

**MCHENRY COUNTY  
TUBERCULOSIS CARE AND TREATMENT BOARD MEETING  
2200 N. SEMINARY AVE. BUILDING A  
WOODSTOCK, ILLINOIS 60098**

**March 20, 2018  
8:00 AM**

**AGENDA**

1. Call to Order
2. Public Participation
3. Minutes from November 2017 meeting
4. Consent Agenda
  - A) Disbursements; November-December 2017 and January - February 2018
  - B) Income and Expense Report; November-December 2017 and January - February 2018
  - C) Stan's Contract (renewal)
5. Monthly Report
  - A) TB Nurse Report
  - B) Statistics
  - C) TB Profile
  - D) IDPH Report
6. Program Highlights
7. Old Business (For Discussion)
  - Health Department Renovation
8. New Business (For Discussion)
9. Board Issues (For Discussion)
10. Information and Communication (For Discussion)

Ai, J., Ruan, Q., Liu, Q., Zhang, W. (December 2016). Updates of the risk factors for latent tuberculosis reactivation and their managements. *Emerging Microbes and Infections*, 1-8.  
Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4777925/>
11. Executive Session
12. Adjournment

# MINUTES AND CONSENT AGENDA

**MCHENRY COUNTY TUBERCULOSIS AND TREATMENT BOARD**

**MEETING MINUTES**

**NOVEMBER 28, 2017**

**CALL TO ORDER:**

Marylou Ludicky RN MPH called the meeting to order at 8:05am; TB Board Members present were: James Mowery M.D, Marylou Ludicky RN MPH, and Rebecca Rockwood M.T; Staff present were: Michael Hill MPH, MPA, FACHE, CHES, Administrator, Susan Karras RN, BSN, MBA, Director of Nursing, Jennifer Schorsch, BS, RN, NE-BC, Assistant Director of Nursing, Sara Boline MPH Communicable Disease Coordinator, Amanda Kurka BSN RN, and Karen Stephenson TB RN.

**MINUTES:**

James Mowery M.D made motion to approve TB Board Minutes for September/October 2017; second by Rebecca Rockwood M.T.

**FINANCIAL STATUS:**

Marylou Ludicky RN MPH reviewed the Disbursements as well as the Income and Expense Report for September/October 2017. Rebecca Rockwood M.T made motion to approve; second by James Mowery M.D.

**MONTHLY REPORTS:**

Sara Boline MPH Communicable Disease Coordinator, reviewed TB Nurse Report for September/October 2017.

**Skin testing**

- In September 16 clinics were held with 45 clients tested
- In October 17 clinics were held with 63 clients tested

**Doctor clinic**

- On September 18<sup>th</sup>, Doctor's clinic was held with 7 chest x-rays and 14 charts reviewed
- On October 16<sup>th</sup>, Doctor's clinic was held with 11 chest x-rays and 19 charts reviewed

**Patient update**

- All 9 contacts of our XDR patient had their final evaluations and were discharged
- 38 year old gentleman on 12 week LTBI program was discharged

**Activities**

- PADS TB testing 10/17/17 at the center and 10/23/2017 at evening church sites

**Webinars/Trainings**

10/16/2017 Prednisone Attenuates IRIS in TB-HIV

10/17/2017 Point of Care Assay Zeros in on Drug-Resistant TB Mutations

10/24/2017 TB Vaccines Where are We & What Needs to be Done

10/25/2017 What's the Plus in Quantiferon

**OLD BUSINESS:**

**NEW BUSINESS:**

- A) New Assistant Nursing Director Jennifer Schorsch
- B) New TB Nurse Amanda Kurka
- C) Updates for Building B no resolution yet until December's meeting

**BOARD ISSUES:**

**INFORMATION:**

Cousins, Sophie. (2017, October 16). 3 innovations that could transform TB diagnosis and care. Retrieved from: <https://www.devex.com/news/3-innovations-that-could-transform-tb-diagnosis-and-care-91271>

**ADJOURNMENT:**

Marylou Ludicky RN MPH made motion to adjourn meeting at 8:30am; second by Rebecca Rockwood M.T.

**MCHENRY COUNTY HEALTH DEPARTMENT**  
**TB - DISBURSEMENTS**  
**November-December 2017 ~ Preliminary as of 1/8/2017**  
**SUMMARY**

PERSONAL SERVICES:	ACCT#	PAYROLL	
Acevedo, Lola	3010	\$ 7,188.74	
Cazares, Maria	3020	\$ 4,443.27	
Kurka, Amanda	3010	\$ 9,888.98	Name Changed from Appner
Schoen, Faith	3010	\$ 10,288.05	
Stephenson, Karen	3010	\$ 6,610.96	
	3025	Included in above	
FICA	3105	\$ 2,918.43	
IMRF	3110	\$ 3,929.46	
INSURANCE	3146	\$ 7,164.72	INS for Sept-Nov posted in Nov-17
Subtotal		52,432.61	12/29/17 Payroll not posted as of 1/8/18

DESCRIPTION:	ACCT #	AMOUNT
Contractual Services	4001	5,199.00
Assoc. Dues/Memberships	4005	
Training	4008	
Subscriptions	4008	
Printing	4055	
Telephone	4096	59.97
Rent	4101	
Maint. Agreements	4130	
Maint Office Equipment	4131	
Medical	4246	748.00
Special Consultants	4435	
Private Lab Services	4442	43.76
Refuse disposal	4449	50.00
Contingent	4570	
Office Supplies	5010	288.75
Office Equipment	5020	
Postage	5030	
Mileage	5040	187.25
Meeting Expenses	5050	64.71
Supplies	5070	500.00
Medical Supplies	5080	
Medication	5085	390.64
Fuel, oil, grease	5160	
TB Test Refund	8090	10.00
<b>TOTAL EXPENSES</b>		
Expense Total		7,542.08
<b>Grand Totals</b>	<b>\$</b>	<b>59,974.69</b>

**MC HENRY COUNTY HEALTH DEPARTMENT**  
**TB - DISBURSEMENTS**  
 November 2017 (FY17)~ Preliminary as of 12/19/2017

<u>Personal Service</u>	<u>ACCT #</u>	<u>PAYROLL</u>	
Acevedo, Lola	3010	\$2,850.00	
Cezares, Maria	3020	\$1,767.84	
Kurka, Amanda	3010	\$3,840.51	Name Changed from Appner to Kurka
Schoen, Faith	3010	\$4,086.00	
Stephenson, Karen	3010	\$2,624.60	
	3025	Included in above	
FICA	3105	\$1,188.08	
IMRF	3110	\$1,572.72	
INSURANCE	3146	\$5,373.64	INS for Sept-Nov posted in Nov-17
<b>Payroll Total</b>		<b>\$23,383.28</b>	

<u>VD</u>	<u>VENDOR</u>	<u>ACCT #</u>	<u>AMOUNT</u>
JE217882	HD Adm'n Charge - Q4	4001	\$5,000.00
VD317177	VERIZON WIRELESS	4096	\$31.05
VD317672	VERIZON WIRELESS	4096	\$28.92
VC285481	METRO INFECTIOUS DISEASE CONSULTANTS	4246	\$500.00
VC289035	MERCY HEALTH SYSTEM CORP	4246	\$248.00
VC285805	ACL LABORATORIES	4442	\$28.88
VC286177	ACL LABORATORIES	4442	\$16.90
VC286174	HEALTHCARE WASTE MANAGEMENT	4449	\$50.00
VD316860	WAREHOUSE DIRECT INC	5010	\$159.95
VD317072	WAREHOUSE DIRECT INC	5010	\$128.60
VD310861	PEREZ ANGELICA	5040	\$29.96
VD317289	STEPHENSON KAREN	5040	\$37.45
VD317289	ACEVEDO LOLA	5040	\$29.96
VD317289	ACEVEDO LOLA	5040	\$59.92
VD317289	PEREZ ANGELICA	5040	\$29.96
VD317179	KURKA AMANDA	5050	\$64.71
VD316861	WALMART WOODSTOCK	5070	\$500.00
VC285460	BRANDT PHARMACY INC	5085	\$8.09
VC285459	BRANDT PHARMACY INC	5085	\$87.70
VC285807	BRANDT PHARMACY INC	5085	\$105.24
VC285806	BRANDT PHARMACY INC	5085	\$35.08
VD317290	SMITH MEDICAL PARTNERS	5085	\$1.00
VD317290	SMITH MEDICAL PARTNERS	5085	\$0.20
VC286188	BRANDT PHARMACY INC	5085	\$50.09
VC286186	BRANDT PHARMACY INC	5085	\$70.16
VC286181	BRANDT PHARMACY INC	5085	\$35.08
VD316963	CALARA JAYSON	8090	\$10.00
<b>Total Expenses</b>			<b>\$7,343.08</b>
<b>Grand Total</b>			<b>\$30,726.37</b>

**MCHENRY COUNTY HEALTH DEPARTMENT**  
**TB - DISBURSEMENTS Preliminary as of**  
**December 2017 (FY18)**

<u>Personal Service</u>	<u>ACCT #</u>	<u>PAYROLL</u>	
Acevedo, Loia	3010	\$4,338.74	
Cazares, Maria	3020	\$2,675.43	
Kurka, Amanda	3010	\$5,948.47	
Schoen, Fallh	3010	\$6,202.05	
Stephenson, Karen	3010	\$3,986.36	
	3025	Included in above	
FICA	3105	\$1,750.35	
IMRF	3110	\$2,356.74	
INSURANCE	3146	\$1,791.18	Not posted as of 1/4/2018
		<hr/>	
	Payroll Total	\$29,049.32	12/29/17 Payroll not posted as of 1/8/18

VD  
VD317552

VENDOR  
STANS OFFICE MACHINES INC

	<u>ACCT #</u>	<u>AMOUNT</u>
	4001	\$199.00
		<hr/>
Total Expenses		\$199.00
<b>Grand Total</b>		<b>\$29,248.32</b>

