CHL5631H: Integrating Public Health and Clinical Care: The case of TB

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Guest Speakers:
Dr. Elizabeth Rea, Associate Medical Officer, Toronto Public Health
Dr. Christopher Rutty, Adjunct Professor, DLSPH and President, Health Heritage Research Services
Dr. Kamran Khan, Staff Physician, St. Michael's Hospital and Associate Professor, IHPME
Dr. Frances Jamieson, Medical microbiologist, Public Health Ontario, Associate Professor, Dept. of Laboratory Medicine and Pathobiology
Dr. I.D. Rusen, Senior Vice President, Vital Strategies/International Union Against Tuberculosis and Lung Disease
Dr. Barry Pakes, Assistant Professor and Program Director, DLSPH
Dr. Firdosi R. Mehta, MD, Former WHO medical officer and Adjunct Professor, DLSPH

Sessions: Sept 11- Nov 27, 2019, on Wednesday, 9:15am to 12:00 pm
Venue: HS 696

Course Description:

Tuberculosis (TB) care and serves is a perfect example of integrating public health and clinical care. TB is a historically deadly disease having killed over 1/6 people in England in the 1900s. The Directly Observed Treatment Short-course (DOTS) has demonstrated as the most cost-effective treatment and control strategy in the 1970s, and then it has been promoted as the national strategies worldwide since the 1990s. TB is now a curable disease with effective treatment (i.e., cure rate over 90% for smear positive cases, and per case medication cost less than $10). Global TB incidence rate has fallen by an average of 1.5% per year since 2000, while TB death rate has dropped nearly half between 1990 and 2015. On the other side, TB remains a disease of poverty, and the NO 1 killers in infectious disease (1.4 million deaths and 10.4 million new cases in 2015), and growing threats from multi-

drug resistant TB, and co-infections of HIV/TB and diabetes/TB. TB is a disease of poverty and heavily stigmatized in many cultures. This course will introduce TB from microbiological, clinical, public health and health policy perspectives. It will discuss TB pathology, epidemiology, diagnosis and treatment, TB programs, policies and practices both at local and global levels. We will also discuss social, ethical and health system issues of TB prevention and care.

Prerequisites: Students should have completed either a quantitative or qualitative research method course, or with permission of one course director. This course is intended for Master students who have taken research method courses, or any year of PhD students. The course will allow maximum 20 students. Students should contact with the course director for enrollment.

Objectives:

The goal of this course is to provide students a solid understanding of the interactions of clinical and public health in the context of TB prevention and care. Both students from the Public Health Sciences (PHS) and Health Policy Management and Evaluation (HPME) are welcomed. Students will be exposed to different study skills relevant in TB prevention and care context, such as quantitative (e.g., epidemiological, and interventional) and qualitative (e.g., social science) studies, policy evaluations, operational research and spatial analysis (geographical information system, GIS). Students will have the opportunities to learn from each other's expertise and insights. By the end of the study, students will acquire the skills to critically evaluate disease control programs at local or national levels.

Specifically, by the end of the course, students should

- Have a solid knowledge on the essential elements of public health approaches in disease control;
- Understand the historical evolution of TB prevention and care programs and policies in Canada;
- Understand ethical, social and health system issues in TB prevention and care and their interactions;
- Understand how different research skills can be applied in TB studies, such as cohort analysis, social science, trials, operational research, genotyping and GIS;
- Gain insights of TB prevention and care in various settings; and
- Be able to critique country TB prevention and care programs and design operational studies.

Evaluation:

Grades will be based on four parts: participation (10%), a short critique (20%), a group presentation (20%) and an individual essay (50%).

1. Participation (10 marks, 10% of total):

Students are expected to participate at least 80% of the lectures and actively engaged in the class discussions in each session to get the full marks of participation. Absence from a session without notice and approval from a course director will result in an automatic deduction of 2 marks (2%). Participation includes preparation (from full prepared to little evidence of reading), interaction (from actively engage in to no participation in discussions with others), and quality of comments (relevance of comments to session topics). Participation Rubric was based on a publication by Adam Chapnick, "A Participation Rubric", *The Teaching Professor*. March 2005, p4.
http://www46.homepage.villanova.edu/john.immerwahr/TP101/lects/participation%20matrix0001.pdf

