

Department: Epidemiology and Biostatistics
Title: EPI 253, Seminar in Infectious Disease Epidemiology
Quarter units: 2 units
Time: Mondays 3:10-5 PM, Mission Hall 1108

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Course description:

This course is a one-quarter-long seminar on epidemiologic methods used in infectious disease epidemiology, with a focus on viral and bacterial infections. It is not meant to be a review of infectious diseases or medical microbiology although we will examine public health interventions used in communicable disease control. The faculty-facilitated seminars will focus on key readings in the field and will be led by students. There will be two introductory lectures that will focus on key concepts in infectious disease epidemiology. Students who are not seeking academic credit and auditors are welcome but will need to participate in the seminars to the same extent as for-credit students.

Teaching format: Seminar, independent study. Depending on the number of participants, each participant will be expected to lead two one-hour discussions and to participate in discussions of all other seminar topics.

Competencies:

At the end of the course students will be able to:

- Understand the terminology used in infectious disease epidemiology
- Use more specialized epidemiologic methods to design studies with infectious diseases as endpoints
- Read and evaluate the infectious disease epidemiology literature
- Understand more advanced epidemiologic methods used to evaluate public health intervention programs designed to control infectious diseases of public health significance

Student evaluation:

Expectations of students: Learning will be primarily in literature-based seminars. We expect students to attend all seminars, and one of the Course Directors must approve absences in advance (other than emergencies). Students are required to complete the reading and contribute actively in seminar discussions.

Grading: For participants who are taking the seminar for academic credit, grading will be based on the student's presentation (50% of the grade) and his or her participation during the other sessions (50% of the grade). The importance of attendance and participation cannot be overemphasized. Please notify us if you are unable to attend because of professional responsibilities, travel or illness. The course can only be taken on a "satisfactory/unsatisfactory" basis.

Course website: http://www.epibiostat.ucsf.edu/courses/schedule/infectious_disease_epi.html

Syllabus

Required reading:

1. Online articles that can be downloaded through the provided URL links or directly from PubMed

Suggested materials:

1. Weekly Epidemiologic Record. Subscribe electronically at <http://www.who.int/wer/en>.
2. MMWR. Subscribe electronically at <http://www.cdc.gov/mmwr/mmwrsubscribe.html>
3. Nelson K, Williams C. *Infectious Disease Epidemiology: Theory and Practice*. 3rd edition. Burlington, MA: Jones & Bartlett, 2014.

Seminar topics and dates (summary):

September 26	Introduction to infectious disease epidemiology I: basic concepts and vocabulary Seminar: Vaccine trials
October 3	Introduction to infectious disease epidemiology II: transmission dynamics Seminar: Assessing vaccine efficacy post-approval and evaluating adverse effects
October 10	Estimating incidence of infectious diseases
October 17	Registry-based studies and treatment cohorts
October 24	Molecular epidemiology
October 31	Mass drug administration, including test and treat for HIV
November 7	Hospital-acquired infections and outbreak investigations
November 14	Contact investigations, quarantine and isolation
November 21	No class
November 28	Zika Virus
December 5	Disease eradication

Week 1

September 26 Vaccine trials and new vaccine development

Instructor: Dr. Morris

Lecture: Introduction to infectious disease epidemiology: basic concepts and vocabulary

Seminar: Vaccine trials

Required reading:

Plennevaux E, Sheldon E, Blatter M, Reeves-Hoché MK, Denis M. Immune response after a single vaccination against 2009 influenza A H1N1 in USA: a preliminary report of two randomised controlled phase 2 trials. *Lancet*. 2010 Jan 2;375(9708):41-8.

Durbin AP, Kirkpatrick BD, Pierce KK, et al. A 12-Month-Interval Dosing Study in Adults Indicates That a Single Dose of the National Institute of Allergy and Infectious Diseases Tetravalent Dengue Vaccine Induces a Robust Neutralizing Antibody Response. *J Infect Dis*. 2016 Sep 15;214(6):832-5. PubMed PMID: 26908742

Rothman AL, Ennis FA. Dengue vaccine: the need, the challenges, and progress [Editorial]. *J Infect Dis* 2016 Sep 15; 214(6):825-27.