TUBERCULOSIS CARE AND TREATMENT FY2017

ACCOUNT DESCRIPTION	FISCAL YEAR 2017												TOTAL	BALANCE	%
	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG			
TOTAL REVENUE	\$564,590	\$531,371	\$487,499	\$726,588	\$17,440,110	\$11,924,717	\$3,582,664	\$6,781,290	\$107,989,477	\$4,110,635	\$3,012,295	\$257,250,330	\$2,500,000	\$2,500,000	100%
NON-FINANCIAL REVENUE	\$564,590	\$531,371	\$487,499	\$726,588	\$17,440,110	\$11,924,717	\$3,582,664	\$6,781,290	\$107,989,477	\$4,110,635	\$3,012,295	\$257,250,330	\$2,500,000	\$2,500,000	100%
FINANCIAL REVENUE															
NET INCOME	\$35,024,651	\$18,050,500	\$20,461,531	\$24,662,500	\$10,742,461	\$8,707,083	\$7,634,658	\$16,511,200	\$85,520,500	\$54,746,377	\$27,419,537	\$277,703,423	\$310,392,299	\$310,392,299	100%
TOTAL EXPENSES	\$25,599,118	\$18,506,979	\$20,975,544	\$25,139,979	\$20,469,234	\$26,147,118	\$25,578,035	\$10,666,554	\$15,309,600	\$23,223,110	\$8,530,525	\$20,716,637	\$207,854,283	\$207,854,283	100%
BANK BALANCE	\$436,058.81	\$417,910.31	\$397,448.35	\$373,990.28	\$359,587.22	\$337,945.93	\$421,624.29	\$404,450.22	\$396,224.92	\$490,740.03	\$467,374.00	\$434,172.40			

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1/11/2018

Fund Balance

\$ 38,225.00	\$30,497.99	20.5%
\$ 376,076.00	\$108,221.62	71.2%

TUBERCULOSIS CARE AND TREATMENT FY2018

LINE ITEM	DEBIT	CREDIT	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	TOTAL	AMOUNT	BALANCE	%
700-PROPERTY TAXES														\$0.00	\$0.00	\$ 250,000.00	0.0%
900-RENT FOR SERVICES	\$150.00		\$200.00	\$350.00										\$700.00	\$ 6,000.00	\$ 5,250.00	12.8%
905														\$0.00	\$	\$	0.0%
910-MEDICAL														\$68.00	\$	(\$68.00)	#DTV/01
911-INTEREST INCOME	\$466.80		\$178.68											\$945.48	\$ 2,600.00	\$ 1,654.52	36.4%
921-INT-PAID ON INT														\$0.00	\$ 25.00	\$ 25.00	0.0%
9900														\$0.00	\$ 79,275.00	\$ 79,275.00	0.0%
TOTAL REVENUE	\$616.80		\$792.68	\$374.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,783.48	\$ 337,900.00	\$ 336,116.52	0.2%
300-REGULAR SALARIES	\$19,071.08		\$11,638.29	\$19,720.90										\$44,450.97	\$ 169,515.00	\$ 125,064.13	26.2%
300-PAID TIME SALARY	\$2,600.17		\$1,472.31	\$1,815.07										\$5,787.55	\$ 21,075.00	\$ 15,287.45	27.8%
305-Holiday	\$1,353.37		\$2,356.22											\$3,851.59	\$ 10,030.00	\$ 6,178.41	38.4%
300-OverTime	\$36.43													\$36.43	(\$36.43)	#DTV/01	
300-OverTime Pool														\$0.00	\$ 4,514.00	\$ 4,514.00	0.0%
3105-SOC-SEC-CITY SHARE	\$1,771.05		\$1,182.49	\$1,188.50										\$4,142.04	\$ 15,693.00	\$ 11,550.96	26.4%
3110-ILL-MINING NET FND	\$2,384.38		\$1,452.65	\$1,530.48										\$5,417.71	\$ 20,549.00	\$ 15,131.29	26.7%
3106-OUTSTANDING DEBIT														\$2,672.58	\$ 21,918.00	\$ 19,245.42	12.2%
PERSONNEL SUBTOTAL	\$37,288.69		\$20,853.14	\$38,274.95	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$66,418.77	\$ 263,200.00	\$ 196,881.23	25.2%
400-Contractual Services	\$199.00													\$199.00	\$ 20,500.00	\$20,301.00	1.0%
400-ASSOC.DIRECTOR/AF														\$0.00	\$ 350.00	\$350.00	0.0%
400-TRAINING														\$0.00	\$ 500.00	\$500.00	0.0%
400-INTERCONTRIS														\$0.00	\$	\$	0.0%
405-PRINTING	\$39.04		\$39.04											\$39.08	\$ 300.00	\$260.92	13.0%
406-TELEPHONE	\$28.18		\$32.89											\$61.07	\$ 500.00	\$438.93	12.2%
410-POST														\$0.00	\$	\$	0.0%
410-MAINTENANCE AGREEMENT	\$76.71													\$26.71	\$ 1,500.00	\$1,473.29	1.8%
411-MAINTENANCE SERVICE EQUIP														\$0.00	\$ 300.00	\$300.00	0.0%
412-MEDICAL	\$906.00		\$1,000.00											\$1,906.00	\$ 30,000.00	\$28,094.00	6.0%
413-Supplies and Maintenance														\$0.00	\$	\$	0.0%
414-LAB	\$71.15													\$71.15	\$ 1,000.00	\$928.85	0.7%
440-ADVISORY DISCOUNT														\$0.00	\$ 600.00	\$600.00	0.0%
440-Contingent Fee Expense														\$0.00	\$	\$	0.0%
CONTRACTUAL SUBTOTAL	\$199.00		\$899.97	\$1,016.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,139.61	\$ 55,550.00	\$53,410.99	3.9%
500-OFFICE EQUIPMENT														\$0.00	\$ 1,000.00	\$1,000.00	0.0%
500-Printer														\$0.00	\$	\$	0.0%
500-MEDICAL	\$29.32		\$136.46											\$196.58	\$ 50.00	\$38.00	0.0%
500-MEETING EXPENSE														\$0.00	\$ 2,500.00	\$2,303.52	7.2%
500-SUPPLIES														\$0.00	\$ 1,000.00	\$1,000.00	0.0%
500-MEDICAL SUPPLIES														\$0.40	\$ 3,000.00	\$2,999.60	0.0%
500-MEDICATION	\$926.46		\$760.28											\$1,687.04	\$ 10,000.00	\$8,312.96	16.2%
5115 Computer components under 50K														\$0.00	\$	\$	0.0%
5122 Computer software under 50K														\$0.00	\$	\$	0.0%
5100-Travel														\$0.00	\$	\$	0.0%
530-REPLICATIONS														\$0.00	\$	\$	0.0%
599-PRINTING														\$0.00	\$	\$	0.0%
599-PRINTING														\$0.00	\$	\$	0.0%
COMMODITIES SUBTOTAL	\$2.00		\$986.38	\$897.44	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,883.82	\$ 19,050.00	\$17,166.18	9.2%
TOTAL EXPENSES	\$27,487.63		\$22,741.49	\$20,212.43	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$70,441.60	\$ 337,900.00	\$367,458.40	20.8%
NET INCOME	(\$26,870.83)		(\$21,948.81)	(\$19,438.43)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	(\$68,658.12)			
BANK BALANCE															3/31/2018		

**MCHENRY COUNTY HEALTH DEPARTMENT**

**TB - DISBURSEMENTS**

**January- February 2018 (FY18)**

**SUMMARY ~ as of 3/8/2018**

<b>PERSONAL SERVICES:</b>	<b>ACCT#</b>	<b>PAYROLL</b>	
Acevedo, Lola	3010	\$	5,829.03
Cazares, Maria	3020	\$	3,556.14
Kurka, Amanda	3010	\$	7,881.02
Schoen, Faith	3010	\$	8,355.01
Stephenson, Karen	3010	\$	5,372.19
	3025		Included in above
FICA	3105	\$	2,370.99
IMRF	3110	\$	3,093.13
<b>INSURANCE</b>	<b>3146</b>	<b>\$</b>	<b>2,672.58</b>
<b>TOTAL PAYROLL</b>			<b>39,130.09</b>

Feb-18 INS not  
posted as of 3/8/18

<b>DESCRIPTION:</b>	<b>ACCT #</b>	<b>AMOUNT</b>
Contractual Services	4001	\$ -
Assoc. Dues/Memberships	4005	\$ -
Training	4006	\$ -
Subscriptions	4008	\$ -
Printing	4055	\$ 39.08
Telephone	4096	\$ 61.07
Rent	4101	\$ -
Maint Agreements	4130	\$ 26.71
Maint Office Equipment	4131	\$ -
Medical	4246	\$ 2,678.00
Special Consultants	4435	\$ -
Private Lab Services	4442	\$ 7.15
Refuse disposal	4449	\$ -
Contingent	4570	\$ -
Office Supplies	5010	\$ -
Office Equipment	5020	\$ -
Postage	5030	\$ -
Mileage	5040	\$ 300.71
Meeting Expenses	5050	\$ -
Supplies	5070	\$ -
Medical Supplies	5080	\$ 0.40
Medication	5085	\$ 1,687.04
TB Test Refund	8090	\$ 10.00
<b>TOTAL EXPENSES</b>		<b>\$ 4,810.16</b>

**Grand Total \$ 43,940.25**

MCHENRY COUNTY HEALTH DEPARTMENT

TB - DISBURSEMENTS

January 2018 (FY18) ~ as of 2/8/2018

<u>Personal Service</u>	<u>ACCT #</u>	<u>PAYROLL</u>
Acevedo, Lola	3010	\$2,914.52
Cazares, Maria	3020	\$1,741.07
Kurka, Amanda	3010	\$3,940.51
Schoen, Faith	3010	\$4,177.50
Stephenson, Karen	3010	\$2,683.82
	3025	Included in above
FICA	3105	\$1,182.49
IMRF	3110	\$1,542.65
INSURANCE	3146	\$2,672.58
	Payroll Total	<u>\$20,855.14</u>