2. Mid-term short critique (20 marks, 20%)
Students will write a short critique (1000 words maximum) to one research paper (NOT including readings on guidelines, training manuals, reviews or case studies) in the course reading list. Detailed guidance can be reached at: Allyson Skene, The Writing Centre, UT Scarborough
https://www.utsc.utoronto.ca/twc/sites/utsc.utoronto.ca.twc/files/resource-files/CritReview.pdf
Grading will be based on overview of the topic (5 marks), list of key points (8 marks), balanced comments (3 marks), and logic and clarity (4 marks).
Due at 9am, Oct 16, 2019

3. Presentation (20 marks, 20%)
Students will be required to describe and critique the TB prevention and care program of a place. This can be a province (e.g., Manitoba) or a country (e.g., Uganda, Indonesia), but cannot be a number of countries or a country/region whose TB prgram profiles have been given in sessions. Students will form small groups (2-5 per group). The group will choose a place with common interests. The group should make a 15-minute presentation based on: the country's health system, TB epidemic and control program, and major challenges. Presentations will be graded based on its clarity, organization, use of research evidences, relevance, and time management. Points will be given based on 1) content score (14 marks): background regarding health system and economy, TB history and epidemic, major challenge of TB program, and use of evidence and adequate discussion of findings; and 2) presentation score (6 marks): clarity, organization, logic, visual layout, and time management. Any overdue of 3 minutes exceeding the 15-minute limit will result in 2 marks (2%) deducted.
Presentation date: 27 Nov, 2019

4. Individual essays (50 marks, 50%)
Students will be required to write an individual essay (min. 1500 words, max 3000 words for Masters) based either on their group work or a place that the student is particularly interested in. The essay has two parts. In Part 1, the study should 1) to critically review a country/ province's TB program and its history based on the best available information from national statistics and literature (15 marks), and identify the major challenges of its

current TB prevention and care program (10 marks). Then the student need to 2) propose reasonable solutions regarding public health measures and/or policy changes that may restructure/reform its TB prevention and care (5 marks). In Part 2, the study should briefly design a feasible operational study to understand deeper of one particular unknown area or to explore solutions regarding the particular area of TB program in the setting. (20 marks)

PhD students will have the same evaluation schemes. However, they will be expected to make more rigorous research design regarding their operational studies (Part 2). Maximum words of the essay for PhD students are 4000.
Due at 9pm, Dec 9, 2019

Late assignment policy: Points will be deducted for handing in assignments late, unless permission is obtained from a course director ahead of time (2marks or 2% deducted per calendar day). Assignments that submitted 7 calendar days after the deadline will not be considered.

Communications:
Students need to log on to Blackboard (or Canvas) frequently to view lecture materials, readings, and course announcements are posted in this environment. There is also an opportunity to post questions and have discussions with class peers. Students are encouraged to use Blackboard/ Canvas to connect with other students in the course if they missed classes and/or have general questions about readings or assignments. All marks and student grades (expect the final one as per UofT policy) will be available through the Blackboard.

Students should contact the instructor/ speaker via email directly pertaining to any questions or concerns regarding the course. Student are welcome to book individual meetings with the course director for specific questions/topics.

This course involves group work. In order to work with peers, students will need to share their name, phone number and/or email address with those in their group.

Formatting of Written Assignments
References should be formatted using Vancouver Style or the American Psychological Association (APA) style. Information about Vancouver Style is available on the website of the International Committee of Medical Journal Editors (http://www.icmje.org/). For AMA style, please refer to the APA Style guide: *Publication Manual of the American Psychological Association, Fifth Edition. Washington DC: American Psychological Association: 2001*.
Students are required to stick to one style of referencing for the entire paper.

Written assignments should be 1.5 spaced, double sided in **Times New Roman** font no smaller than **11 point**, with one-inch margins on all sides of the page. Cover pages, tables/graphs/figures, references and appendices do not count against the specified page limits and should be employed judiciously.

Submitting Written Assignments

Students will be required to upload written assignments to Blackboard/ Canvas or via email to the course directors by 9:00pm April 13, 2018. If there are problems with uploading the assignments to the Blackboard/ Canvas on the due date, students may notice the course director and send a copy directly.

Grading

Grades will be based on the following criteria (also refer to individual assignment grading rubric):

1. Inclusion of all of the assignment's required elements;
2. Organization of ideas and clarity of presentation;
3. Extent and appropriateness of information, concepts, references and data used;
4. Critical analysis of material;
5. Clear and accurate presentation of references to support arguments
6. Writing style including spelling, grammar, punctuation and sentence structure.

