 air ACH. Findings

Bibliographic reference	**Shared Air: A renewed focus on Ventilation for the Prevention of Tuberculosis Transmission. PlosOne; 2014, 9(5), e96334**
	demonstrate that students spend 60.2% of their time above recommended threshold CO_2 environment encountered is seen to be highly variable
Source of funding	None stated
Comments	South Africa had an incidence greater than 1,000 per 100,000 people in 2012. A plausible explanation, despite HIV, is the continued existence of crowded, poorly ventilated indoor environments.
Abbreviations: ACH= air changes per hour; CO_2 = carbon dioxide; GPS = global positioning system; ppm = parts per million; TB = tuberculosis;	

RQs CC and DD

A.1.11 Bouti, 2013

Bibliographic reference	Factors influencing sputum conversion among smear-positive pulmonary tuberculosis patients in Morocco. 2013; article ID 486507, 5 pages
Study type	Prospective 'cohort' study (one group – 6 months).
Study quality	The study sample represents the population of interest with regard to key characteristics, sufficient to limit potential bias to the results? *Unclear, authors mentioned a limitation of the study is the hospital only receives complicated cases not representing patterns of the community in general.* Loss of follow up is unrelated to key characteristics (that is, the study data adequately represent the sample), sufficient to limit potential bias. *Yes, 4 deaths* The prognostic factor of interest is adequately measured in study participants, sufficient to limit potential bias. *Yes* The outcome of interest is adequately measured in study participants, sufficient to limit potential bias. Yes Important potential confounders are appropriately accounted for, limiting potential bias with respect to the prognostic factor of interest *Unclear, authors do not mentioned confounders or how they were accounted for* The statistical analysis is appropriate for the design of the study, limiting potential for the presentation of invalid results. *Yes*
Number of patients	119 (65% male, 35% female)
Participant characteristics	Sociodemographic characteristics shows that age varied between 17 and 79, mean age 39, 43 individuals were smokers, 61 non smokers, and 15 were weaned. Comorbidities: 9 individuals had diabetes, 4 respiratory diseases, 1 HIV and 10 others. No drug resistance was detected. Only 74% of sample had pulmonary disease alone, 7% had pulmonary and pleura disease, 13% had pulmonary and lymph node TB, and the 7 remaining cases had pulmonary and another extrapulmonary location. Inclusion: • All new smear positive pulmonary TB Exclusion:

Bibliographic reference	Factors influencing sputum conversion among smear-positive pulmonary tuberculosis patients in Morocco. 2013; article ID 486507, 5 pages
	• Unclear Other • Data collection happened from January 1, 2010 to June 30, 2010. Individuals were followed up every two weeks for up to 6 months or until they underwent smear conversion whichever was earlier. Two smear specimens were collected in each evaluation. • Completers: 96% of sample – Drop out: 4 (deaths)
Intervention	'Standard protocol of treatment' and supervised DOTS - all patients received four drug regimen (isoniazid, rifampicin, pyrazinamide, and ethambutol)
Approach to Analysis	Univariate analysis and stepwise regression analysis with *p* value of *<0.05* considered significant
Location	Tertiary care hospital, Moulay Youssef University Hospital, Rabat, Morocco
Outcomes measures and effect size	Data collected: demographic, clinical and radiological findings, past history of TB, tobacco, alcohol, and drugs consumption, BCG status, diabetes mellitus, renal diseases, and HIV coinfenction. The rate of sputum conversion at the end of one month of treatment was 73.1% (*p <0.01*) while it was 95% (*p< 0.05*) at the end of the second month. Sputum specimens were collected and processed in a standard manner with the Ziehl-Neelsen stain. Smear grading (44.5% negativation in the first 2 weeks in 1+/2+ group vs 12.1% in the 3+/4+ group p = 0.02); military (7.1% negativation in the first two weeks vs 57.1% in the 4th fortnight or later; p = 0.01), bilateral radiologic lesions (26.9% negativation in the first two weeks vs 40.4% in the 4th fortnight or later, p < 0.01). No statistically significant differences in other evaluated variables (i.e. age, sex, weight, smoking, alcoholism, addictions, respiratory disease, diabetes mellitus, HIV infection, cavitations, TB contagion, previous TB disease, alternative anti TB treatment, and related toxicity). Multivariate logistic regression analysis showed that all 3 significant variables from the univariate analysis were independently associated with delayed smear conversion: • Smear grading 3+: OR 7.1, 95% CI 2.5-11.2, • Miliary: OR 8.8, 95% CI 2.3-19.4; • Bilateral radiologic lesions: OR 8.8, 95% CI 1.8-55.6

