

7Department:	Epidemiology and Biostatistics
Title:	EPI 253, Seminar in Infectious Disease Epidemiology
Quarter units:	2 units
Time:	Mondays 3:10-5 PM, Mission Hall 1108
Course director:	George W. Rutherford, M.D. Salvatore Pablo Lucia Professor of Epidemiology, Preventive Medicine, Pediatrics and History Vice Chair, Department of Epidemiology and Biostatistics Chief, Division of Infectious Disease of Epidemiology Mission Hall, 3 rd floor 550 16 th Street, Box 1224 (415) 476-5781, e-mail: george.rutherford@ucsf.edu Office hours: Mondays, 12-1 and by arrangement
	Meghan Morris, Ph.D., M.P.H. Assistant Professor of Epidemiology Mission Hall 550 16 th Street, 3 rd floor 550 16 th Street, Box 1224 (415) 476-5822, e-mail: Meghan.Morris@ucsf.edu Office hours: by arrangement

Course description:

This course is a one-quarter-long seminar on epidemiologic methods used in infectious disease epidemiology. 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 seminars will focus on key readings in the field and will be led by both students and faculty. 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 one or 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 seminars.

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.

Syllabus

Required reading:

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

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 28	Introduction to infectious disease epidemiology I: basic concepts and vocabulary (Dr. Morris) Seminar: Vaccine trials
October 5	Introduction to infectious disease epidemiology II: transmission dynamics (Dr. Rutherford) Seminar: Assessing vaccine efficacy post-approval and evaluating adverse effects
October 12	Molecular epidemiology
October 19	Registry-based studies and treatment cohorts
October 26	Estimating incidence of infectious diseases
November 2	Mass drug administration, including test and treat for HIV
November 9	Hospital-acquired infections and outbreak investigations
November 16	Contact investigations, quarantine and isolation
November 23	Ebola virus disease
November 30	Disease eradication

Week 1

September 28 Vaccine trials and new vaccine development

Instructor: Dr. Meghan 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.

RTS,S Clinical Trials Partnership, Agnandji ST, Lell B, et al. A phase 3 trial of RTS,S/AS01 malaria vaccine in African infants. *N Engl J Med*. 2012 Dec 13;367(24):2284-95.

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:

Institute of Medicine. *Ranking Vaccines: Applications of a Prioritization Software Tool: Phase III: Use Case Studies and Data Framework*. Washington: National Academies Press, 2015.

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. Medicines in development: Vaccines, 2013 Report: especially 28-34. Available at: <http://www.phrma.org/sites/default/files/pdf/vaccines2013.pdf>

Week 2

October 5 Assessing vaccine efficacy post-approval and evaluating adverse effects

Instructor: **Dr. Rutherford**

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.

Yih WK, Lee GM, Lieu TA, et al. Surveillance for adverse events following receipt of pandemic 2009 H1N1 vaccine in the Post-Licensure Rapid Immunization Safety Monitoring (PRISM) system. *Am J Epidemiol* 2012; 175:1120-28.

Murphy TV, Gargiullo PM, Massoudi MS, et al. Intussusception among infants given an oral rotavirus vaccine. *N Engl J Med* 200; 344:564-72.

Optional reading:

Glass RI, Parashar UD. Rotavirus vaccines – balancing intussusception risks and health benefits. *N Engl J Med* 2014; 370:568-70.

Schonberger LB, Bregman DJ, Sullivan-Bolyai JZ, et al. Guillain-Barré syndrome following vaccination in the National Influenza Immunization Program, United States, 1976-1977. *Am J Epidemiol* 1979; 110:105-23.

Week 3

October 12 Molecular epidemiology

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

Required reading:

Wertheim JO, Leigh Brown AJ, Hepler NL, Mehta SR, Richman DD, Smith DM, Kosakovsky Pond SL. The global transmission network of HIV-1. *J Infect Dis*. 2014 Jan 15;209(2):304-13. PubMed PMID: 24151309

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

Muñoz-Jordán JL, Santiago GA, Margolis H, Stark L. Genetic relatedness of dengue viruses in Key West, Florida, USA, 2009-2010. *Emerg Infect Dis* 2013; 19:652-4.

Optional reading:

Faria NR, Nogueira RM, de Filippis AM, et al. Twenty years of DENV-2 activity in Brazil: molecular characterization and phylogeny of strains isolated from 1990 to 2010. *PLoS Negl Trop Dis* 2013; 7:e2095.