Emphasis is placed on critical thinking and analysis in all assignments. A valuable resource is available at the Foundation for Critical Thinking web community (www.criticalthinking.org). Students are encouraged to work together to solve problems and review course material, however grades will be assigned to students individually and each student must submit unique, original work with the exception of group project presentations, where students work together and grades are assigned to the team as a whole.

The correspondence between letter and number grades is as follows (SGS Guidelines):

A+	90-100%
A	85-89%
A-	80-84%
B+	77-79%
B	73-76%
B-	70-72%
Fail** ➔	0- 69%

Grading Complaints: In case of any complaint about a grade, the student should submit the complaint in writing to the course director.

Plagiarism:

Plagiarism is a serious academic offense and will not be tolerated. Give credit where credit is due. Plagiarism includes representing someone else's work or ideas as your own, as well as heavily copy your previous assignment or paper for this course purpose (self-plagiarism). The University of Toronto's Code of Behavior on Academic Matters provides a complete discussion of the university policy: http://www.artsci.utoronto.ca/osai/The-rules/code/the-code-of-behaviour-on-academic-matters

University of Toronto's policy regarding plagiarism:
http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize

Academic Integrity:
Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences:
(http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/ppjun011995.pdf)

University of Toronto's policy regarding plagiarism:
http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize

Potential offences include, but are not limited to:
In papers and assignments:
•Using someone else's ideas or words without appropriate acknowledgement.
•Submitting your own work in more than one course without the permission of the instructor.
•Making up sources or facts.
•Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:
•Using or possessing unauthorized aids.
•Looking at someone else's answers during an exam or test.
•Misrepresenting your identity.

Turnitin.com:
Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

Accessibility and Accommodation:
The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs. For more information, or to register with Accessibility Services, please visit: http://studentlife.utoronto.ca/as

Acknowledgement of Territory:
We would like to acknowledge the traditional territories of the Mississauga of the New Credit First Nation, Anishnawbe, Wendat, Huron, and Haudenosaunee Indigenous Peoples

on which the Dalla Lana School of Public Health now stands. The territory was the subject of the Dish With One Spoon Wampum Belt Covenant, an agreement between the Iroquois Confederacy and Confederacy of the Ojibwe and allied nations to peaceably share and care for the resources around the Great Lakes. We would also like to pay our respects to all our ancestors and to our present Elders.

Required general readings:
WHO Stop TB Strategies: Five elements of DOTS:
http://www.who.int/tb/dots/whatisdots/en/
and the End TB Strategy http://www.who.int/tb/strategy/en/

WHO Global TB Report 2016: http://www.who.int/tb/publications/global_report/en/

Recommended general readings:
Lancet Tuberculosis issue: Vol 375, Number 9238, 2012 published on May 22nd, p1753-1844, http://www.thelancet.com/journals/lancet/issue/current?tab=past

Courtwright A, Turner AN. Tuberculosis and Stigmatization: Pathways and Interventions. Public Health Reports 2010;**125**(Suppl 4):34-42
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2882973/

NOTE: Readings and lecture notes will be updated three days prior to the lecture. These may change based on the make-up and interests of each session. Students will be notified in advance on the Blackboard/ Canvas of any changes.

Tentative Schedule for 2019:

Day	Date	Topic	Format	Instructor(s)
1	Sept 11, 2019	Introduction of TB pathology, transmission, epidemiology and global TB program strategies	Lecture and discussions	Ross Upshur Xiaolin Wei
2	Sept 18, 2019	Community management of TB: case finding, contact tracing, DOT and patient support	Lecture and discussion	Xiaolin Wei Elisabeth Rea
3	Sept 25, 2019	Historical aspects of TB program in Canada and US, and the implications to public health approaches	Lecture and discussions	Christopher Rutty
4	Oct 2, 2019	TB program studies and operational research	Case studies and discussions	Xiaolin Wei
5	Oct 9, 2019	Social and ethical issues	Lecture and discussions	Ross Upshur
6	Oct 16, 2019	Clinical aspects: TB diagnosis, treatment, clinical evaluations, and latent TB Diagnosis critical – the laboratory role in the identification of tuberculosis infection and disease Short Critique due at 9am Oct 18	Lecture and discussion	Kamran Khan Frances Jamieson
7	Oct 23, 2019	TB in low burden countries: working towards TB elimination in Canada	Lecture and group work	Elizabeth Rea Barry Pakes
8	Oct 30, 2019	TB programs in high burden countries: India and Indonesia	Lecture and group work	Firdosi R. Mehta
9	Nov 6, 2019	TB programs in low HIV prevalent but high TB burden countries: China and Hong Kong SAR	Lecture and group work	Xiaolin Wei
10	Nov 13, 2019	Health system strengthening in TB programs	Lecture and discussions	Xiaolin Wei
11	Nov 20, 2019	Research on shortened MDR-TB regimens: progress and challenges	Case study	I.D. Rusen

12	Nov 27, 2019	Student Presentations Due		
13		Individual essay is due at 9pm, 9 Dec		

WEEKLY SESSION DETAILS & READINGS

September 11: Introduction of TB pathology, transmission, epidemiology and global TB program strategies

INSTRUCTOR: Xiaolin Wei, MD. PhD.