<u>VD</u>	<u>VENDOR</u>	<u>ACCT #</u>	<u>AMOUNT</u>
VD317933	GUGLE JOSEPH E	4055	\$39.08
VD318200	VERIZON WIRELESS	4096	\$28.18
VD317940	ANSERCALL 24 LLC	4130	\$26.71
VC286749	MERCY HEALTH SYSTEM CORP OMI	4246	\$124.00 FY17 ~ Backdated to Nov-17
VC286748	MERCY HEALTH SYSTEM CORP OMI	4246	\$248.00 FY17 ~ Backdated to Nov-17
VC286747	METRO INFECTIOUS DISEASE CONSULTANTS	4246	\$500.00 FY17 ~ Backdated to Nov-17
VC287289	MERCY HEALTH SYSTEM CORP OMI	4246	\$806.00
VD317936	KURKA AMANDA	5040	\$104.33 FY17 ~ Backdated to Nov-17
VD317937	ACEVEDO LOLA	5040	\$29.96
VD317937	PEREZ ANGELICA	5040	\$29.96
VC286751	BRANDT PHARMACY INC	5085	\$422.43
VC286750	BRANDT PHARMACY INC	5085	\$52.62
VC286756	BRANDT PHARMACY INC	5085	\$128.87
VC286793	BRANDT PHARMACY INC	5085	\$87.70
VC287257	BRANDT PHARMACY INC	5085	\$76.25
VC287255	BRANDT PHARMACY INC	5085	\$58.71
VC287288	BRANDT PHARMACY INC	5085	\$99.88
	Expense Total		<u>\$2,862.68</u>
	Grand Total		<u>\$23,717.82</u>

**MCHENRY COUNTY HEALTH DEPARTMENT**  
**TB - DISBURSEMENTS**  
**February 2018 (FY18) as of 3/8/2018**

<u>Personal Service</u>	<u>ACCT #</u>	<u>PAYROLL</u>	
Acevedo, Lola	3010	\$2,914.51	
Cazares, Maria	3020	\$1,815.07	
Kurka, Amanda	3010	\$3,940.51	
Schoen, Faith	3010	\$4,177.51	
Stephenson, Karen	3010	\$2,688.37	
	3025	Included in above	
FICA	3105	\$1,188.50	
IMRF	3110	\$1,550.48	
INSURANCE	3146	\$0.00	Not Posted as of 3/8/18
	<b>Payroll Total</b>	<b>\$18,274.95</b>	

<u>VD</u>	<u>VENDOR</u>	<u>ACCT #</u>	<u>AMOUNT</u>
VD318659	VERIZON WIRELESS	4096	\$32.89
VC287686	METRO INFECTIOUS DISEASE CONSULTANTS	4246	\$500.00
VC287687	METRO INFECTIOUS DISEASE CONSULTANTS	4246	\$500.00
VC287913	ACL LABORATORIES	4442	\$7.15
VD318465	PEREZ ANGELICA	5040	\$30.52
VD318402	KURKA AMANDA	5040	\$47.62
VD318608	ACEVEDO LOLA	5040	\$30.52
VD318656	KURKA AMANDA	5040	\$11.99
VD318740	STEPHENSON KAREN	5040	\$15.81
VD318663	R&S NORTHEAST LLC	5080	\$0.40
VC287914	BRANDT PHARMACY INC	5085	\$76.25
VC287912	BRANDT PHARMACY INC	5085	\$70.16
VC287911	BRANDT PHARMACY INC	5085	\$544.01
VC288094	BRANDT PHARMACY INC	5085	\$70.16
VD318621	FREITES MARIA	8090	\$10.00
	<b>Expense Total</b>		<b>\$1,947.48</b>
	<b>Grand Total</b>		<b>\$20,222.43</b>

# IDPH TB Report

## Presented at last NIPHC meeting 2/21/2018 from Elaine Darnall

### I. Number of Cases

There have been 18 cases of active TB reported and confirmed as of 2/21/18. Compared to the same week last year, there were 20 cases reported.

	<u>2018 totals</u>
DuPage County	4
Kane County	0
Kendall	0
Lake County	1
McHenry	0
Will County	0
Winnebago	0
Suburban Cook	6
Chicago	6

### II. Drug Resistance

For 2017, of the 337 cases reported, 251 were culture positive. 219 (87.3%) had drug susceptibilities completed with 24 showing single drug resistance.

INH resistance: 19

RIF resistance: 1

PZA resistance: 4

Streptomycin resistance: 1

For 2018, of the 18 cases reported thus far, 11 were culture positive 6 have had susceptibilities completed 1 showing single drug resistance

### III. Dead at Diagnosis or Died on Therapy

For 2017, of the 337 cases reported, 11 dead at diagnosis and 23 died during treatment.

For 2018, of the 18 cases reported thus far, 1 case died during therapy.

## BOH CONTRACT SUMMARY

- New Contract  
 Renewal  
 Amended Renewal

<b>NAME OF ORGANIZATION</b>	Stan's Office Technologies – Agreement #701202 AUI#101471	
<b>EFFECTIVE DATES OF CONTRACT</b>	3/14/18 – 3/13/19	
<b>BRIEF DESCRIPTION OF CONTRACT PURPOSE</b>	Service Agreement for RICOH MP201SPF Copier/Printer/Scanner/Fax	
<b>MCDH DEPT/STAFF INVOLVED</b>	TB Program	
<b>FINANCIAL TERMS</b>	2018	2017
	\$265/year 10,000 pages \$.0180 additional pages	\$255/year 10,000 pages \$.0170 additional pages
<b>INDEMNIFICATION CLAUSE?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<b>SPECIAL ARRANGEMENTS, REQUIREMENTS, CONDITIONS</b>	<ul style="list-style-type: none"> <li>• Black toner supplied</li> <li>• Stan's will maintain equipment in good working order</li> <li>• On-going maintenance: Lubrication Cleaning Adjustment and Replacement of parts which are unserviceable</li> </ul>	



Main Office: 2370 S. Eastwood Dr., Woodstock, IL  
Wisconsin Office: 1400 Willametal Road - Suite 120, Beloit  
Phone: (815) 831-0520 www.stans.com

Agreement #701202  
AUI#101471

### BUSINESS EQUIPMENT SERVICE AGREEMENT WITH TONER

This agreement, commencing on the 14<sup>th</sup> day of March 2018 by and between *Stan's - LPS Midwest*, hereafter for brevity called "*Stan's*" and *McHenry County Health Department*, 2200 N Seminary Avenue, Woodstock, Illinois 60098, herein for brevity called "*Customer*".

*Stan's* agrees to provide service, black toner (based on 6% - 8 ½ x 11 image area, additional toner may be purchased based on actual consumption), parts and consumable products (excluding staples and paper) as described below relating to one **Ricoh MP201SPF Printer/Copier #3019605786** with options located at **Communicable Disease - Annex B Room A101**. Excess toner consumption is subject to rate negotiation. Any unused supplies, provided by *Stan's*, remains the property of *Stan's*.

**DESCRIPTION OF COVERED SERVICE:** During the period of service availability, *Stan's* will maintain in good working order all equipment covered by this agreement, in accordance with its service policies. Service will include:

- A. Unscheduled repairs upon request by the *Customer* during *Stan's* normal working hours
- B. Ongoing maintenance as defined by current *Stan's* preventive maintenance service policies applicable to the respective products which include: LUBRICATION, CLEANING, ADJUSTMENT, AND THE REPLACEMENT OF PARTS WHICH ARE UNSERVICEABLE.

**DESCRIPTION OF SERVICES NOT COVERED:**

- A. Service needed as a result of the use of inferior or generic toner.
- B. Services resulting from fire, water, food spills, acts of God, lightning, abuse or damage to the machine (including scratches to and overexposure of the photo conductor drum).
- C. Installation of accessories, attachments, or other devices.
- D. Performance of normal operator functions as described in the manufacturer's operator manuals.
- E. Repair of damage from any cause other than ordinary use, except damage caused by the sole negligence of *Stan's*.
- F. Increase in service time resulting from neglect or unique applications.
- G. *Stan's* is not liable for costs related to pages made on any substitute equipment, if the equipment covered by this agreement, is inoperable or inaccessible.
- H. Service or parts required as a result of non-existent and/or disconnection of power protection device.
- I. Software/Network support, including software training, changes in software, network configurations, workstation configurations, driver updates and internet service provider changes.
- J. Major overhauls.
- K. Shipping/Handling of supplies.

**RELOCATION OF EQUIPMENT:** *Customer* will be liable for all costs associated with any equipment relocation requested by the *Customer*. These costs will include all applicable installation and removal charges, special rigging charges, and technical representative and labor charges. *Stan's* shall be under no obligation to provide maintenance of any equipment which is relocated outside its geographic service area. *Stan's* will assist the *Customer* in obtaining service from other qualified dealers outside this area. *Stan's* must be notified in writing if the geographic location of the equipment is changed.

**SERVICE HOURS:** Service is to be performed during normal business hours (8:30 A.M. to 4:30 P.M. daily), not including Saturdays, Sundays and Holidays.

**DELAYS OR INABILITY TO PERFORM SERVICE:** *Stan's* will not be responsible for delays or inability to perform service due to strikes, accidents, embargoes, acts of war or terrorism, acts of God or any other event beyond its control. In the event the manufacturer discontinues producing parts for this equipment, *Stan's* shall make every effort to obtain suitable replacement parts from other sources. Should *Stan's* be unable to obtain critical parts or suitable replacements to keep the equipment operable, *Stan's* will offer a pro-rated credit on the remaining service agreement.

**ACCESSORIES:** Any accessory purchased from *Stan's* for which service pricing is available will automatically be added to the service agreement. The term of the agreement with respect to such accessories will be concurrent with the term of the original agreement.

# MONTHLY REPORT

# MCDH TB Nurse Report

November/ December 2017

## Skin Testing

- In November 16th clinics were held with 39 clients tested
- In December 15 clinics were held with 47 clients tested

## Doctor Clinic

- On November 13th Doctors clinic was held with 9 chest x-rays and 26 charts reviewed.
- On December 22 Doctors clinic was held with 13 chest x-rays and 25 charts reviewed.

## Patient Update

On 12/18: admitted 35 year old possible Active case on daily DOT

On 12/27/17 culture ID Mycobacterium kansasii and gastri

He was discharged 12/28/17

## Activities

Old firehouse 11/6/17 11 people were tested

Inservice on TB testing November 16<sup>th</sup> at Valley HI Nursing home

NITCA Conference at DuPage County November 16<sup>th</sup>

Pads TB testing 12/11/17 at evening church site 7 people were tested

## Webinars/Trainings:

12/6/2017	Use of EMR's Benefits and Challenges
12/6/2017	Understanding TB Diagnosis Guidelines
12/7/2017	TB Program Evaluation network

## Up-coming events

MCDH annual TB testing January 9th

Pads Day site testing January 8th and 11th

Pads evening testing at evening church sites January 24th and 26th

Outreach Old Firehouse Assistance Center TB testing scheduled Feb 20th & 23rd.