Please review on-line prior to class:

Food and Drug Administration. Vaccine product approval process. Available at: <http://www.fda.gov/biologicsbloodvaccines/developmentapprovalprocess/biologicslicenseapplicationsblaprocess/ucm133096.htm>

Optional reading/resources:

National Institute of Allergy and Infectious Diseases. The Jordan Report: Accelerated Development of Vaccines 2012: especially 115-38. Available at: <http://www.niaid.nih.gov/topics/vaccines/pages/Jordan2012.aspx>

PhRMA. 2016 Report: Medicines in Development for Rare Diseases Available at: <http://phrma.org/sites/default/files/pdf/medicines-in-development-report-rare-diseases.pdf>

Week 2

October 3 Assessing vaccine efficacy post-approval and evaluating adverse effects

Instructor: Dr. Morris

Lecture: Introduction to infectious disease epidemiology II: transmission dynamics

Seminar: Assessing vaccine effectiveness and adverse events

Required reading:

Griffin MR, Zhu Y, Moore MR, Whitney CG, Crijalva CG. U.S. hospitalizations for pneumonia after a decade of pneumococcal vaccination. *N Engl J Med* 2013; 369:155-63.

Gaglani M, Pruszynski J, Murthy K, Clipper L, Robertson A, Reis M, Chung JR, Piedra PA, Avadhanula V, Nowalk MP, Zimmerman RK, Jackson ML, Jackson LA, Petrie JG, Ohmit SE, Monto AS, McLean HQ, Belongia EA, Fry AM, Flannery B. Influenza Vaccine Effectiveness Against 2009 Pandemic Influenza A(H1N1) Virus Differed by Vaccine Type During 2013-2014 in the United States. *J Infect Dis*. 2016 May 15;213(10):1546-56.

* additional readings available by request

Week 3**October 10 Estimating incidence of infectious diseases**

Instructors: Dr. Morris

Required reading:

Busch MP, Pilcher CD, Mastro TD, et al. Beyond detuning: 10 years of progress and new challenges in the development and application of assays for HIV incidence estimation. *AIDS* 2010; 24:2763-71.

Eschleman SH, Hughes PHJ, Laeyendecker O, et al. Use of a multifaceted approach to analyze HIV incidence in a cohort study of women in the United States: HIV Prevention Trials Network 064 study. *J Infect Dis* 2013; 207:223-31.

Zibbell JE, Iqbal K, Patel RC, Suryaprasad A, Sanders KJ, Moore-Moravian L, Serrecchia J, Blankenship S, Ward JW, Holtzman D; Centers for Disease Control and Prevention (CDC). Increases in hepatitis C virus infection related to injection drug use among persons aged ≤ 30 years - Kentucky, Tennessee, Virginia, and West Virginia, 2006-2012. *MMWR Morb Mortal Wkly Rep*. 2015 May 8;64(17):453-8

Week 4**October 17 Registry-based studies and treatment cohorts**

Instructor: Drs. Morris & Rutherford

Required reading:

Cattamanchi A, Hopewell PC, Gonzalez LC, et al. A 13-year molecular epidemiologic analysis of tuberculosis in San Francisco. *Int J Tuberc Lung Dis* 2006; 10:297-304.

The Opportunistic Infections Project Team of the Collaboration of Observational HIV Epidemiological Research in Europe (COHERE) in EuroCoord CD4 cell count and the risk of AIDS or death in HIV-infected adults on combination antiretroviral therapy with a suppressed viral load: a longitudinal cohort study from COHERE. *PLoS Med* 2012; 9(3): e1001194.

Please review on-line prior to class:

International Epidemiologic Databases to Evaluate AIDS (IeDEA). Available at: www.iedea.org.