This first week will introduce the course, instructors and students. The session will introduce the basic tuberculosis mycobacterium biology and pathology, the multi-drug resistant TB (MDR-TB), a deadlier form, and the co-infection of TB/HIV. The session will also introduce the global TB epidemic and the evolution of control strategies. Specific learning objectives are:

1. Understand tuberculosis from both personal and public health/medicine perspectives;
2. Be familiar with the basic bacteriology biology, pathology of TB, and how TB is transmitted;
3. Realize the threat of MDR-TB, HIV/TB and diabetes/TB coinfection;
4. Introduce the global TB epidemic and control strategies

Readings:

1. WHO Stop TB Strategies: the Five elements of DOTS: http://www.who.int/tb/dots/whatisdots/en/ and the End TB Strategy http://www.who.int/tb/strategy/en/

Recommended readings:

1. Global TB Report 2016: Chapter 1 and 2 http://www.who.int/tb/publications/global_report/en/

September 18: Community management of TB: case finding, contact tracing, DOT and patient support

INSTRUCTORS: Xiaolin Wei, MD, PhD, and Elizabeth Rea, MD, MSc, FRCP(C)

Managing TB cases in the community is crucial to ensure successful treatment outcomes. This includes case finding, contact tracing and community support. Passive case finding is the default procedure in most countries; however, active case finding is often demanded for close contact tracing of known TB cases. We will discuss the pro and cons of Directly Observed Therapy (DOT), the iconic case management element for TB since the 90s, and its evolution as patient care and support after 2006. We will also discuss community treatment and support for MDR-TB patients. By the end of the session, students will:

1. Understand the importance of case management for infectious disease;
2. Be aware of several basic active case finding approaches;
3. Understand the social discrimination against TB, and the importance of of providing support and care while respecting patient's rights, confidentiality and culture;
4. Develop essential skills to critique certain case management procedures in TB case management.

Readings:

1. WHO, 2013, Systematic screening for active tuberculosis: http://www.who.int/tb/tbscreening/en/ Page 7-11, executive summary

2. Chapter 6, Supervision and Patient Support, WHO. Guidelines for treatment of tuberculosis. Geneva: World Health Organization, 2010.
http://www.who.int/tb/publications/2010/9789241547833/en/

Recommended readings:

1. Volmink J, Garner P. Directly observed therapy for treating tuberculosis. *Cochrane Database Syst Rev* 2007; (4): CD003343.
2. Wei XL, Yin J, Zou GY, et al. Treatment interruption and directly observed treatment of multidrug-resistant tuberculosis patients in China. *The international journal of tuberculosis and lung disease* 2015; **19**(4): 413-9.
3. Newell JN, Baral SC, Pande SB, Bam DS, Malla P. Family-member DOTS and community DOTS for tuberculosis control in Nepal: cluster-randomised controlled trial. *Lancet* 2006; **367**(9514): 903-9.

September 25: Historical aspects of TB program in Canada and US, and the implications to public health approaches

INSTRUCTOR: Christopher Rutty, Ph.D.

The session aims to provide historical perspectives on TB program Canada, focusing on the 1890s through the 1950s, and placing this evolving experience in its international context, especially with respect to the U.S. and Europe. The lecture will describe differing strategies for tuberculosis treatment and prevention over time and between countries, focusing on sanatoriums, milk pasteurization and BCG vaccination, and the particular impact of the disease on Canada's aboriginal population. The readings are divided into two groups: historical articles that reflect the main themes, and primary articles drawn from the Canadian Journal of Public Health published in the 1930s and 1950s period to gain a sense of how TB incidence was changing and how it was being managed. The books listed in the Recommended Resources section provide rich historical detail for those who wish to explore the subject further. Students will be expected to:

1. Gain perspective on the historical impact of TB, especially in Canada, and how it changed over time.
2. Understand the varied public health strategies employed to treat and prevent TB in different countries over time and the rationales they were based on.
3. Gain insight into the particular historical legacy of TB among Canada's indigenous population.

