

Population Health Risk Assessment I (EPI 5181)

Faculty of Medicine and
Department of Epidemiology and Community Medicine
Roger Guindon Hall, 451 Smyth Road, room 2111
Tuesdays 1:30 - 4:30, September - December 2009
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Outline

Principles and methods of population health risk assessment are examined, including national and international policy frameworks for health risk assessment and risk management. Specific topics include determinants of population health; clinical, epidemiological and toxicological methods for identifying health hazards; population health surveillance; methodologies for population health risk assessment; regulatory, economic, technological and advisory approaches to population health risk management; community action and social marketing; development of effective population health strategies; principles of risk management decision making; audit and evaluation of interventions; risk communication; risk perception; risk acceptability; and evidence based population health risk management policy development.

Texts

Glickman, Theodore S., Gough, Michael, eds (1995). *Readings in Risk*. Washington, D.C.: Resources for the Future.

National Research Council. (2009) *Science and Decisions: Advancing Risk Assessment*, National Academies Press, Washington, D.C. [details available at www.nap.edu]

Session 1: Introduction to Population Health Risk Assessment

September 15, 2009

The concept of population health is discussed within the context of a five stage framework developed by the Institute of Population Health. Definitions of health risk are examined, and a new framework for population health risk assessment introduced.

Population Health Risk Assessment, Chapter 1: Introduction.

Readings in Risk, Defining Risk (pp. 30-41).

Readings in Risk, Analyzing the Daily Risks of Life (pp. 55-60).

Krewski D, Hogan V, Turner MC, Zeman PL, McDowell I, Edwards N, Losos J. An integrated framework for risk management and population health. *Hum Ecol Risk Assessment* 2007; 13(6): 1288-1312.

Session 2: Evolution of Population Health Risk Assessment

September 22, 2009

The historical development of population health risk assessment over the last two decades will be reviewed. Policy frameworks for risk management decision making developed by national and international organizations will be discussed in detail, including principles and guidelines for population health risk assessment and management.

Population Health Risk Assessment, Chapter 2: Risk Management Frameworks

Population Health Risk Assessment, Chapter 3: Population Health Frameworks

Population Health Risk Assessment, Chapter 4: Health Status Determinants

Jardine CG, Hrudey SE, J. H. Shortreed JH, Craig L, Krewski D, Furgal C, McColl S. Risk management frameworks for human health and environmental risks. *Journal of Toxicology and Environmental Health B* 2003; 6(6):569-718.

Session 3: Health Risk Analysis

September 29, 2009

The identification of population health risks using epidemiological, toxicological, clinical and other sources of information is discussed. The use of surveillance data in health risk assessment is explored.

Topics for term papers to be discussed.

Population Health Risk Assessment, Chapter 5: Identification of Health Risks and Determinants

Readings in Risk, Part 4: Health Risk Assessment (pp. 141-180).

Science and Decisions, Chapter 2: Evolution and Use of Risk Assessment in the Environmental Protection Agency: Current Practice and Future Prospects

Science and Decisions, Chapter 3: The Design of Risk Assessments

Session 4: Quantitative Risk Assessment

October 6, 2009

Statistical methods for quantifying population health risks at both the individual and population levels are discussed. Biologically based risk assessment models are introduced, and their use in risk assessment described. Methods for describing uncertainties in estimates of population health risks are also addressed.

Abstracts of term papers to be submitted.

Population Health Risk Assessment, Chapter 6: Risk Estimation

Science and Decisions, Chapter 4: Uncertainty & Variability: The Recurring and Recalcitrant Elements of Risk Assessment

Science and Decisions, Chapter 5: Toward a Unified Approach to Dose-Response Assessment

Science and Decisions, Chapter 6: Selection and Use of Defaults

Session 5: Perception of Population Health Risks

October 13, 2009

Public perception of risk is an important consideration in population health risk management. Perceived risk is gauged by examining the results of surveys of risk perception. The factors shaping public perception of risk are discussed using the results of studies of the perception of different risks by the Canadian public. Differences between public and expert perceptions of risk are examined. Risk acceptability will also be discussed in this session.

Term paper outlines due.

Population Health Risk Assessment, Chapter 11: Risk Perception.
Population Health Risk Assessment, Chapter 12: Risk Acceptability.

Supplemental

Terwel BW, Harinck F, Ellemers N, Daamen DDL. Competence-based and integrity-based trust as predictors of acceptance of carbon dioxide capture and storage (CCS). *Risk Analysis* 2009; 29(8): 1129-1140.

Session 6: Risk Communication

October 20, 2009

Risk communication is broadly defined as any purposeful exchange of information about health risks among interested parties. Communication strategies for use in communication between different stakeholder groups, particularly between experts and the public, are examined. Guidelines for the effective communication of information on population health risks are presented.