# MCDH TB Nurse Report

January/ February 2018

## Skin Testing

- In January 14 clinics were held with 107 clients tested
- In February 14 clinics were held with 52 clients tested

## Doctor Clinic

- On January 22 Doctors clinic was held with 7 chest x-rays and 15 charts reviewed.
- No doctor clinic was held in February

## Patient Update

ON 2/05 we admitted 27 year old possible Active case on daily DOT

On 2//18/18 culture ID Mycobacterium gordonae

PT was discharged 02/18/18

## Activities

Pads TB testing 1/8/18 and 1/11/17

Pads evening testing sites 1/24/18 and 1/26/18 and 2/13/18 and 2/15/18

Old firehouse 2/20/2018 and 2/23/2018

A total of 30 clients were tested

## Webinars/Trainings:

02/14/2018	TB Treatment for Prisoners found Inferior
02/14/2018	Drug-Resistant TB on the Rise in These Four Countries
02/14/2018	Closer Look at Household Contacts Finds more TB Cases

## Up-coming events

Pads Day site testing March 13<sup>th</sup> and 16<sup>th</sup>

Pads testing at evening church sites March 13<sup>th</sup> and March 15<sup>th</sup>

Outreach Old Firehouse Assistance Center TB testing scheduled April 17<sup>th</sup> and 20<sup>th</sup>

TB Summit Verona Wi, on March 22 through the Southwestern National Tuberculosis Center. This is now the new Regional center for Illinois

TUBERCULOSIS PROGRAM MONTHLY REPORT FY 2017

EDUCATION

TB STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16	
<b>PRESENTATIONS</b>															
# of Presentations													1	1	3
# of Attendees													9	9	185
<b>1:1 EDUCATION (PUBLIC &amp; HCPs) (HOURS)</b>															
Phone contacts	6.16	6.84	7.92	8.67	7.5	9.91	6.25	3.92	6.08	5.17	7	5.33	79.75	96.09	
Face to Face contacts (@MCDH)	10.09	19.92	13.83	15.25	15.25	13.83	15.92	15.42	25.33	11.75	31	16.59	204.18	191.32	
Case Mangement	5.25	7.09	10.75	4.75	8.17	7.75	7.67	5.75	6.5	7	6.58	4.33	75.01	109.07	
TB Board Meeting Prep		2		2		2				2		2	10	5.75	

TESTING

TB SKIN TEST STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
<b>MCDH (Annex B)</b>														
# of Clinics	18	16	16	18	15	17	17	16	18	16	17	16	200	199
# of IGRAs														
# of skin tests	53	87	46	58	52	34	36	46	93	45	63	39	652	703
<b>Outreach Testing</b>														
<b>PADS / Old Firehouse</b>														
RN time	5.5	4.5	6.5	5.5	7	7		2.5			4	2	44.5	45.5
# of site visits	2	2	3	2	2	2		2			4	2	21	17
# of skin tests	6	5	3	3	2	6		9			20	11	65	35
<b>Contact Investigation Testing</b>														
RN time														
# of site visits														
# of skin tests														
<b>Total Skin Tests</b>	<b>59</b>	<b>92</b>	<b>49</b>	<b>61</b>	<b>54</b>	<b>40</b>	<b>36</b>	<b>55</b>	<b>93</b>	<b>45</b>	<b>83</b>	<b>50</b>	<b>717</b>	<b>761</b>

POSITIVE SKIN TEST STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
Positive skin tests/Outside agency	4	2		1	6	1	6	1	1	1	2		25	23
Positive skin tests /MCDH clinics	1	1	1	1		1		1	1	2	1	1	11	6
Positive skin tests/PADS														
Positive skin tests /Outreach Sites														
Positive skin tests/Contacts														
<b>Total</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>2</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>36</b>	<b>29</b>
<b>County Positive Skin Test Rate*</b>	<b>1.63</b>	<b>0.98</b>	<b>0.33</b>	<b>0.65</b>	<b>1.95</b>	<b>0.65</b>	<b>1.95</b>	<b>0.65</b>	<b>0.65</b>	<b>0.98</b>	<b>0.98</b>	<b>0.33</b>	<b>11.71</b>	<b>9.44</b>

DIAGNOSTIC STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
X-Rays Ordered	7	4	9	7	5	5	6	6	4	5	5	5	68	63
Sputum Collected		9	9			6	6		6	3	3		42	12
Laboratory Tests Ordered	4	1	3	10	2	4	1	2	6	5	3	2	43	17

MD CLINIC (HOURS)

MD CLINIC (HOURS)	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
Pre Clinic RN Prep Time		2.83	2.5	1	1	5.58	1	2.75	2.75	4.33	4	1.5	29.24	36.93
Pre Clinic Clerical Prep Time		14.25	16.75	3.5	2.5	2.75	3.5	1.5	1.25	16.5	13.25	10.75	86.5	184.25
<b>Total Pre Clinic Prep Time</b>		<b>17.08</b>	<b>19.25</b>	<b>4.5</b>	<b>3.5</b>	<b>8.33</b>	<b>4.5</b>	<b>4.25</b>	<b>4</b>	<b>20.83</b>	<b>17.25</b>	<b>12.25</b>	<b>116.7</b>	<b>221.2</b>
<b>Total Clinic Time</b>		<b>2</b>		<b>2</b>	<b>3.25</b>	<b>2.17</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1.58</b>	<b>19</b>	<b>25.08</b>
Post Clinic RN Time		3		2.5	2.33	1.5	2	2.5	1	2.83	2.5	2	22.16	30.58
Post Clinic Clerical Time		18.75		13.25	11.5	9.25	10.25	8.75	4.5	7.5	6.75	4.25	94.75	180.42
<b>Total Post Clinic Contact</b>		<b>21.75</b>		<b>15.75</b>	<b>13.83</b>	<b>10.75</b>	<b>12.25</b>	<b>11.25</b>	<b>5.5</b>	<b>10.33</b>	<b>9.25</b>	<b>6.25</b>	<b>116.9</b>	<b>211</b>
<b>Total</b>		<b>40.83</b>	<b>19.25</b>	<b>22.25</b>	<b>20.58</b>	<b>21.25</b>	<b>17.75</b>	<b>16.5</b>	<b>10.5</b>	<b>33.16</b>	<b>29.5</b>	<b>20.08</b>	<b>251.7</b>	<b>457.3</b>

LTBI

PREVENTIVE STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
Positive clients transferred into county														
Positive Interviews	7	4	6	7	5	5	6	2	2	2	5	2	53	70
Clients Starting LTBI	3	1	3	10	1	2	2	1	2	3	2	1	31	25

\*Rate is per 100,000 using the 2016 estimated census population of 307,357 from the US Census Bureau

CLIENTS STARTING LTBI	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
<b>GENDER</b>														
Male	1	1	1	4		1	1	1	1	1			12	5
Female	2		2	6	1	1	1		1	2	2	1	19	20
<b>AGE</b>														
Children (0-18 years)	1			3					1				5	2
Adult (19-64 years)	2	1	2	6	1	1	1	1	1	3	2	1	22	22
Senior Adult (65+ years)			1	1		1	1						4	1
<b>FOREIGN BORN</b>														
Yes	3		3	9	1	2	2			2	1	1	24	14
No		1		1				1		1	1		5	11

TREATMENT COMPLETION	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
Clients Completing LTBI	1	1	4					2			1	2	11	7
Failure to Complete		2				1	3			3	1	9	19	21
Moved		1								1			2	3
Lost to F/U							3				1	9	13	16
Declined- Personal						1				2			3	
Declined-Medical		1											1	2
Deceased														
Other														

**ACTIVE TB**

ACTIVE TB STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
# Active TB Cases Identified														1
County Active TB rate*														0.325
Active Cases Transferred OUT of McHenry County														1
Active Cases Transferred INTO McHenry County														2
Total Active TB Caseload*	1	1											1	2
DOT Visits	21	14											35	205
DOT Visit/Travel Time (Hours)	10.5	6.5											17	135.5
# TB Contact Investigations Initiated														
# Suspects Investigated														

\*Number does not accumulate, it reflects the number of people for whom the DOT visits and DOT time account for

TREATMENT COMPLETION	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
Cases Completing Active TB Medication		1											1	
Failure to Complete														
Moved														
Lost to F/U														
Declined- Personal														
Declined-Medical														
Deceased														
Other														

RESISTANCE CLASSIFICATIONS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
#MDR Cases Identified														
#XDR Cases Identified														

ACTIVE TB STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 17	YTD 16
<b>LOCATION OF ACTIVE TB IDENTIFIED</b>														
Pulmonary														
Extrapulmonary														1
<b>GENDER</b>														
Male														1
Female														
<b>AGE</b>														
Children (0-18 years)														
Adult (19-64 years)														1
Senior Adult (65+ years)														
<b>FOREIGN BORN</b>														
Yes														1
No														

\*Rate is per 100,000 using the 2016 estimated census population of 307,357 from the US Census Bureau

TUBERCULOSIS PROGRAM MONTHLY REPORT FY 2018

EDUCATION

TB STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
<b>PRESENTATIONS</b>														
# of Presentations														
# of Attendees														
<b>1:1 EDUCATION (PUBLIC &amp; HCPs) (HOURS)</b>														
Phone contacts	3.24	4.84	7.75										15.83	13
Face to Face contacts (@MCDH)	19.75	23.5	19.66										62.91	30.01
Case Mangement	3.33	0.67	6.25										10.25	12.34
TB Board Meeting Prep		2											2	2

TESTING

TB SKIN TEST STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
<b>MCDH (Annex B)</b>														
# of Clinics	15	14	14										43	34
# of IGRAs														
# of skin tests	47	107	52										206	140
<b>Outreach Testing</b>														
<b>PADS / Old Firehouse</b>														
RN time	3.5	4.75	8.25										16.5	10
# of site visits	2	4	4										10	4
# of skin tests	7	17	16										40	11
<b>Contact Investigation Testing</b>														
RN time														
# of site visits														
# of skin tests														
<b>Total Skin Tests</b>	<b>54</b>	<b>124</b>	<b>68</b>										<b>246</b>	<b>151</b>