Readings:

Historical Articles:

1. Adams A, Burke S. "Not a Shack in the Woods": Architecture for Tuberculosis in Muskoka and Toronto. Canadian Bulletin of Medical History 2006; **23**(2): 429-55. https://www.dropbox.com/s/sb8ne7ldg4e458f/AdamsA-ArchForTBMuskokaToronto-CBMH-v23-2006-p429.pdf?dl=0
2. Bryder L. "We shall not find salvation in inoculation": BCG vaccination in Scandinavia, Britain and the USA, 1921-1960. Social Science & Medicine 1999; **49**: 1157-1167. https://www.dropbox.com/s/2q50nxrszarconj/BryderL-BCGvaccScandBritainUS1921-60-SocSciMed-v49-1999-p1157.pdf?dl=0

3. Grzybowski S, Allen EA. Tuberculosis: 2. History of the disease in Canada. Canadian Medical Association Journal 1999; **160**(7): 1025-28. https://www.dropbox.com/s/tsjj4q04bzktjae/GrzybowskiS-HistoryTBCanada-CMAJ-v160-1999-04-06-p1025.pdf?dl=0
4. Lux M. Care for the "Racially Careless": Indian Hospitals in the Canadian West, 1920-1950s. Canadian Historical Review 2010; **91**(2): 407-34. https://www.dropbox.com/s/7053mf9a1i42940/LuxMK-IndianHospitalsCanWast1920-50s-CanHistRev-v91-2010-09-p407.pdf?dl=0

Primary Public Health Articles:

1. Ross MA. Tuberculosis Mortality in Ontario. Canadian Public Health Journal 1934; **25**(2): 73-86. https://www.dropbox.com/s/p527e2lagj9cym3/RossMA-TBMortalityOntario-CPHJ-v25-1934-02-p73.pdf?dl=0
2. Brink GC. Tuberculosis in Ontario. Canadian Journal of Public Health 1954; **45**(5): 195-201. https://www.dropbox.com/s/ijwxdo5g1eqpz2b/BrinkGC-TBinOntario-CJPH-v45-1954-05-p195.pdf?dl=0
3. Wherrett GJ. Recent Developments in Canada's Tuberculosis Services. Canadian Journal of Public Health 1955; **46**(1): 93-99. https://www.dropbox.com/s/x8y8gc2kwgmd66f/WherrettGJ-ReentDevCanadaTBServices-CJPH-v46-1955-03-p93.pdf?dl=0

Recommended Resources:

1. Feldberg GD. Disease and Class: Tuberculosis and the Shaping of Modern North American Society. New Brunswick NJ: Rutgers University Press, 1995.
2. Grygier PS. A long Way From Home: The Tuberculosis Epidemic among the Inuit. Montreal & Kingston: McGill-Queen's University Press, 1994.
3. McCuaig K. The Weariness, the Fever, and the Fret: The Campaign against Tuberculosis in Canada, 1900-1950. Montreal & Kingston: McGill-Queen's University Press, 1999.

October 2: TB program studies and operational research

INSTRUCTOR: Xiaolin Wei, MD, PhD

The session will give a brief introduction of epidemiological and social science research skills in disease control programs, and the application of operational research perspective in research implementation and the scale-up of research results at reginal, national and global levels. The session will give examples of common research methods such as cohort studies, surveys, in-depth interviews, semi-experimental studies and randomized controlled trials in TB program. Students will have the opportunity to practice the research skills using a national/ regional TB cohort. The session will enable students to learn:

1. How to apply basic research designs for tuberculosis studies;
2. The principles of operational studies and its application in TB program;
3. The ability of assessing country TB program profiles using TB routine reports.

Readings:

1. Zachariah R, Harries AD, Ishikawa N, et al. Operational research in low-income countries: what, why, and how? *Lancet Infect Dis* 2009; **9**(11): 711-7.
2. Walley J, Khan MA, Shah SK, Witter S, Wei X. How to get research into practice: first get practice into research. *Bull World Health Organ* 2007; **85**(6): 424.
3. Yao H, Wei X, Liu J, Zhao J, Hu D, Walley JD. Evaluating the effects of providing financial incentives to tuberculosis patients and health providers in China. *Int J Tuberc Lung Dis* 2008; **12**(10): 1166-72.
4. Wei X, Walley J, Zhao J, Yao H, Liu J, Newell J. Why financial incentives did not reach the poor tuberculosis patients? A qualitative study of a Fidelis funded project in Shanxi, China. *Health policy* 2009; **90**(2-3): 206-13.