Bibliographic reference	Factors influencing sputum conversion among smear-positive pulmonary tuberculosis patients in Morocco. 2013; article ID 486507, 5 pages
Source of funding	Authors had no conflict of interest to declare/ sources of funding not stated.
Comments	Limitations: small sample size. Study unclear messages: • Pg 2 states 'at least one culture was done to confirm the diagnosis and to exclude a drug resistant TB' – Pg 3 states ' no case was confirmed by sputum culture' • Smear grading: pg 2 states classification is' negative, 1+, 2+ and 3+' – pg 2 smear grading explained in 4 levels (1+, 2+, 3+, 4+)
Abbreviations: AFB smear = acid fast bacilli, DOTS: direct observed therapy HIV=human immunodeficiency virus, MDR-TB = multidrug resistant tuberculosis, TB=tuberculosis	

A.1.12 Horne et al. 2010

Bibliographic reference	How soon can smear positive TB patients be released from inpatient isolation? Infect Control Hosp Epidemiol, 2010; 31 (1): 78-84
Study type	"Cohort study" (one group). • Cases retrospectively reviewed from the TB Information Management System and medical records - *from January 1, 2003, through December 21, 2004*
Study quality	The study sample represents the population of interest with regard to key characteristics, sufficient to limit potential bias to the results? *Yes* Loss of follow up is unrelated to key characteristics (that is, the study data adequately represent the sample), sufficient to limit potential bias. *Yes, reasons provided and adequately described.* The prognostic factor of interest is adequately measured in study participants, sufficient to limit potential bias. *Yes,* The outcome of interest is adequately measured in study participants, sufficient to limit potential bias *Yes* Important potential confounders are appropriately accounted for, limiting potential bias with respect to the prognostic factor of interest *Unclear, confounders not mentioned*

Bibliographic reference	How soon can smear positive TB patients be released from inpatient isolation? Infect Control Hosp Epidemiol, 2010; 31 (1): 78-84
	The statistical analysis is appropriate for the design of the study, limiting potential for the presentation of invalid results *Yes*
Number of patients	N=98 (21% female:79% were men)
Participant characteristics	Sample mean age of 44.3 years; 21% were female and 79% were men. HIV co-infection was present in 4% of individuals and diabetes mellitus in 7%, 64% were born outside of the US, and one patient had MDR-TB. Baseline characteristics compared by sputum smear grade: 1+ = 13, Sputum Smear Grade 2+ = 24, Sputum Smear Grade 3+ = 22, Sputum Smear Grade 4+ = 39. Sputum collection every 2 weeks while individuals were smear positive. *Inclusion:* • *Patients with at least one spontaneous expectorated or induced sputum that was AFB smear positive and culture positive* for M tuberculosis complex. *Exclusion:* • *Patients who had pulmonary TB diagnosis solely on the basis of more invasive test (e.g. bronchoscopy)* • *Patients diagnosed with pulmonary TB solely on clinical grounds without culture confirmation.*
Intervention	All patients received directly observed therapy throughout the course of treatment and were treated according to US TB treatment guidelines.
Approach to Analysis	Baseline characteristics were compared by smear grade. Time to smear and culture conversion was assessed by log-rank statistics. Study used Cox proportional hazards model. The multivariable model included variables that were significant in the univariate analysis at the 0.20 level / partial likelihood ratio tests was used for deleting and comparing variables. Logistic regression analysis evaluated predictors of culture conversion preceding smear conversion
Location	Seattle and King county TB control program *('TB clinic').* Harborview Medical Centre, Seattle, Washington
Outcomes measures and effect size	End points were time to sputum smear and culture conversion for all subjects. Collection of sputum was done every two weeks while patients were positive or weekly if there is a need to detect smear conversion earlier.