POSITIVE SKIN TEST STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
Positive skin tests/Outside agency		2	1										3	6
Positive skin tests /MCDH clinics	3	1											4	2
Positive skin tests/PADS														
Positive skin tests /Outreach Sites														
Positive skin tests/Contacts														
<b>Total</b>	<b>3</b>	<b>3</b>	<b>1</b>										<b>7</b>	<b>8</b>
<b>County Positive Skin Test Rate<sup>A</sup></b>	<b>0.98</b>	<b>0.98</b>	<b>0.33</b>										<b>2.28</b>	<b>2.60</b>

DIAGNOSTIC STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
X-Rays Ordered	16	5	5										26	11
Sputum Collected	3		9										12	9
Laboratory Tests Ordered	2	4	2										8	5

MD CLINIC (HOURS)

MD CLINIC (HOURS)	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
Pre Clinic RN Prep Time	3.17	1.25	1										5.42	2.83
Pre Clinic Clerical Prep Time	2.5	2.75	3.25										8.5	14.25
<b>Total Pre Clinic Prep Time</b>	<b>5.67</b>	<b>4</b>	<b>4.25</b>										<b>13.92</b>	<b>17.08</b>
<b>Total Clinic Time</b>	<b>1</b>	<b>1</b>											<b>2</b>	<b>2</b>
Post Clinic RN Time	3	1.58											4.58	3
Post Clinic Clerical Time	5.25	6.75											12	18.75
<b>Total Post Clinic Contact</b>	<b>8.25</b>	<b>8.33</b>											<b>16.58</b>	<b>21.75</b>
<b>Total</b>	<b>14.92</b>	<b>13.33</b>	<b>4.25</b>										<b>32.5</b>	<b>40.83</b>

LTBI

PREVENTIVE STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
Positive clients transferred into county														
Positive Interviews	16	5	3										24	11
Clients Starting LTBI	3	4	2										9	4

<sup>A</sup>Rate is per 100,000 using the 2015 estimated census population of 307,367 from the US Census Bureau

CLIENTS STARTING LTBI	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
<b>GENDER</b>														
Male	1	2	1										4	2
Female	2	2	1										5	2
<b>AGE</b>														
Children (0-18 years)														1
Adult (19-64 years)	3	4	1										8	3
Senior Adult (65+ years)			1										1	
<b>FOREIGN BORN</b>														
Yes	1	3											4	3
No	2	1	2										5	1

TREATMENT COMPLETION	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
Clients Completing LTBI	1	2											3	1
Failure to Complete		1											1	2
Moved														1
Lost to F/U		1											1	
Declined- Personal														
Declined-Medical														1
Deceased														
Other														

**ACTIVE TB**

ACTIVE TB STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
# Active TB Cases Identified														
County Active TB rate*														
Active Cases Transferred OUT of McHenry County														
Active Cases Transferred INTO McHenry County														
Total Active TB Caseload*														1
DOT Visits	7		4										11	35
DOT Visit/Travel Time (Hours)	4.25		2.5										6.75	17
# TB Contact Investigations Initiated														
# Suspects Investigated	1												1	

\*Number does not accumulate, it reflects the number of people for whom the DOT visits and DOT time account for

TREATMENT COMPLETION	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
Cases Completing Active TB Medication														1
Failure to Complete														
Moved														
Lost to F/U														
Declined- Personal														
Declined-Medical														
Deceased														
Other														

RESISTANCE CLASSIFICATIONS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
#MDR Cases Identified														
#XDR Cases Identified														

ACTIVE TB STATISTICS	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YTD 18	YTD 17
<b>LOCATION OF ACTIVE TB IDENTIFIED</b>														
Pulmonary														
Extrapulmonary														
<b>GENDER</b>														
Male														
Female														
<b>AGE</b>														
Children (0-18 years)														
Adult (19-64 years)														
Senior Adult (65+ years)														
<b>FOREIGN BORN</b>														
Yes														
No														

\*Rate is per 100,000 using the 2015 estimated census population of 307,357 from the US Census Bureau



**McHENRY COUNTY DEPARTMENT OF HEALTH**

**McHenry County TB Board**

Mary Lou Ludicky RN, MPH  
 President  
 James Mowery, M.D.  
 Vice-President  
 Rebecca Rockwood, MT (ASCP)  
 Secretary  
 Irfan Hafiz, M.D.  
 Medical Director

**Tuberculosis Care and Treatment Program**

2200 N. Seminary Avenue, Annex B  
 Woodstock, Illinois 60098  
 (815) 334-4500  
 Fax (815) 334-0191

**Tuberculosis Profile**

**McHenry County TB Cases and Rates as of 1/11/2018**

Year	Confirmed Active Cases	Male	Female	Pulmonary and Pleural	Extrapulmonary	Rate/100,000
2007	5	2	3	3	2	1.61
2008	5	4	1	2	3	1.59
2009	3	3	0	2	1	0.95
2010	0	0	0	0	0	0
2011	4	3	1	4	0	1.29
2012	2	2	0	1	1	0.65
2013	1	1	0	1	0	0.32
2014	5	3	2	4	1	1.62
2015	1	0	1	1	0	0.32
2016	1	1	0	0	1	0.32
2017	0	0	0	0	0	0

**TB Cases and Rates-US, Illinois, McHenry County, 2007-2016<sup>^</sup>**

Year	Case Count			Rate/100,000		
	US	Illinois	McHenry Co.	US	Illinois	McHenry Co.
2007	13,293	521	5	4.4	4.1	1.61
2008	12,906	466	5	4.2	3.6	1.59
2009	11,545	418	3	3.8	3.2	0.95
2010	11,181	372	0	3.6	2.8	0
2011	10,528	359	4	3.4	2.9	1.29
2012	9,945	347	2	3.2	2.7	0.65
2013	9,588	327	1	3.03	2.54	0.32
2014	9,412	320	5	3.0	2.49	1.62
2015	9,563	344	1	2.98	2.67	0.32
2016	9,287	342	1	2.9	2.66	0.32

<sup>^</sup>Data Obtained from: Illinois Department of Public Health, Map of Illinois Case Rates found at <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/tuberculosis>

## IDPH TB report

Presented at last NIPHC meeting 12/20/2017 from Elaine Darnall

### I. Number of Cases

There have been 284 cases of active TB reported and confirmed as of Monday, Dec 18. Compared to the same week last year, there were 296 cases. We have 12 less cases than the number reported this week last year.

	<u>2017 to date</u>
DuPage County	35
Kane County	15
Kendall	3
Lake County	9
McHenry	0
Will County	9
Winnebago	2
Suburban Cook	61
Chicago	115

### II. Drug Resistance

Of the 284 cases reported thus far, 221 were culture positive. 184 (83.3%) had drug susceptibilities completed with 23 showing single drug resistance.

INH resistance: 15

PZA resistance: 7

Streptomycin resistance: 1

### III. Dead at Diagnosis or Died on Therapy

Of the 284 cases reported thus far, 29 cases were either dead at dx, or died during therapy.

# **PROGRAM HIGHLIGHTS**

# OLD BUSINESS

# NEW BUSINESS

# BOARD ISSUES

# INFORMATION



## REVIEW

# Updates on the risk factors for latent tuberculosis reactivation and their managements

Jing-Wen Ai, Qiao-Ling Ruan, Qi-Hui Liu and Wen-Hong Zhang

The preventive treatment of latent tuberculosis infection (LTBI) is of great importance for the elimination and control of tuberculosis (TB) worldwide, but existing screening methods for LTBI are still limited in predicting the onset of TB. Previous studies have found that some high-risk factors (including human immunodeficiency virus (HIV), organ transplantation, silicosis, tumor necrosis factor- $\alpha$  blockers, close contacts and kidney dialysis) contribute to a significantly increased TB reactivation rate. This article reviews each risk factor's association with TB and approaches to address those factors. Five regimens are currently recommended by the World Health Organization, and no regimen has shown superiority over others. In recent years, studies have gradually narrowed down to the preventive treatment of LTBI for high-risk target groups, such as silicosis patients, organ-transplantation recipients and HIV-infected patients. This review discusses regimens for each target group and compares the efficacy of different regimens. For HIV patients and transplant recipients, isoniazid monotherapy is effective in treating LTBI, but for others, little evidence is available at present.

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**Keywords:** Latent tuberculosis infection; risk factor; preventive treatment; regimen; reactivation

## INTRODUCTION

The preventive treatment of latent tuberculosis infection (LTBI) has gradually gained a vital role in tuberculosis (TB) control worldwide since the 1950s. Currently, the global strategy in the treatment of TB is divided into two basic parts: in areas with a high incidence of TB, the main goal is to treat the active cases, but in areas with a low incidence of TB, the goal also includes prophylactic treatment for LTBI. According to the World Health Organization (WHO), approximately 2–3 billion people in the world are latently infected with *Mycobacterium tuberculosis* (Mtb), and 5%–15% of these people will suffer from reactivation of TB during their lifetime.<sup>1</sup> Therefore, the treatment of LTBI directly influences the future global prevention of TB infection. At present, the study of LTBI relies heavily on screening for high-risk populations and on treatment strategies for the disease.

## SCREENING FOR LATENT TUBERCULOSIS INFECTION

Currently, a golden standard for the diagnosis of the LTBI is lacking. Because the amount of *Mycobacterium tuberculosis* is small in LTBI patients, diagnosis of LTBI mainly depends on the immune reaction of the host rather than the bacteria itself. There are two currently available screening tests for LTBI: the tuberculin skin test (TST) and interferon- $\gamma$  release assays (IGRAs, including the QuantiFERON-TB Gold and the T-SPOT.TB test). As the conventional method for the diagnosis of LTBI, TST showed a high sensitivity in persons with normal immune responses<sup>2</sup> and a sensitivity of 70% in human immunodeficiency virus (HIV)-infected person.<sup>3</sup> However, TB vaccination (*Mycobacterium bovis* bacilli Calmette-Guérin, BCG) and exposure

to non-tuberculous mycobacteria could cause cross-activity with the TST test, resulting in a low specificity.<sup>4</sup> Compared to the TST, IGRAs reported a higher specificity in low-TB-prevalence areas and less cross-activity with the BCG vaccine in non-HIV-infected persons.<sup>5–6</sup> However, in individuals infected with HIV, no difference was found in the diagnostic performance of tests for LTBI,<sup>7</sup> although IGRAs were proven to be more cost-effective.<sup>8</sup>

Reactivation of LTBI accounts for a large proportion of active TB incidence, especially in countries with a low TB prevalence.<sup>9–10</sup> Therefore, the predictive value for the development of active TB of IGRAs and the TST is very important and should be fully assessed. So to date, two meta-analyses have been conducted, and both reported little value for the prediction of active TB with either method.<sup>11–12</sup> In fact, the majority of TST or IGRA-positive LTBI patients remain unreactivated after latent infection, and the TB risk was not significantly different between the two groups.<sup>11,13</sup> A screening method with a better predictive value for ATB is needed in the future.