Recommended Resources:

1. Wei X, Liang X, Liu F, Walley JD, Dong B. Decentralising tuberculosis services from county tuberculosis dispensaries to township hospitals in China: an intervention study. *The international journal of tuberculosis and lung disease* 2008; **12**(5): 538-47.
2. Zachariah R, Rust S, Berger SD, et al. Building Global Capacity for Conducting Operational Research Using the SORT IT Model: Where and Who? *PLoS One* 2016; **11**(8): e0160837.
3. Theron G, Zijenah L, Chanda D, et al. Feasibility, accuracy, and clinical effect of point-of-care Xpert MTB/RIF testing for tuberculosis in primary-care settings in Africa: a multicentre, randomised, controlled trial. *Lancet* 2014; **383**(9915): 424-35.

October 9: Social and ethical issues

INSTRUCTOR: Ross Upshur, MD, MA, MSc.

This session will introduce students to the numerous and often overlooked ethical issues associated with clinical and public health responses to tuberculosis. Cases will be used to illustrate local and global responses. A former TB patient will be invited to this class as guest lecturer to discuss personal experience of having TB. Students will be expected to learn:

1. Ethical concepts relevant to the analysis of tuberculosis programs;
2. The utility and importance of ethical frameworks for managing complex health conditions like tuberculosis; and
3. Appreciate the limitations of current approaches to managing complex health conditions like tuberculosis.

Readings:

1. Ethics guidance for the implementation of the End TB strategy. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.
2. Benatar SR, Upshur R. Tuberculosis and poverty: what could (and should) be done? *Int J Tuberc Lung Dis* 2010; **14**(10): 1215-21
3. Upshur R, Singh J, Ford N. Apocalypse or redemption: responding to extensively drug-resistant tuberculosis. *Bull World Health Organ* 2009; **87**(6): 481-3.
4. Singh J, Upshur R, Radayatchi N. XDR-TB in South Africa: No time for denial or complacency. *PLOS Medicine* 2007; **4**(1): e50.

October 16: Clinical aspects: TB diagnosis, treatment, clinical evaluations, and latent TB

Diagnosis critical – the laboratory role in the identification of tuberculosis infection and disease

INSTRUCTOR: Kamran Khan, MD, FRCRC, MPH and Frances Jamieson, MD, FRCPC

Students will learn basic clinical aspects of TB treatment and care, including symptoms of TB, diagnosis, treatment of drug-susceptible TB cases using the DOTS chemotherapy, and clinical evaluations of TB during treatment. The laboratory lecture will introduce students to the TB and mycobacteriology laboratory and describe strategies for optimal use of laboratory testing in the diagnosis of active tuberculosis disease and latent tuberculosis (LTBI). Students will also learn how TB genotyping and molecular epidemiology supports public health TB case management and investigation of transmission of TB. Students will be introduced the clinical complexity involved with diagnosing and treating MDR-TB and TB/HIV. The session will also introduce the diagnosis and treatment of latent-TB in low TB prevalent settings. Learners will

1. Understand current laboratory assays and testing algorithms in use in the public health laboratory, including new molecular methods and testing limitations/caveats
2. Understand the use of genotyping and molecular epidemiology in the investigation and public health management of TB.
3. Understand basic clinical knowledge regarding TB diagnosis and treatment;
4. Be familiar with TB case categories, and the evaluation during their treatments;
5. Get to know the complexity of diagnosing and treating more severe forms of TB;
6. Be familiar with diagnosis and treatment of latent-TB in low TB prevalent settings.

Readings:

1. Chapter 1-4, WHO. Guidelines for treatment of tuberculosis. Geneva: World Health Organization, 2010. http://www.who.int/tb/publications/2010/9789241547833/en/

2. Chapters 3, 4 and Appendix D. Canadian Tuberculosis Standards, 7th Edition. Can Resp J 2013; volume 20, supplement A

3. Walker, T., Ip, C., Harrell, R., Evans, J., Kapatai, G., Dedicoat, M. et al. Whole-genome sequencing to delineate Mycobacterium tuberculosis outbreaks: a retrospective observational study. Lancet Infect Dis. Feb;13(2):137-46. doi: 10.1016/S1473-3099(12)70277-3. Epub 2012 Nov 15.