Bibliographic reference	How soon can smear positive TB patients be released from inpatient isolation? Infect Control Hosp Epidemiol, 2010; 31 (1): 78-84

Culture was performed with conventional Lowenstein Jensen solid media, and in BACTEC broth media

Predictor variables and potential risk factors for delayed time to sputum smear or culture conversion: race and ethnicity, chest radiographs, cavitary disease, smear grade based on fluorochrome quantitation scale, drug resistance

Univariate and Multivariable Models of Time to Sputum Smear Conversion

	Univariate Analysis		Multivariate Analysis	
Variable	**HR (95% CI)**	**p-value**	**HR (95% CI)**	**p-value**
Age (year)	1.00 (0.99, 1.00)	0.95	-	
Male sex	0.84 (0.52, 1.35)	0.46	-	
Sputum smear grade*	0.47 (0.37, 0.59)	0.00	0.45 (0.35, 0.57)	0.000
Cavitation	0.65 (0.42, 0.99)	0.05	-	
Bilateral lung involvement	1.08 (0.71, 1.64)	0.73	-	
Drug resistance	1.47 (0.71, 3.05)	0.30	2.30 (1.08, 4.89)	0.03
Tobacco use	1.40 (0.91, 2.17)	0.13	-	
Alcohol abuse	0.96 (0.63, 1.47)	0.85	-	
Diabetes mellitus	0.79 (0.36, 1.73)	0.56	-	
HIV** infection	1.43 (0.45, 4.54)	0.55	-	

*1+ to 4+ scale;

**Human immunodeficiency virus

Bibliographic reference	How soon can smear positive TB patients be released from inpatient isolation? Infect Control Hosp Epidemiol, 2010; 31 (1): 78-84

Univariate and Multivariable Models of Time to Sputum Culture Conversion

	Univariate Analysis		Multivariate Analysis	
Variable	**HR (95% CI)**	**p-value**	**HR (95% CI)**	**p-value**
Age (year)	1.00 (0.99, 1.02)	0.40	-	
Male sex	0.68 (0.42, 1.09)	0.12	-	
Sputum smear grade*	0.53 (0.44, 0.67)	0.00	0.52 (0.40, 0.67)	0.00
Cavitation	0.57 (0.38, 0.87)	0.01	-	
Bilateral lung involvement	1.29 (0.85, 1.95)	0.23	-	
Drug resistance**	1.16 (0.56, 2.41)	0.69	2.30 (1.02, 5.21)	0.05
Tobacco use	1.11 (0.73, 1.68)	0.64	-	
Alcohol abuse	0.91 (0.60, 1.38)	0.65	-	
Diabetes mellitus	1.00 (0.46, 2.17)	1.0	-	
HIV† infection	2.77 (0.99, 7.74)	0.09	-	

*1+ to 4+ scale;

**To any 1st-line drug;

†Human immunodeficiency virus

Source of funding	None mentioned
Comments	Time to sputum smear and culture conversion by determining the time elapsed from the date of TB treatment initiation to the date of sustained conversion, which was defined as the first of at least three consecutive negative specimens.

Abbreviations: AFB smear = acid fast bacilli, HIV=human immunodeficiency virus, MDR-TB = multidrug resistant tuberculosis, TB = tuberculosis , US = United States.

A.1.13 Lippincot 2014

Bibliographic reference	**Xpert MTB/RIF assay shortens airborne isolation for hospitalized patients with presumptive tuberculosis in the United States. 2014; 59: 186-192.**
Study type	Cohort study – single centre / group (March 2012 through July 2013)
Study quality	**Selection Bias** The method of allocation to treatment groups was unrelated to potential confounding factors? *n/a* Attempts were made within the design or analysis to balance the comparison groups for potential confounders *n/a* The groups were comparable at baseline, including all major confounding and prognostic factors *n/a* **Performance Bias** The comparison groups received the same care apart from the intervention(s) studied *n/a* Participants receiving care were kept 'blind' to treatment allocation *n/a* **Attrition Bias** All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *n/a* How many participants did not complete treatment in each group? The groups were comparable for treatment completion *n/a* For how many participants in each group were no outcome data available? The groups were comparable with respect to the availability of outcome data *n/a* **Detection Bias** The study had an appropriate length of follow up *yes* The study used a precise definition of outcome *yes* A valid and reliable method was used to determine the outcome *yes* Investigators were kept 'blind' to participant's exposure to the intervention *Unclear, 'clinicians were blinded to Xpert results (Abstract pg 186)'* Investigators were kept 'blind' to other important confounding and prognostic factors *Unclear*