## RISK FACTORS FOR TUBERCULOSIS REACTIVATION

Only 5%–10% of screen-test-positive patients will develop active TB in the future.<sup>10</sup> If prophylaxis is provided for all LTBI patients, it will result in an enormous waste of resources and increase the likelihood of anti-TB drug resistance. Some factors increase the risk of TB reactivation and require screening and treatment for LTBI. Table 1 lists reported risk factors and their relative risk of active TB.

**Table 1 Risk factors for TB activation**

Risk factor	TB risk <sup>a</sup>	Reference(s)	WHO's recommendation for screening and treatment for LTBI <sup>41</sup>	
			Country A <sup>b</sup>	Country B <sup>c</sup>
<b>High-risk factors</b>				
HIV/AIDS	10–100	Landry <i>et al.</i> , <sup>4</sup> Hourburgh <i>et al.</i> , <sup>9</sup> and WHO <sup>14</sup>	Required	Required
Close contacts	15	Landry <i>et al.</i> , <sup>4</sup> and Sutherland <i>et al.</i> , <sup>15</sup>	Required	Required for close contacts (<five years old)
Organ-transplantation recipients	20–70	Aguado <i>et al.</i> , <sup>16</sup> and Sakhuja <i>et al.</i> , <sup>17</sup>	Required	Not mentioned
Chronic renal failure requiring dialysis	6.9–52.5	Andrew <i>et al.</i> , <sup>18</sup> Lundin <i>et al.</i> , <sup>19</sup> Belcon <i>et al.</i> , <sup>20</sup> and Hussein <i>et al.</i> , <sup>21</sup>	Required	Not mentioned
TNF-alpha blockers	1.6–25.1	Solovic <i>et al.</i> , <sup>22</sup>	Required	Not mentioned
Silicosis	2.8	Cowie <i>et al.</i> , <sup>23</sup>	Required	Not mentioned
<b>Moderate-risk factors</b>				
Fibronodular disease on chest x-ray	6–19	Grzybowski <i>et al.</i> , <sup>24</sup>	Not mentioned	Not mentioned
Immigrants from high-TB-prevalence countries	2.9–5.3	Baussano <i>et al.</i> , <sup>25</sup>	Options to be considered	Not mentioned
Health-care workers	2.55	Chu <i>et al.</i> , <sup>26</sup>	Options to be considered	Not mentioned
Prisoners, homeless persons, illicit drug users	–	–	Options to be considered	Not mentioned
<b>Low-risk factors</b>				
Diabetes mellitus	1.6–7.83	Harries <i>et al.</i> , <sup>27</sup> Dobler <i>et al.</i> , <sup>28</sup> Jeon <i>et al.</i> , <sup>29</sup> Boucot <i>et al.</i> , <sup>30</sup> Kim <i>et al.</i> , <sup>31</sup> and Baker <i>et al.</i> , <sup>32</sup>	Not recommended	Not mentioned
Smoking	2–3.4	Altet <i>et al.</i> , <sup>33</sup> Slarna <i>et al.</i> , <sup>34</sup> and Maurya <i>et al.</i> , <sup>35</sup>	Not recommended	Not mentioned
Use of corticosteroids	2.8–7.7	Jick <i>et al.</i> , <sup>36</sup>	Not recommended	Not mentioned
Underweight	2–3	Palmer <i>et al.</i> , <sup>37</sup> and Comstock <i>et al.</i> , <sup>38</sup>	Not recommended	Not mentioned

<sup>a</sup> Relative risk of TB compared to the general population.

<sup>b</sup> In high- and upper-middle-income countries with an estimated TB incidence less than 100/100,000 population.

<sup>c</sup> For resource-limited countries and other middle-income countries that do not belong to country A.

### High-risk factors

**HIV/AIDS.** Approximately 1/4 of HIV deaths are caused by TB infection.<sup>14</sup> Various studies have reported that HIV infection might lead to a 10–110 times higher risk of LTBI reactivation.<sup>4,9,14</sup> A meta-analysis in 2010 reported that all LTBI prophylactic regimens would reduce the TB risks of HIV patients who were TST positive, whereas no evidence of efficacy was found among tuberculin skin-test-negative patients.<sup>39</sup> However, in resource-constrained settings, full implementation of the TST or IGRAs has met with many difficulties. Therefore, the WHO recommended that all HIV patients who have unknown or positive screening test results and have no evidence of active TB receive prophylaxis, although patients with a positive TST or IGRA result might benefit more from preventive therapy. For HIV patients with negative screening test results, physicians should evaluate their individual TB risks and decide whether treatment should be prescribed.<sup>40</sup> In 2015, the WHO's guidelines on latent TB again stressed the importance of LTBI treatment in HIV patients in both low- and high-income countries.<sup>41</sup>

**Transplantation with immunosuppressant use.** Patients who undergo organ transplantation are more susceptible to infections due to the use of immunosuppressive drugs. A study in Spain reported that kidney-, liver- and heart-transplant recipients had a TB incidence of 0.8%, 20 times higher than that of the general population, and no difference in TB risk was found among three types of transplantation.<sup>16</sup> Retrospective studies reported a 0.65%–0.8% annual TB incidence rate after renal allografts in the United States, compared to 0.013 in the general population.<sup>42–43</sup> Another study conducted in India reported a TB incidence of 11.8% among kidney-transplant recipients, 70 times higher than that of the general population.<sup>17</sup> It would seem that the TB risk post-transplantation would be higher in third-world countries, but nevertheless, all studies recommended careful pre- and post-transplant

examination for TB and LTBI. The WHO now recommends high- or middle-income countries with a low TB incidence rate (<100 per 100,000 population) to test and treat for LTBI in patients preparing for organ/hematologic transplantation.<sup>41</sup>

**Silicosis.** The relationship between silicosis and TB has long been recognized. Studies have reported that 25%–30% of silicosis patients develop TB,<sup>23,44</sup> and the relative risk for TB reached 2.8 in silicosis patients compared to the general population.<sup>23</sup> One study showed that preventive therapy could reduce the TB incidence rate by 12%–17% compared to the placebo group,<sup>44</sup> and the WHO now recommends both testing and preventive treatment for LTBI for silicosis patients in high- or middle-income countries with a low TB incidence rate (<100 per 100,000 population).<sup>41</sup> For countries with limited resources, whether to treat LTBI in silicosis patients remain to be discussed.

**Close contact with pulmonary tuberculosis patients.** People who have been recently infected with *Mtb* have a high risk of reactivation, and those who are close contacts of people with active TB have a high possibility of having been infected within the past 2 years.<sup>3</sup> Studies have reported that the reactivation rate of TB is 15 times greater for those who have been recently infected (<two years).<sup>4,15</sup> The American Thoracic Society (ATS) recommends that household contacts of TB patients with drug-susceptible TB and who are TST test positive undergo preventive treatment,<sup>10</sup> whereas for close contacts of those with multidrug-resistant TB (MDR-TB), individual regimens based on drug susceptibility should be considered.<sup>41</sup>

**Tumor necrosis factor-alpha blockers.** Tumor necrosis factor-alpha (TNF- $\alpha$ ) plays a key role in the body's inflammatory responses, and five TNF- $\alpha$  antagonists are currently used in the clinical fields (etanercept, adalimumab, infliximab, golimumab and certolizumab

pegol). Randomized clinical trials (RCTs) on infliximab first reported a fourfold increase in the risk of TB infection,<sup>45–46</sup> and soon, more studies reported a higher risk of TB in patients using TNF- $\alpha$  antagonists comparing to the placebo group, with a relative risk ranging from 1.6 to 25.1.<sup>22</sup> In recent years, registry and longitudinal cohort studies have showed that the TB risk caused by the monoclonal antibody is generally higher than that of the receptor antibody.<sup>47–48</sup> A meta-analysis of the published registry and longitudinal cohort studies found that the TB risks of infliximab and adalimumab were 2.78 and 3.88 times higher than that of etanercept, respectively.<sup>49</sup> The WHO now recommends testing and treating for LTBI in all patients who plan to receive anti-TNF treatment in countries with a low TB risk.<sup>41</sup>

**Chronic renal failure and hemodialysis.** In the 1970s–1980s, many regions in the world reported a 10- to 12-fold increase of TB risk in patients with chronic renal failure (CRF) undergoing hemodialysis compared to the general population.<sup>18–20</sup> Later, more studies confirmed a 6.9- to 52.5-fold increase of TB risk in dialysis patients.<sup>21</sup> Other than the high prevalence of TB in the dialysis population, the diagnosis of TB in CRF patients had proven difficult. The sensitivity of the TST can be reduced by 50% during CRF and hemodialysis,<sup>50</sup> and the localization of TB in CRF patients is often extrapulmonary, mostly presenting as tuberculous peritonitis and lymphadenitis.<sup>21</sup> Thus, LTBI or TB cannot be simply ruled out with a negative TST result in CRF patients, but rather, IGRA tests and more invasive investigations are recommended.<sup>21</sup> Currently, in several guidelines and reports, testing and prophylaxis of LTBI in CRF patients are suggested.<sup>41,50–52</sup>

#### Moderate risk factors

**Fibronodular diseases on chest x-rays.** In the 1970s, a study reported a 6- to 19-folds increase of TB risk in individuals who were found to have old inactive TB lesions on chest radiography but did not have adequate treatment.<sup>24</sup> The International Union Against Tuberculosis (IUAT) trials showed a 65% reduction in TB incidence with 6 months of isoniazid (INH) therapy for individuals with fibrotic lesions, proving the necessity of prophylaxis in this group.<sup>53</sup> However, due to the widespread treatment of TB since the 1950s, especially in developed countries, the percentage of untreated patients has declined significantly. A national survey in the United States and Canada reported that only 1.4% of LTBI patients had old, healed TB,<sup>54</sup> and a continuous decline in this percentage is foreseeable. Moreover, 30%–80% of TB infections could experience self-cure in the disease progression, and persons with evidence of healed TB lesions (i.e., calcified solitary pulmonary nodules, calcified hilar lymph nodes and apical pleural capping) do not suffer increased risk for TB reactivation.<sup>10</sup> Therefore, the risk of previous TB infection is gradually reduced. The ATS recommended that patients who had evidence of or previous TB infection and no history of treatment be screened and treated for LTBI, and if an x-ray suggests healed primary TB, the decision regarding LTBI treatment should depend on other risk factors.<sup>10</sup>