Recommended readings:

1. Chapter 5-8, WHO. Guidelines for treatment of tuberculosis. Geneva: World Health Organization, 2010.

http://www.who.int/tb/publications/2010/9789241547833/en/

2. WHO Guidelines on the management of latent tuberculosis infection:

http://www.who.int/tb/publications/latent-tuberculosis-infection/en/

3. Pai M, Behr M. 2016. Latent Mycobacterium tuberculosis infection and interferon-gamma release assays. Microbiol Spectrum 4(5). doi:10.1128/microbiolspec.TBTB2-0023-2016.

4. Pai M, Nicol MP, Boehme CC. 2016. Tuberculosis diagnostics: state of the art and future directions. Microbiol Spectrum 4(5). doi:10.1128/microbiolspec.TBTB2-0019-2016.

5. Hatherell HA et al. Interpreting whole genome sequencing for investigating tuberculosis transmission: a systematic review. BMC Med. 2016 Mar 23;14:21. doi: 10.1186/s12916-016-0566-x.

6. Walker TM et al. Tuberculosis is changing (commentary). Lancet Infect Dis 2017; Apr;17(4):359-361. doi: 10.1016/S1473-3099(17)30123-8. Epub 2017 Mar 13

October 23: TB in low burden countries: working towards TB elimination in Canada

INSTRUCTOR: Elizabeth Rea, MD, MSc, FRCP(C) and Barry Pakes, MD, FRCPC, PhD

The session will introduce TB program in Toronto, Ontario and Canada. The session will discuss TB in two core populations with high TB prevalence: first nations population, and people living in the inner city areas. The session will also introduce the current practice towards TB elimination and its challenges in Canada.

Readings:

1. Khan K, Hirji MM, Miniota J, et al. Domestic impact of tuberculosis screening among new immigrants to Ontario, Canada. CMAJ 2015;187:E473-81.
2. Lonnroth K, Migliori GB, Abubakar I, et al. Towards tuberculosis elimination: an action framework for low-incidence countries. Eur Respir J 2015;45:928-52.

3. Gardy JL, Johnston JC, Ho Sui SJ, et al. Whole-genome sequencing and social-network analysis of a tuberculosis outbreak. N Engl J Med 2011;364:730-9.

October 30: TB programs in high burden countries: India and Indonesia

INSTRUCTOR: Firdosi R. Mehta, MD

India and Indonesia have the highest TB burdens in the world. Both countries have very active private providers in their health systems. India is reforming its public private partnership (PPM) in its revised national TB program, while Indonesia is rapidly expanding its universal health coverage program. We will access their progress of TB program in the last decade, and discuss how social environment, health reform, PPM, and health financing affects outcomes in the two countries. Students in this session will:

1. Recognize the influence of social environment in TB treatment and care;
2. Understand the progress of WHO TB DOTS programs in the two countries and the key challenges;
3. Practice the skills of assessing national TB programs; and
4. Conduct group work and develop their own critiques

Readings (to be updated):

November 6: TB programs in low HIV prevalent but high TB burden countries: China and Hong Kong SAR

INSTRUCTORS: Xiaolin Wei, MD, PhD,

China has the second largest burden of TB cases in the world. With the rapid expansion of DOTS program under the national disease control and prevention (CDC) system, China has achieved rapid TB prevention and care progresses since 1990s. At the same time, China is facing an increasing threat of the MDR-TB epidemic. The session will provide case studies comparing patient experience and costs under three different TB care models in China. Hong Kong is a special administrative region (SAR) in China and a former British colony. The city provides a unique case to demonstrate how its close interaction with Mainland China has resulted a dynamic local TB epidemic, and to what extend the interaction has shown a far-reaching impact after 40 years. Student will also have time for group work regarding their exams from the session and on. At the end of the session, students will learn:

1. TB epidemiology in China and Hong Kong;
2. How TB prevention, diagnosis and treatment service is provided in China and Hong Kong, and the patient experiences;
3. The challenges of TB programs in China and Hong Kong; and
4. Conduct group work and develop their own critiques.

Readings:

1. Country profile: China, WHO Global TB Report 2016: http://www.who.int/tb/publications/global_report/en/
2. Wang L, Zhang H, Ruan Y, et al. Tuberculosis prevalence in China, 1990-2010; a longitudinal analysis of national survey data. *Lancet* 2014; **383**(9934): 2057-64.
3. Wei X, Zou G, Walley J, et al. China tuberculosis policy at crucial crossroads: comparing the practice of different hospital and tuberculosis control collaboration models using survey data. *PLoS One* 2014; **9**(3): e90596.
4. Wei X, Zou G, Yin J, Walley J, Sun Q. Comparing patient care seeking pathways in three models of hospital and TB programme collaboration in China. *BMC Infect Dis* 2013; **13**: 93.