Bibliographic reference	**Xpert MTB/RIF assay shortens airborne isolation for hospitalized patients with presumptive tuberculosis in the United States. 2014; 59: 186-192.**
Number of patients	N =207 (511 induced or expectorated sputum)
Participant characteristics	Median subject age was 51 years, and 36% were female; approximately one-quarter were HIV infected, 37% were African American, 37% were white, and 16% were Hispanic. The majority (79%) presented with a cough, which was the predominant tuberculosis symptom documented, and 74% had a chest radiograph compatible with active PTB *Inclusion:* • *Presumptive pulmonary TB* • *Consecutive inpatient adults (>18 years) for whom 1 sputum specimen was submitted for AFB and culture* *Exclusion:* • *Individuals with cystic fibrosis*
Intervention	Smear microscopy, culture and Xpert performed in each sputum specimen
Approach to Analysis	Descriptive statistics. Sensitivity and specificity and their 95% confidence intervals of smear microscopy, culture and Xpert. Isolation time between initiation, first, second and third specimen collection was described graphically with Kaplan Meier curves. Laboratory processing time was calculated for each smear and Xpert test and compared visually with Kaplan Meier curves and statistically by the log rank test. Isolation duration of the smear based and the 3 Xpert based isolation discontinuation were compared with Kaplan Meier curves and by the log rank test.
Location	University of North Carolina Hospital, US
Outcomes measures and effect size	Isolation duration, laboratory processing time, strategy-based tuberculosis detection and sensitivity and specificity. When using the smear microscopy for isolation discontinuation, the median isolation duration among 201 individuals hospitalized for presumptive pulmonary TB (but not diagnosed) was 68 hours (IQR, 47.1-97.5). The median isolation duration for the Xpert isolation discontinuation was 20.8 hours (IQR, 16.8 -32) for a single Xpert strategy (n=201), 41.2 hours (IQR, 2.6-54.8) for a 2-specimen strategy (n=180) and 54 hours (IQR, 43.3 – 80) for 3 specimen strategy (n=148) (all long-

Bibliographic reference	Xpert MTB/RIF assay shortens airborne isolation for hospitalized patients with presumptive tuberculosis in the United States. 2014; 59: 186-192.
	rank test p< .004)
Source of funding	The work was supported byt the National Institute of Allergy and Infectious Diseases (grant number T32 AI007001 to CKL) and the Fogarty International Centre, the National Heart, Lung, and Blood Institute, the NIH Office of the Director Office of Research on Women Health and the NIH Office of the Director Office of AIDS Research (grant number R25 TW009340 to CKL). Cepheid provided G4 cartridges at no cost.
Comments	Most subjects (n=153) had 3 samples collected prior isolation discharge, 33 (16%) had 2 specimens, and 21(10%) had 1 specimen. Xpert was performed in 505/511 sputum specimens (99%) The hospital provides care for 200-300 patients with presumptive tuberculosis annually; in average 8 are diagnosed with pulmonary TB. Xpert was approved for research only in the US at the time of the study. Invalid results were repeated once. The study assumed that Xpert could routinely be performed twice daily during weekdays and once daily during weekends. This assumption may have bias results in favour of Xpert.
Abbreviations: AFB smear = acid fast bacilli, HIV=human immunodeficiency virus, MDR-TB = multidrug resistant tuberculosis, TB=tuberculosis, PTB: pulmonary tuberculosis, US = United States.	

A.1.14 Ritchie et al. 2007

Bibliographic reference	New recommendations for the duration of respiratory isolation based on time to detect Mycobacterium tuberculosis in liquid culture. Eur Respir J, 30(3): 501-7
Study type	Retrospective laboratory based audit.
Study quality	**Selection Bias** The method of allocation to treatment groups was unrelated to potential confounding factors? *n/a* Attempts were made within the design or analysis to balance the comparison groups for potential confounders *n/a* The groups were comparable at baseline, including all major confounding and prognostic factors *n/a*

Bibliographic reference	New recommendations for the duration of respiratory isolation based on time to detect Mycobacterium tuberculosis in liquid culture. Eur Respir J, 30(3): 501-7
	Performance Bias The comparison groups received the same care apart from the intervention(s) studied *n/a* Participants receiving care were kept 'blind' to treatment allocation *n/a* **Attrition Bias** All groups were followed up for an equal length of time (or analysis was adjusted to allow for differences in length of follow up) *n/a* How many participants did not complete treatment in each group? The groups were comparable for treatment completion *n/a* For how many participants in each group were no outcome data available? The groups were comparable with respect to the availability of outcome data *n/a* **Detection Bias** The study had an appropriate length of follow up *yes* The study used a precise definition of outcome *yes* A valid and reliable method was used to determine the outcome *yes* Investigators were kept 'blind' to participant's exposure to the intervention *unclear* Investigators were kept 'blind' to other important confounding and prognostic factors *unclear*
Number of patients	Outcome data available for = 146
Patient characteristics	*Participants' characteristics:* Sample of 261 individuals with a mean age range of 32-45 years, approximately 46% were female and 54% were men. Patients at low risk of drug resistance or with known susceptible isolates. Patients identified from the Auckland District Health Board mycobacterial laboratory. *Inclusion:* • *"*positive sputum or induced sputum TB culture between January 1st 2000 and December 31st 2003.