Discussion of Format of Term Papers (Daniel Bedard)

Population Health Risk Assessment, Chapter 13: Risk Communication.
Readings in Risk, Part 6: Risk Communication (pp. 221-260).
Jardine CG, Hrudey SE. Mixed messages in risk communication. *Risk Analysis* 1997; 17(4): 489-498.
Health Canada (2006). Risk Communication Handbook. Health Canada, Ottawa. (http://www.hc-sc.gc.ca/ahc-asc/pubs/_ris-comm/framework-cadre/index-eng.php)

Session 7. Population Health Risk Management

October 27, 2009

Regulatory, economic, advisory, and technological strategies for managing population health risks are discussed. Community based approaches to health risk management are also considered. The use of multiple risk management strategies in managing population health risks is indicated.

A mid-term exam on the principles and methods covered in sessions 1 - 6 will be given.

Population Health Risk Assessment, Chapter 7: Population Health Risk Management Options
Population Health Risk Assessment, Chapter 8: Regulatory Statutes in Canada.
Readings in Risk, Risk, Science and Democracy (pp. 105-119).
Science and Decisions, Chapter 8: Improving the Utility of Risk Assessment

Session 8: Evaluation of Risk Management Strategies

November 3, 2009

An important step in the risk management process is the evaluation and audit of the effectiveness of population health risk management strategies, using health outcomes based performance measures. Economic approaches for the evaluation of risk management programs, including cost-effectiveness, cost-benefit, cost-utility, and risk-benefit analysis are discussed within the context of a more general framework for program evaluation.

Population Health Risk Assessment, Chapter 9: Decision-Making Principles.
Population Health Risk Assessment, Chapter 10: Decision Analysis.
Readings in Risk, Cost-Benefit Analysis: An Ethical Technique (pp. 129-140).

Session 9: International Collaboration in Risk Management

November 10, 2009

Many population health risk issues, such as the long-range transport of air pollution and climate change, are transboundary in nature. The role of international agencies such as the World Health Organization in population health risk management is discussed, and their relationship with national risk management initiatives examined.

Population Health Risk Assessment, Chapter 14: International Collaboration in Risk Management.

Climate Change 2007: Synthesis Report. Intergovernmental Panel on Climate Change.
http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

Session 10: Applications

November 17, 2009

The principles and methods covered in the first ten sessions will be illustrated using case studies. The specific applications will be selected to illustrate the main concepts covered in the previous sessions.

Case Study 1: Chemical Risk Assessment under REACH: Aluminum

Case Study 2: TBD

Session 11: Current Trends in Population Health Risk Assessment

November 24, 2009

Recent developments in population health risk assessment are examined, including the use of unified integrated approaches to establishing safety standards and new visions for toxicity testing to take

advantages of advances in areas such as genomics, bioinformatics, systems biology and computational biology.

Course evaluation to be completed following this session.

Toxicity Testing in the 21st Century. NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES, THE NATIONAL ACADEMIES PRESS, Washington, D.C. Report available online (page by page) at http://books.nap.edu/openbook.php?record_id=11970

Andersen ME, Krewski D. Toxicity testing in the 21st century: bringing the vision to life. *Toxicol Sci.* 2009;107(2):324-30.

Krewski D, Andersen ME, Mantus E, Zeise L. Toxicity testing in the 21st century: implications for human health risk assessment. *Risk Anal.* 2009;29(4):474-9. [See also the invited commentaries on this article and the reply in the same journal issue].

Session 12: Presentation of Term Papers

December 1, 2009

Participants in the course will present their term papers. Presentations will be limited to 15 minutes, including discussion.

Term papers due.

Session 13: Final Session

December 8, 2009

A final exam covering the principles and methods discussed in the course will be held.

Grading Scheme

Participants in the course will prepare a term paper of approximately 20 pages in length on a topic to be chosen in consultation with the instructor.

The term paper will account for 40% of the final grade, the presentation of the term paper for 10%, and the preparation of a public summary of the term paper for an additional 10%. The mid-term exam (1.5 hour) will account for 20% of the final grade, and the final exam (1.5 hours) for the remaining 20%.

Term papers are graded with respect to: presentation of the context in which the risk issue is discussed (5 marks), clarity (10 marks), depth (10 marks), use of an appropriate risk management framework (5 marks), development of risk management recommendations based on arguments presented in the paper, (5 marks), and inclusion of an appropriate bibliography (5 marks).

Term paper presentations are graded with respect to: statement of the risk management objectives (2 marks), quality of the slides (3 marks), clarity of the presentation (3 marks), use of an appropriate

risk management framework (2 marks), development of risk management recommendations (2 marks), and depth of content (2 marks).

The format of the public summary of the term paper will be presented during session 6 on risk communication. Participants in the course may elect to have their summaries posted on the McLaughlin Centre's new website RISKcom, subject to review by the international Science Panel and Communications Panel that oversee all content posted on the site. The public summary is graded with respect to: clarity of exposition of the risk issue (3 marks), adherence to the format of risk issues summarized on RISKcom (3 marks), accessibility to the general public (5 marks), provision of general references that may be consulted for further information (3 marks), and the provision of links to other sources of information that will be of help to the public in understanding the risk issue (3 marks).

Pre/Co-requisites

Students should have completed Epidemiology I: Introductory Epidemiology (EPI 5240) and Biostatistics I (EPI 5242) or equivalent prior to taking this course. EPI 5240 and 5242 may be taken concurrently.