Sabat AJ, Budimir A, Nashev D, et al. Overview of molecular typing methods for outbreak detection and epidemiological surveillance. *Euro Surveill* 2013; 18:20380.

Villalba JA, Bello G, Maes M, et al. HIV-epidemic in Warao Amerindians from Venezuela: spatial phylodynamics and epidemiological patterns. *AIDS* 2013; 27:1783-91.

Ypma RJF, Jonges M, Bataille A, et al. Genetic data provide evidence for wind-mediated transmission of highly pathogenic avian influenza. *J Infect Dis* 2013; 207:730–35.

Week 4

October 19 Registry-based studies and treatment cohorts

Instructor: **Dr. Morris**

Required reading:

Anger HA, Proops D, Harris TB, et al. Active case finding and prevention of tuberculosis among a cohort of contacts exposed to infectious tuberculosis cases in New York City. *Clin Infect Dis* 2012; 54:1287-95.

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.

Hanna DB, Buchaz K, Gebo KA, et al. Trends and disparities in antiretroviral therapy initiation and virologic suppression among newly treatment-eligible HIV-infected individuals in North American, 2001-2009. *Clin Infect Dis* 2013; 56:1174-82.

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 26****Estimating incidence of infectious diseases**

Instructors: Drs. Morris and Rutherford

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 State: 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

Mastro TD. Determining HIV incidence in populations: moving in the right direction [Editorial]. *J Infect Dis* 2013; 207:204-06.

Optional reading:

Benjamin RM. Raising awareness of viral hepatitis: National Hepatitis Testing Day, May 19. *Public Health Rep*. 2012 May-Jun;127(3):244-5. PubMed PMID: 22547853; PubMed Central PMCID: PMC3314066.

Laeyendecker O, Brookmeyer R, Cousins MM, et al. HIV incidence determination in the United States: a multiassay approach. *J Infect Dis* 2013; 207:232-39.

Brookmeyer R, Quinn T, Shepherd M, Mehendale S, Rodrigues J, Bollinger R. The AIDS epidemic in India: a new method for estimating current human immunodeficiency virus (HIV) incidence rates. *Am J Epidemiol* 1995; 142:709-13.

Janssen RS, Satten GA, Stramer SL, et al. New testing strategy to detect early HIV-1 infection for use in incidence estimates and for clinical and prevention purposes. *JAMA* 1998; 280:42-48.

Parekh BS, Kennedy MS, Dobbs T, et al. Quantitative detection of increasing HIV type 1 antibodies after seroconversion: a simple assay for detecting recent HIV infection and estimating incidence. *AIDS Res Hum Retroviruses* 2002; 18:295-307.

Week 6**November 2****Mass drug administration, including test and treat for HIV**

Instructors: Dr. Morris

Required reading:

Yap P, Wu F-W, Du Z-W et al. Effect of deworming on physical fitness of school-aged children in Yunnan, China: a double-blind, randomized, placebo-controlled trial. PLoS Negl Trop Dis 2014; 8(7): e2983.

Simonsen PE, Derua YA, Kisinza WN, Magesa SM, Malecela MN, Pedersen EM. Lymphatic filariasis control in Tanzania: status after eight rounds of mass drug administration. Parasit Vectors 2014; 7:507.

HIV test and treat

Anglemyer A, Rutherford GW, Easterbrook PJ, Horvath T, Vitória M, Jan M, Doherty MC. Early initiation of antiretroviral therapy in HIV-infected adults and adolescents: a systematic review. AIDS 2014; 28(Suppl 2):S105-S118.

INSIGHT START Study Group. Initiation of antiretroviral therapy in early asymptomatic HIV infection. N Engl J Med 2015 [Epub ahead of print].

TEMPRANO ANRS 12136 Study Group. A trial of early antiretrovirals and isoniazid preventive therapy in Africa. N Engl J Med 2015 [Epub ahead of print].

Please review on line prior to class:

Population Effects of Antiretroviral Therapy to Reduce HIV Transmission (PopART). Available at www.clinicaltrials.gov.

Sustainable East Africa Research in Community Health (SEARCH). Available at www.clinicaltrials.gov.

Optional reading:

Granich RM, Gilks CF, Dye C, De Cock KM, Williams BG. Universal voluntary HIV testing with immediate antiretroviral therapy as a strategy for elimination of HIV transmission: a mathematical model. Lancet 2009; 373:48-57.