<table>
<tr><th>Bibliographic reference</th><th>New recommendations for the duration of respiratory isolation based on time to detect Mycobacterium tuberculosis in liquid culture. Eur Respir J, 30(3): 501-7</th></tr>
<tr><td></td><td>• Only patients receiving isoniazid, rifampicin, and pyrazinamide, with or without ethambutol were included”.
Exclusion:
• “patients whose isolates were resistant to isoniazid, rifampicin or pyrazinamide and patients who did not received treatment at this hospital or were receiving treatment when their first positive specimen was received in the laboratory”.
Culture: automated BACTEC 960 (Becton Dickinson, Sparks, US) Mycobacterial Growth Indicator Tube (MGIT) broth / median duration of hospitalization days used as a surrogate for total duration of isolation.</td></tr>
<tr><td>Intervention</td><td>Individuals received Isoniazid, rifampicin, and pyrazinamide with or without ethambutol</td></tr>
<tr><td>Location</td><td>Auckland, NZ (The Auckland District Health Board was the reference laboratory)</td></tr>
<tr><td>Approach to Analysis</td><td>Tuberculosis in liquid culture (TTD-TB) was defined as the number of days from inoculation of the mycobacterial growth indicator tube to the detection of positive growth and visualization of acid fast bacilli (AFB). Specimens taken after starting therapy were grouped into 7-day periods. Culture negative specimens were assigned a TTD-TB of 29 days, with a median of 14 days (IQR 12-20) for 0 AFB.
a) Spearman correlation coefficient was used to examined the relationship between TTD-RB and smear grade in pre-treatment specimens, smear grade and duration of treatment, and TTD-TB and</td></tr>
<tr><td>Outcomes measures and effect size</td><td>Time to detect TB using liquid culture / time spent in isolation
Inverse correlation was found between TTD-TB and smear grade -0.87, p<0.01. Duration of isolation closely followed the time to smear conversion.
Duration of treatment and TTD-TB correlation 0.801, p<0.01
Duration of treatment and smear grade correlation -0.552, p<0.01

Recommended duration of isolation (based on number of days of treatment required to increase TTD-TB to > 14 days)
<table>
<tr><td>Initial Smear Grade</td><td>Duration of Isolation for non severe disease*</td><td>Duration of isolation for severe disease**</td></tr>
</table>
</td></tr>
</table>

Bibliographic reference	New recommendations for the duration of respiratory isolation based on time to detect Mycobacterium tuberculosis in liquid culture. Eur Respir J, 30(3): 501-7

0	0 days	Until clinical improvement
1	7 days	Until clinical improvement after 7 days
2	7 days	Until clinical improvement after 7 days
3	14 days	28 days
4	25 days	42 days

*Based on time taken for 50% of patients to achieve TTD-TB > 14 days

**Based on time taken for 90% of patients to achieve TTD-TB > 14 days

Reduction in the duration of respiratory isolation in patients with sputum smear positive pulmonary tuberculosis using a newly proposed system based on TTD-TB data

Sputum smear	n	Median duration of hospital stay / days (IQR)	New recommendation – number of days
Grade 1	21	9 (3-25)	7
Grade 2	15	17 (11-21)	7
Grade 3	26	27 (18-37)	14(28)
Grade 4	81	38 (27-53)	25(42)

Source of funding	None mentioned
Comments	Diagnosis of TB was done through sputum smear, culture were performed with conventional Lowenstein-Jensen solid media and in BACTEC broth media For those in isolation sputum samples collected weekly (by policy). Once a sputum was negative, two other samples were