Recommended Resources

1. The Hong Kong Tuberculosis, Chest, and Heart Diseases Association, Annual report 2013, http://www.info.gov.hk/tb_chest/doc/AnnualReport2013.pdf
2. Li R, Ruan Y, Sun Q, et al. Effect of a comprehensive programme to provide universal access to care for sputum-smear-positive multidrug-resistant tuberculosis in China: a before-and-after study. *The Lancet Global Health* 2015; **3**(4): e217-e28.

November 13: Health system strengthening in TB programs

INSTRUCTOR: Xiaolin Wei, MD, PhD.

A strong health system is fundamental for a successful TB program. While, the opposite is always painfully true that many gaps in the TB programs have to be dealt with health system solutions. The session will employ China as an example. It guides students through the major health system reforms in China and its consequences as difficulties faced by TB patients. The session will illustrate the challenge of providing TB care to rural-to-urban migrants in Shanghai, the largest city in China, and how intervention was delivered and evaluated. We will also introduce a study that using genotyping and spatial analysis of MDR-TB in Shanghai to redefine public health strategies for public health control of MDR-TB. Students will be expected to learn:

2. To what extent that health system of a country has a predominant influence over its TB programs;
3. Using operational research skills to understand the disease control barriers from a health system point of view, then develop and evaluate interventions; and
4. Applying relevant skills in their own settings.

Readings:

1. Wei X, Chen J, Chen P, et al. Barriers to TB care for rural-to-urban migrant TB patients in Shanghai: a qualitative study. *Tropical medicine & international health: TM & IH* 2009; **14**(7): 754-60..
2. Wei X, Zou G, Yin J, et al. Providing financial incentives to rural-to-urban tuberculosis migrants in Shanghai: an intervention study. *Infectious diseases of poverty* 2012; **1**(1): 9.
3. Zou G, Wei X, Witter S, et al. Incremental cost-effectiveness of improving treatment results among migrant tuberculosis patients in Shanghai. *Int J Tuberc Lung Dis* 2013; 17(8): 1056-64.
4. Yang, C., Luo, T., Shen, X., Wu, J., Gan, M., Xu, P., Wu, Z., Lin, S., Tian, J., Liu, Q., Yuan, Z., Mei, J., DeRiemer, K., Gao, Q., 2017. Transmission of multidrug-resistant Mycobacterium tuberculosis in Shanghai, China: a retrospective observational study using whole-genome sequencing and epidemiological investigation. Lancet Infect Dis 17, 275-284.

Recommended Resources:

1. WHO, 2006, Contribute to health system strengthening: guiding principles to national tuberculosis program: http://www.who.int/tb/health_systems/en/

November 20: Research on shortened MDR-TB regimens: progress and challenges

INSTRUCTOR: I.D. Rusen, MD.

The session aims to provide updated knowledge regarding research on shortened treatment regimens for MDR-TB. The session will highlight the challenges of conducting clinical research in low resource settings using the STREAM clinical trial as a case study. Students will be expected to learn:

1. The burden of MDR-TB at a global and individual level
2. Progress made in shortened MDR-TB regimen research
3. Challenges related to clinical research in low resource settings
4. The mission, goals and activities of the International Union Against TB and Lung Disease (The Union) – one of the world's oldest humanitarian health organizations;
5. A case study of a MDR-TB clinical trial - STREAM.

Readings:

1. Nunn AJ, Rusen I.D., Van Deun A, Torrea G, Phillips PP, Chiang CY, Squire SB, Madan J, Meredith SK. Evaluation of a standardized treatment regimen of anti-tuberculosis drugs for patients with multi-drug-resistant tuberculosis (STREAM): study protocol for a randomized controlled trial. Trials. 2014 Sep 9;15:353. doi: 10.1186/1745-6215-15-353.
2. Aung KJ, Van Deun A, Declercq E, et al. Successful '9-month Bangladesh regimen' for multidrug-resistant tuberculosis among over 500 consecutive patients. *Int J Tuberc Lung Dis* 2014; **18**(10): 1180-7.

Recommended Resources:

1. http://www.who.int/tb/Short_MDR_regimen_factsheet.pdf?ua=1
2. http://www.resisttb.org/wp-content/uploads/2016/06/RESIST-TB-Clinical-Trials-Progress-Report_13Jun20162.pdf