Tanser F, Barnighausen T, Grapsa E, Zaidi J, Newell M-L. High coverage of ART associated with decline in risk of HIV acquisition in rural KwaZulu-Natal, South Africa. Science 2013; 330:966-71.

Week 7**November 9 Hospital acquired infections and outbreak investigations**

Instructor: Dr. Case

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:

CDC. Community outbreak of HIV infection linked to injection drug use of oxycodone – Indiana, 2015. MMWR 2015; 64:443-44.

Laidler MR, Toudjman 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.

Strathdee SA, Beyrer C. Threading the needle – how to stop the HIV outbreak in rural Indiana? N Engl J Med 2015; 33:397-99.

Optional reading:

O'Brien TR. Epidemic-assistance investigations by the Centers for Disease Control and Prevention – the first 60 years. Am J Epidemiol 2011; 174:1211-12.

Week 8

November 16 Contact investigations, quarantine and isolation

Instructor: Dr. Morris

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.

Garza RC, Basurto-Dávila R, Ortega-Sanchez IR, et al. Effect of winter school breaks on influenza-like illness, Argentina, 2005-2008. Emerg Infect Dis 2013; 19:938-44.

Contact tracing:

Hogben M, McNally T, McPheeters M, Hutchinson AB. The effectiveness of HIV partner counseling and referral services in increasing identification of HIV-positive individuals: a systematic review. Am J Prev Med 2007; 33(2 Suppl):S89-100.

Rivers CM, Lofgren ET, Marathe M, Eubank S, Lewis BL. Modeling the impact of interventions on an epidemic of Ebola in Sierra Leone and Liberia. PLoS Curr 2014; 6: doi:10.1371/currents.outbreaks.4d41fe5d6c05e9df30ddce33c66d084c..

Optional reading:

Feng Z, Yang Y, Xu D, Zhang P, McCauley MM, Glasser JW. Timely identification of optimal control strategies for emerging infectious diseases. J Theor Biol 2009; 259:165-71.

Mathews C, Coetzee N, Zwarenstein M, et al. A systematic review of strategies for partner notification for sexually transmitted diseases, including HIV/AIDS. Int J STD AIDS 2002; 13:285-300.

Week 9

November 23 Current problems: Ebola virus disease, West Africa

Instructor: Dr. Rutherford

Required reading:

Alexander KA, Sanderson CE, Marathe M, Lewis BL, Rivers CM, Shaman J, Drake JM, Lofgren E, Dato VM, Eisenberg MC, Eubank S. What factors might have led to the emergence of Ebola in West Africa? PLoS Negl Trop Dis. 2015 Jun 4;9(6):e0003652.

Park DJ, Dudas G, Wohl S, et al. Ebola Virus Epidemiology, Transmission, and Evolution during Seven Months in Sierra Leone. Cell. 2015 Jun 18;161(7):1516-26.

Gire SK, Goba A, Andersen KG, et al. Genomic surveillance elucidates Ebola virus origin and transmission during the 2014 outbreak. Science. 2014 Sep 12;345(6202):1369-72.

WHO Ebola Response Team. Ebola virus disease in West Africa--the first 9 months of the epidemic and forward projections. N Engl J Med. 2014 Oct 16;371(16):1481-95. doi: 10.1056/NEJMoa1411100. Epub 2014 Sep 22. PubMed PMID: 25244186;

Optional reading:

Qui X, Wong G, Audet J, et al. Reversion of advanced Ebola virus disease in nonhuman primates with ZMapp. Nature 2014 Aug 29 [epub ahead of print].

Week 10**November 30 Disease eradication and elimination**

Instructors: Drs. Morris and Rutherford

Required reading:

Breman JG, Arita I. The certification of smallpox eradication and implications for Guinea worm, poliomyelitis, and other diseases: confirming and maintaining a negative. Vaccine 2011; 29 (Suppl 4):D41-8.

CDC. Progress toward global eradication of dracunculiasis--January 2013-June 2014. MMWR 2014; 63:1050-54.

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

Rebollo MP, Bockarie MJ. Toward the elimination of lymphatic filariasis by 2020: treatment update and impact assessment for the endgame. Expert Rev Anti Infect Ther 2013; 11:723-31.

Optional reading:

Hopkins DR. Disease eradication. N Engl J Med 2013; 368:54-63.

Liu J, Modrek S, Gosling R, Feachem R. Malaria eradication: is it possible? Is it worth it? Should we do it? Lancet Global Health 2013; e2-e3