Bibliographic reference	New recommendations for the duration of respiratory isolation based on time to detect Mycobacterium tuberculosis in liquid culture. Eur Respir J, 30(3): 501-7
	collected.
Abbreviations: NZ: New Zealand, MGIT: mycobacterial growth indicator tube, TB: tuberculosis, TTD-TB: liquid culture diagnosis using the BACTEC 960; US: United States	

A.1.15 Wang 2009

Bibliographic reference	Factors influencing time to smear conversion in patients with smear-positive pulmonary tuberculosis. 2009; 14, 1012-19
Study type	Retrospective review (July 2003- to June 2007, 3years -11 months) Mycobacterial laboratory database was searched for all patients with culture-confirmed pulmonary TB. Among these patients, those whose initial sputum smear was acid fast stain positive were identified. Medical charts, including records of interviews with TB case managers, were then reviewed.
Study quality	The study sample represents the population of interest with regard to key characteristics, sufficient to limit potential bias to the results? *Unclear; authors mentioned there are potential limitations in patient selection because the study was conducted at a tertiary medical centre and at the local teaching hospital, and exclusion criteria not described* Loss of follow up is unrelated to key characteristics (that is, the study data adequately represent the sample), sufficient to limit potential bias. *Yes, reasons provided* The prognostic factor of interest is adequately measured in study participants, sufficient to limit potential bias. *Yes, blinding reported for chest specialist and radiologist who reviewed the chest X-ray* The outcome of interest is adequately measured in study participants, sufficient to limit potential bias *Yes,* Important potential confounders are appropriately accounted for, limiting potential bias with respect to the prognostic factor of interest *Unclear, authors did not mention how they control (or if) they intended to address potential confounders.* The statistical analysis is appropriate for the design of the study, limiting potential for the presentation of invalid results *Yes*
Number of patients	N=305

Bibliographic reference	Factors influencing time to smear conversion in patients with smear-positive pulmonary tuberculosis. 2009; 14, 1012-19
Patient characteristics	Mean age was 58.6 (range 11-95). Diabetes mellitus and malignancy were the most common comorbidities, 8 patients were HIV positive, 11 patients were carriers of HBV, 18 were HCV and 1 was infected with both. There were 26 patients with extrapulmonary involvement, 10 had disseminated TB. *Inclusion* • *All patients with culture confirmed pulmonary TB between July 2003 and June 2007* • *Among those whose initial sputum smear was AFS positive were identified* *Exclusion* • *Unclear*
Intervention	Standard TB treatment consisted of daily isoniazid, rifampicin, ethambutol and pyrazinamide in the first 2 months / initial phase (HERZ), followed by HER for 4 months / continuation phase
Location	National Taiwan University Hospital and Yun Lin branch - Taiwan
Approach to Analysis	'time to event analysis' (Survival) Graphs were generated using the Kaplan-Meier method and compared using the long rank test. If there was a significant difference ($p<0.05$), variables were included in the multivariate analysis, using Cox proportional hazard regression to identify factors independently associated with the time to sputum smear conversion after anti-TB treatment. Chi-square test was used to compare mortality rates among patients with or without smear conversion in 2 months.
Outcomes measures and effect size	AFS mycobacterial culture and drug susceptibility Time to sputum smear conversion was calculated from the beginning of ant-TB treatment to the date when the first of the three consecutive smear-negative samples was collected. Clinical characteristics (i.e. age, gender) comorbidities (i.e. diabetes, AIDS) alcoholism, smoking status, chest X-ray – location and pattern of lesion and presence or absence of cavity were recorded, drug resistance, smear grading, first months regime, laboratory testing for HBV, HCV, HIV Multivariate analysis revealed the following independent factors influencing time to sputum smear conversion: • Grade 4+ HR 0.5 (0.35-0.71), Grade 3+ HR 047 (0.33-0.66), Grade 2+ HR 0.6 (0.43-0.84) • Cavitation HR 0.26 (0.18-0.38)

Bibliographic reference	Factors influencing time to smear conversion in patients with smear-positive pulmonary tuberculosis. 2009; 14, 1012-19
	• First Two month regimen HR 0.46 (0.27-0.79)
Source of funding	None stated
Comments	The management protocol was not standardized (treatment was modified according to the presence of concomitant hepatic and/or renal disease, adverse effects and results of susceptibility testing) other clinically relevant information was not available. Potential limitation/bias on patient selection.
Abbreviations: AFS: Acid fast stain; TB: tuberculosis, HIV: human immunodeficiency virus; HBV hepatitis B virus; HCV: hepatitis C virus;	