Week 5**October 24 Molecular epidemiology**

Guest instructor: Dr. Bryan Greenhouse, Department of Medicine, Division of Infectious Diseases

Required reading:

Wang X, Wu Y, Mao L, Xia W, Zhang W, Dai L, Mehta SR, Wertheim JO, Dong X, Zhang T, Wu H, Smith DM. Targeting HIV Prevention Based on Molecular Epidemiology Among Deeply Sampled Subnetworks of Men Who Have Sex With Men. *Clin Infect Dis*. 2015 Nov 1;61(9):1462-8. PubMed: 26129754

Truong H-H, Pipkin S, O'Kefe K, et al. Recent infection, sexually transmitted infections, and transmission cluster frequently observed among persons newly diagnosed with HIV in San Francisco. *JAIDS* 2015; 69:606-09

Week 6

October 31 **Mass drug administration, including test and treat for HIV**

Instructors: **Drs. Morris & Rutherford**

Required reading:

Kuehne A, Tiffany A, Lasry E, Janssens M, Besse C, Okonta C, Larbi K, Pah AC, Danis K, Porten K. Impact and Lessons Learned from Mass Drug Administrations of Malaria Chemoprevention during the Ebola Outbreak in Monrovia, Liberia, 2014. *PLoS One*. 2016 Aug 31;11(8):e0161311. doi: 10.1371/journal.pone.0161311. eCollection 2016. PubMed PMID: 27580098.

HIV test and treat

TEMPRANO ANRS 12136 Study Group. A trial of early antiretrovirals and isoniazid preventive therapy in Africa. *N Engl J Med* 2015; 373:808-22.

Week 7

November 7 **Hospital acquired infections and outbreak investigations**

Instructor: **Dr. Cora Hoover**

Required reading:

Hospital-acquired infections:

Chowell G, Blumberg S, Simonsen L, Miller MA, Viboud C. Synthesizing data and models for the spread of MERS-CoV, 2013: key role of index cases and hospital transmission. *Epidemics* 2014; 9:40-51.

Climo MW, Yokoe DS, Warren DK, et al. Effect of daily chlorhexidine bathing on hospital-acquired infection. *N Engl J Med* 2013; 368:533-42.

Outbreak investigations:

Laidler MR, Tourdjman M, Buser GL, et al. *Escherichia coli* O157:H7 infections associated with consumption of locally grown strawberries contaminated by deer. *Clin Infect Dis* 2013; 57:1129-34.

Week 8

November 14 **Contact investigations, quarantine and isolation**

Instructor: **Dr. Brown**

Required reading:

Isolation and quarantine:

Bondy SJ, Russell ML, Laflèche JM, Rea E. Quantifying the impact of community quarantine on SARS transmission in Ontario: estimation of secondary case count difference and number needed to quarantine. *BMC Public Health* 2009; 9:488.

Contact tracing:

Chung WM, Smith JC, Weil LM, Hughes SM, Joyner SN, Hall EM, Ritch J, Srinath D, Goodman E, Chevalier MS, Epstein L, Hunter JC, Kallen AJ, Karwowski MP, Kuhar DT, Smith C, Petersen LR, Mahon BE, Lakey DL, Schrag SJ. Active tracing and monitoring of contacts associated with the first cluster of Ebola in the United States. *Ann Intern Med*. 2015 Aug 4;163(3):164-73.

<http://www.ncbi.nlm.nih.gov/pubmed/26005809>

Levine R, Ghiselli M, Conteh A, et al. Notes from the Field. Development of a contact tracing system for Ebola virus disease — Kambia District, Sierra Leone, January–February 2015. *MMWR Morb Mortal Wkly Rep* 2016;65:402.

<http://www.cdc.gov/mmwr/volumes/65/wr/mm6515a4.htm>

Week 9

November 28 Current problems: Zika virus disease, Americas

Instructor: Dr. Rutherford

Required reading:

Brasil P, Pereira JP Jr, Gabaglia Cret al. Zika virus infection in pregnant women in Rio de Janeiro – preliminary report. *N Engl J Med* 2016 Mar 4.

Rasmussen SA, Jamieson DJ, Honein MA, Petersen LR. Zika virus and birth defects - reviewing the evidence for causality. *N Engl J Med* 2016; 374:1981-87.

Wikan N, Smith DR. Zika virus: history of a newly emerging arbovirus. *Lancet Infect Dis* 2016 Jul; 16(7):e119–26.

Week 10

December 5 Disease eradication and elimination

Instructors: Drs. Morris and Rutherford

Required reading:

CDC. Tracking progress toward polio eradication – worldwide, 2013-2014. *MMWR* 2015; 64:415-20.

Holzman H, Hengel H, Tensusch M, Doerr HW. Eradication of measles: remaining challenges. *Med Microbiol Immunol* 2016; 205:201-08.