**Immigrants from countries with a high TB prevalence.** In developed countries with a low TB prevalence, immigrants from high-TB-burden countries are one of the risk groups for TB.<sup>25,55–56</sup> Therefore, screening and treating for LTBI and TB are conducted in many developed countries for foreign-born individuals. A study of 31 member countries of the Organization for Economic Cooperation and Development found that whereas 86.2% (16/29) of the members screen immigrants for active TB, only 55.2% (16/29) screened for LTBI.<sup>57</sup> Moreover, some

countries used solely the TST or IGRAs to screen for LTBI, and some use a combination of two methods for screening.<sup>57</sup> A study in the Netherlands comparing TST and IGRA results among immigrants showed no evidence that one method was superior to the other,<sup>58</sup> but the UK reported superior cost-effectiveness in IGRAs.<sup>59</sup> Considering that some developing countries would use BCG vaccines to prevent TB prevalence, IGRAs might be more encouraged for LTBI screening. The cutoff value for screening also varies in different regions. Britain screens individuals who come from countries with a TB risk higher than 40/100,000 per year,<sup>60</sup> and Japan screens people from countries with a risk of 100/100,000 per year.<sup>51</sup> In the future, better uniformity in the screening methods and screening cutoff values should be implemented.

**Health-care workers.** Health-care workers are often at higher risk for nosocomially acquired TB compared to those not working in a health-care setting,<sup>26,61</sup> which would result in secondary hospital outbreaks if not properly treated. The risk factors might be malfunctioning air conditioning systems (allowing recirculation of contaminated air),<sup>62</sup> doctors without adequate self-protection who are present at procedures such as bronchoscopy,<sup>63</sup> the emergence of the HIV epidemic<sup>64–65</sup> or the increasing number of travelers from TB-prevalent countries. The TST and IGRAs are currently used for LTBI screening, and the WHO recommends that both testing and treating for LTBI be considered in middle- and high-income countries with a low TB incidence rate.<sup>41</sup>

**Prisoners, homeless persons, and drug users.** LTBI is more common among prisoners, homeless persons and drug users because these groups are usually underserved.<sup>66–68</sup> These populations are more likely to be coinfecting with HIV and are more difficult to treat adherently. Moreover, imprisonment is an important risk factor for the spread of drug-resistant TB infection.<sup>69</sup> Several studies have evaluated the efficacy of prophylaxis for these groups, and it is widely recommended that these groups be screened and treated for LTBI.<sup>10,41</sup> However, the efficacy of different regimens remains to be studied.

#### Low-risk factors

**Diabetes mellitus.** Diabetes mellitus (DM) is known to increase the TB risk in individuals, and several studies have reported that the relative risk ranged from 1.16 to 7.83.<sup>27–32</sup> However, no strong evidence supporting LTBI prophylaxis is available, and the WHO does not currently recommend systematic testing for LTBI.<sup>41</sup> The reasons for this might be that the risk of TB in DM is relatively low, and no large-sample RCTs have been conducted concerning the subject. However, the TB risk is closely related to the patient's glycemic control, and a study has shown that patients with poor disease control have an increased risk of TB reactivation.<sup>70</sup> Therefore, whether to treat LTBI patients who have poor glycemic control remains to be studied.

**Smoking.** Tobacco smoking can alter the lung immune responses to *Mtb* and can therefore contribute to a higher susceptibility to individual TB infection.<sup>33,71</sup> The relative risk of TB infection in tobacco smokers compared to nonsmokers ranges from 2 to 3.4, and the TB reactivation and mortality rates are also higher in the tobacco group.<sup>33–35</sup> For decades, physicians have debated whether LTBI patients exposed to tobacco smoking should receive prophylaxis, but no recommendation has been made in the current strategy.<sup>41</sup> The reasons include financial and health issues. In low- and middle-income nations, approximately 50% of men and 8% of women smoke,

and if every LTBI patient exposed to tobacco is treated, the number of patients to treat would cause huge financial and medical waste.<sup>72</sup> On the other hand, a study has estimated that the complete elimination of tobacco smoking would lead to a 14%–52% reduction in TB risk.<sup>73</sup> Therefore, the current best and most efficient strategy might still be to promote antismoking campaigns worldwide.

**Use of corticosteroids.** For patients who are being treated with corticosteroids, the risk of TB reactivation increases 2.8- to 7.7-fold.<sup>36</sup> Although there is a lack of evidence to support the preventive treatment of LTBI in all patients who are administered corticosteroids, it is still reasonable to evaluate the risks of TB in these patients. If a patient is prescribed a large dose of corticosteroids and has a high-risk for TB reactivation, such as HIV infection, silicosis and organ transplantation, prophylactic treatment might lower the incidence rate of TB.

**Underweight status.** Being underweight ( $\geq 10\%$  deviation from ideal weight) can cause a 2- to 3-fold increase in active TB development compared to the general population.<sup>37–38</sup> In their 2000 statement, the ATS held a vague position concerning whether underweight people should receive preventive treatment, despite regarding underweight status as a risk factor for TB development.<sup>10</sup> The TBNET consensus statement also considered LTBI treatment unnecessary,<sup>22</sup> and the WHO noted that the benefits of routine testing and treatment of LTBI for underweight persons were nonsignificant. The current recommendation states that testing and treatment of LTBI should be conducted only when underweight status is accompanied by any of the high-risk factors.<sup>41</sup>

## PREVENTIVE TREATMENT OF LATENT TUBERCULOSIS INFECTION IN NON-HIV PATIENTS

The preventive treatment of latent TB has improved greatly in recent decades. The treatment of high-risk LTBI populations has been proven effective by many clinical trials in reducing the recurrence rate of active TB. Table 2 lists current prophylactic therapies and their dosages, as recommended by the WHO.

## Isoniazid monotherapy

Isoniazid monotherapy was the first experimental therapy for the preventive treatment of LTBI. Between the 1950s and 1970s, many randomized clinical studies were launched on isoniazid monotherapy, with regimens ranging from 3 months of isoniazid (3INH) therapy to 12 months of isoniazid (12INH) therapy, and all the results strongly suggested that daily or intermittent isoniazid might reduce the incidence of TB reactivation.<sup>39,53,74</sup> The largest trial ever conducted was by the IUAT, in which approximately 28,000 TST-positive persons with fibrotic lesions were enrolled. The study reported that compared with placebo, the 3INH, 6 months of isoniazid (6INH) and 12INH regimens reduced the TB risk by 21%, 65% and 75%, respectively, within 5 years of follow-up. Both 6INH and 12INH therapies showed a more significant reduction in TB incidence than the placebo group and the 3INH group; however, no statistical significance was observed between the 6INH and 12INH regimens.<sup>53</sup> In 1999, based on the United States Public Health Service trials conducted in the 1950s and 1960s, a secondary modeling reanalysis reported that daily 9-month isoniazid (9INH) therapy might achieve the maximum efficacy.<sup>75</sup> In a recently published trial of isoniazid preventive therapy in South African gold miners, the results showed a reduction of TB risk during 9INH treatment compared to the control group (incidence rate ratio, 0.42; 95% CI, 0.20–0.88), but the protection was lost after 2 years of follow-up.<sup>76</sup> This result suggested a higher TB reactivation rate in high TB-prevalence areas despite prophylaxis. Currently, the WHO recommends both 6INH and 9INH regimens as equivalent options, and no significant difference in efficacy has been found between the two regimens.<sup>41</sup>

With the widespread use of isoniazid preventive treatment for latent TB, side effects have gradually become a concern. In 1970–1971, the United States Public Health Center examined 14,000 patients who were administered isoniazid, and reported that the occurrence of hepatitis was 1–2.3%, and the risk increased for patients with a history of chronic liver disease or alcohol intake.<sup>10</sup> In 2008, the 9INH regimen was reported to cause severe liver toxicity in 3.8% of the patients, and the compliance rate varied greatly among different studies.<sup>77–78</sup>

Table 2 WHO-recommended preventive regimens for latent tuberculosis infection<sup>41</sup>

Regimen*	Dosage	Hepatotoxicity OR (95% CI)	Treatment efficacy
6INH	Children: 10 mg/kg/d Adults: 5 mg/kg/d Maximum dose: 300 mg	Compared to placebo: 0.99 (0.42–2.32)	Equivalent to 9INH and 3RPT + INH regimens
9INH	Children: 10 mg/kg/d Adults: 5 mg/kg/d Maximum dose: 300 mg	–	Equivalent to 6INH and 3RPT + INH regimens
3-4RIF	Children: 10 mg/kg/d Adults: 10 mg/kg/d Maximum dose: 600 mg	Compared to 6INH: 0.03 (0.00–0.48)	Maybe equivalent to 6INH regimen
3-4RIF + INH	Rifampicin: Children: 10 mg/kg/d Adults: 10 mg/kg/d Maximum dose: 600 mg	Isoniazid: Children: 10 mg/kg/d Adults: 5 mg/kg/d Maximum dose: 300 mg	Compared to 6INH: 0.89 (0.52–1.55) Maybe equivalent to 6INH regimen
3RPT + INH	Rifapentine: 10.0–14.0 kg: 300 mg 14.1–25.0 kg: 450 mg 25.1–32.0 kg: 600 mg 32.1–49.9 kg: 750 mg Maximum dose: 900 mg	Isoniazid: Children: 15 mg/kg/d Adults: 15 mg/kg/d Maximum dose: 900 mg	Compared to 6INH: 1.0 (0.50–1.99) Compared to 6INH: 0.16 (0.10–0.27) Equivalent to 6INH and 9INH regimens

\* Regimen: 6INH: daily isoniazid for six months; 9INH: daily isoniazid for nine months; 3-4RIF: daily rifampicin for three to four months; 3-4RIF + INH: daily rifampicin plus isoniazid for three to four months; 3RPT + INH: weekly rifapentine plus isoniazid for three months.

Other adverse effects of isoniazid monotherapy, such as peripheral neuropathy, have also been noted.

#### Rifampicin-containing therapies

Silicosis is a high-risk factor for TB. In 1992, the Hong Kong Thoracic Society and the British Medical Research Council conducted a randomized controlled clinical trial targeting Chinese silicosis patients. The researchers compared the TB incidence rate among the three months of rifampicin plus isoniazid regimen (3RIF + INH), three months of rifampicin regimen (3RIF), 6INH and the placebo group. The study found that the 5-year cumulative incidence rate of active TB in the placebo group was higher than in the other groups (placebo: 27%, 3RIF + INH group: 16%, 6INH group: 14%, 3RIF group: 10%).<sup>44</sup> This clinical study was the first to support rifampicin monotherapy and the 3RIF + INH regimen as the treatment for LTBI. Later on, more studies were conducted on rifampicin-containing therapies. Although no trial showed that the rifampicin-containing regimens had a significantly better prophylactic result than the INH regimens, studies found that the 4RIF regimen had less liver toxicity and was more cost effective.<sup>77,79</sup> In 2000, the ATS recommended 4RIF as an alternative to 9INH,<sup>10</sup> and the British Thoracic Society recommended 3RIF + INH as an alternative to 6INH.<sup>80</sup>

#### High-dosage rifapentine plus isoniazid therapy

A random, unblinded, noninferiority study conducted from 2001 to 2008 reported that three months of weekly rifapentine plus isoniazid therapy (3RPT + INH) did not have a disadvantage compared with 9INH therapy in non-HIV patients (the cumulative incidence rates of active TB were 0.19% and 0.43%, respectively) and had significantly lower liver toxicity (OR 0.16, 95% CI: 0.1–0.27).<sup>81</sup> Another recent study reported systemic drug reactions, mostly flu-like syndromes, among persons (3.5%) receiving the 3RPT + INH regimen.<sup>82</sup> The advantage of 3RPT + INH is clear, characterized by a short treatment course, reduction of the frequency of medication and fewer hepatotoxicity events. In the 2015 WHO guidelines, the 3RPT + INH regimen is recommended as a treatment option equivalent to the 6INH and 9INH regimens, but the quality of the evidence is only moderate to low.<sup>41</sup> To date, treatment in the 3RPT + INH group was directly observed in clinics, and therefore, the treatment efficacy of a self-administered 3RPT + INH regimen remains to be studied.

#### Rifampicin plus pyrazinamide therapy

Two-month rifampicin plus pyrazinamide (2RZ) regimen was first proved effective in clinical studies and was recommended as an alternative treatment to isoniazid.<sup>83–84</sup> However, studies soon reported that the 2RZ regimen could cause serious liver toxicity,<sup>85–86</sup> which in severe cases could lead to death. These reports evoked vigilance, and in 2003, the ATS/CDC recommended against this regimen in general. The 2RZ regimen should be provided to selected patients only when other alternative regimens cannot be completed and only with the consultation and oversight of physicians.<sup>87</sup>

#### Comparison between regimens

Currently, the 6INH and 9INH regimens are the classic recommended regimens for LTBI treatment. Although the 3RPT + INH, 3-4RIF + INH and 3-4RIF regimens are also recommended by the WHO, none of these regimens has shown superiority over isoniazid monotherapy. In some studies, the 3-4RIF and 3RPT + INH regimens were reported to have fewer hepatotoxicity events, but the quality of evidence supporting this is only moderate to low.<sup>41</sup> Therefore, for non-HIV

patients, the first-line choice should still be the 6 or 9INH regimen, and the treatment efficacy and safety of 3RPT + INH and 3-4 RIF should be further studied.

### PREVENTIVE THERAPY FOR TARGETED GROUPS WITH HIGH-RISK FACTORS

#### HIV-infected patients

Several clinical studies showed that isoniazid monotherapy, with a regimen ranging from six to twelve months, could reduce the probability of TB reactivation by 32–67% in HIV-infected LTBI patients.<sup>88–91</sup> However, in high TB-prevalence regions, the reactivation rate of ATB would be higher.<sup>92</sup> Continuous isoniazid monotherapy was also explored for its potential benefit in settings with a high HIV and TB prevalence. One large, RCT reported that 36 months of isoniazid therapy (36INH) showed a superior efficacy than 6INH in LTBI treatment,<sup>93</sup> whereas another study showed that continuous isoniazid therapy up to six years had no superiority over 6INH but more adverse reactions.<sup>94</sup> The efficacy between multidrug regimens was also compared. The results showed that the 3RPT + INH and 3RIF + INH (daily or twice weekly) regimens both reduced the TB risk in HIV-infected LTBI patients, although no significant difference in treatment efficacy was observed compared to the 6INH regimen.<sup>90,94</sup> Additionally, side effects were more likely to take place with multidrug therapies.<sup>90</sup> Currently, the WHO strongly recommends at least 6 months of isoniazid preventive therapy (6INH, 9INH, 12INH) for HIV-infected patients and suggests a continuous 36INH regimen as the surrogate treatment, especially in regions with high HIV and TB prevalence.<sup>40</sup>

#### Silicosis patients

For silicosis patients, most of the data have come from the Hong Kong Chest Service. In a 5-year follow-up, the 3RIF regimen was considered to have the best efficacy when compared to the placebo group, reducing the TB risk by 17%. Both the 6INH and 3RIF + INH regimens also reduced the TB risk in silicosis patients (14% and 12%, respectively), and no significant differences were observed among the three prophylactic regimens.<sup>44</sup> Because 3RIF has the least hepatotoxicity among the three regimens,<sup>41</sup> rifampicin monotherapy might be the first choice for the preventive treatment in silicosis patients, although further studies are required.

#### Organ-transplantation recipients with immunosuppressant use

Various studies have reported the prophylactic value of different isoniazid monotherapy (e.g., 6INH and 12INH) in post-kidney-transplant recipients,<sup>95–96</sup> all in high-TB-prevalence areas (India, Brazil and Pakistan). Systematic reviews showed that isoniazid prophylaxis could significantly reduce the post-kidney-transplant TB risk by 65%–69% in recipients who were at risk of TB reactivation, but hepatotoxicity risks were also reported.<sup>97–98</sup> We recommend isoniazid monotherapy as the prophylactic regimen in transplantation recipients, but hepatotoxicity events should be carefully monitored in the future.

#### TNF- $\alpha$ antagonist recipients

A meta-analysis was conducted to evaluate the efficacy of preventive treatment, and the results showed that the TB risk was decreased by 65% (RR = 0.35, P = 0.02) in patients receiving prophylaxis compared to those who did not.<sup>18</sup> However, the studies enrolled mostly rheumatoid arthritis patients, and the regimens differed among the included studies (e.g., 6INH, 9INH, 3INH + RIF).<sup>99–102</sup> One study reported a 97% decrease in TB risk using 9INH, whereas another study

reported a 33% risk decrease using 6INH or 3INH + RIF,<sup>99,101</sup> suggesting that the 9INH regimen might be more effective in treating LTBI. However, currently, no RCT or cohort directly comparing the efficacy among different regimens is available.

#### Close contacts of pulmonary tuberculosis patients

The WHO, the ATS and the British Thoracic Society all recommend screening and treatment for LTBI for close contacts of TB patients with drug-susceptible TB.<sup>10,41,80</sup> However, for close contacts of MDR-TB, controversy remains regarding the efficacy and necessity of prophylaxis for LTBI. Because of the limited studies on preventive treatment for contacts of MDR-TB, systematic reviews all noted that high-quality evidence to support the feasibility and safety of prophylactic treatment is still lacking.<sup>103–104</sup> Additionally, the regimens for LTBI patients exposed to MDR-TB are not clear, and some studies have recommended that individual regimens be based on drug susceptibility.<sup>41</sup> In a prospective study published in 2014, a 12-month fluoroquinolone regimen was administered to 119 contacts of MDR-TB patients, and none of the 104 contacts who received the treatment developed MDR-TB, while three of the 15 contacts who refused the treatment developed the disease.<sup>105</sup> This study suggested that treatment for contacts of MDR-TB might prevent MDR-TB development, but further research is urgently needed.

#### Chronic renal failure and hemodialysis

One study in India reported a 60% reduction in the TB risk in CRF patients undergoing hemodialysis when treated with 12INH, indicating the efficacy of prophylaxis. However, hepatitis developed in 16.7% of the patients, and most of them were hepatitis B or C positive. These results indicated that patients with previous liver diseases have a higher risk of liver damage during isoniazid prophylaxis.<sup>106</sup> Currently, no worldwide consensus has been reached concerning treatment options. The ATS recommended the 9INH regimen (accompanied by pyridoxine) to treat for LTBI in CRF patients undergoing hemodialysis,<sup>10,21</sup> and the British Thoracic Society recommended three other potential regimens: the 6INH, 3RIF + INH and 4-6RIF regimens.<sup>50</sup> Both recommendations have little evidence, and further studies are strongly required.

#### CONCLUSION

The prophylaxis of LTBI plays an important role in the prevention and treatment of TB. IGRAs and the TST are both used to screen for LTBI, and although some studies in low-TB-prevalence areas reported a higher specificity with IGRAs than with the TST, neither method had a satisfying predictive value for active TB. In the future, a screening method with a better predictive value should be explored. High-risk factors (HIV/AIDs, transplantation, silicosis, TNF- $\alpha$  blockers, close contacts, kidney dialysis) contribute to a significantly increased TB reactivation rate, and for countries with a low TB prevalence, patients with high-risk factors should undergo screening and treatment for LTBI.

At present, the WHO recommends five prophylactic regimens—6INH, 9INH, 3-4RIF, 3-4RIF + INH and 3RPT + INH—none of which has shown superiority over the conventional 6INH or 9INH therapies. The 3-4RIF and 3RPT + INH regimens have been reported to have fewer hepatotoxicity events, but the quality of evidence is low. Further research regarding the treatment efficacy and safety of the 3RPT + INH and 3-4 RIF regimens is required. For high-risk groups, isoniazid monotherapy could reduce the TB risk in HIV-infected patients and transplant recipients, but for others, little evidence is

available to draw a conclusion at this time. In the future, high-risk population screening and new preventive treatment therapies for specific target groups and the drug resistance that follows will be the keys to improve the prophylaxis of latent TB.

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