ANIL AGGRAWAL'S
Internet Journal of
Forensic Medicine and Toxicology
The world's first online journal devoted entirely to forensic medicine and toxicology · Published 1 January and 1 July

VOL. 12, NO. 1
Downloaded from www.anilaggrawal.com · ISSN 0972-8074 (Online) · https://www.anilaggrawal.com/ij/vol_012_no_001/reviews/tb/page001.html

Book Reviews: Technical Books Section

...AN EXCELLENT BOOK ON FORENSIC EPIDEMIOLOGY ...Overall, this is a very informative book. The information is not easily available elsewhere, and provides the reader with an insight into this new specialty. I would recommend this book highly to all forensic practitioners, who want to explore this new specialty... Rating : 10/10...

Forensic Epidemiology, 1st Edition, by Steven A. Koehler and Peggy A. Brown. Hardcover, 9.3" x 6.1" x 0.8".
CRC Press LLC, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742. , . Publication Date August 26, 2009. 320 pages, ISBN-10: 1420063278; ISBN-13: 978-1420063271 (alk. paper). Price: $129.95.

Visit the Official site of this book by clicking here

Buy from Amazon by clicking here.

Click cover to buy from amazon

INTERNATIO
AND INV

F
Epid





Steven A. Koehler received his PhD and MPH degree from the University of Pittsburgh, Graduate School of Public Health. Dr. Koehler was formerly the Chief of the Epidemiology Division at the Allegheny County Medical Examiners Office in Allegheny County, PA.

He is an Associate Professor of the Forensic Science Program at Point Park University, Adjunct Associate Professor of epidemiology at the University of Pittsburgh Graduate School of Public Health and Adjunct Associate Professor at the Duquesne School of Law. He has served in the Suicide Death Review committee, Child Death Review committee, the Firearm Death Review board and the Internal Monitoring Committee for the Center for Injury Research and Control. He is listed in Who's Who in Medicine and Health.

Readers may want to read an interview with Steven by clicking here.

*E*pidemiology – as we all know - is the study of the distribution of a disease or a physiological condition in the human population and the factors that influence this distribution. Epidemiology uses the scientific method to locate and describe these patterns of disease in a defined population and identify factors that may play a role. If this kind of study is used to understand and answer questions of law, then it would be called forensic epidemiology. Forensic epidemiology – as the authors define - is a new field of study that provides an investigative response to public health issues and events that may be linked to criminal activities.

After the events of 9/11, forensic epidemiology emerged as a leading tool of investigation, partnering public health officers with law enforcement like never before. The book under review demonstrates the important role of forensic epidemiology in public health, the medical community, and the legal system. Emphasizing the importance of understanding the terminology and

procedures of each field in order to work together effectively, the text explains methods to collect, analyze, and interpret data for criminal investigations using a variety of illustrations and real-world case studies.

This is one of the very few books available on this specialty. The authors have divided the book in 13 chapters.

Chapter 1 entitled “The Basics of Epidemiology,” provides an overview of the science of epidemiology, highlighting the basic principles and the different fields within this discipline. Subsequent chapters describe a brief history of forensic science and trace the development of the field of forensic epidemiology. The Role of the Forensic Epidemiologist in the Medical Examiner’s or Coroner’s Office is elucidated in chapter 3. The chapter also discusses data collection, analysis, and interpretation. In addition, the chapter expands upon the forensic epidemiologist’s role as liaison officer between the Medical examiner and coroner’s office and outside agencies.

…The book under review demonstrates the important role of forensic epidemiology in public health, the medical community, and the legal system. Emphasizing the importance of understanding the terminology and procedures of each field in order to work together effectively, the text explains methods to collect, analyze, and interpret data for criminal investigations using a variety of illustrations and real-world case studies…

Chapter 4, entitled “The Operations of a Medical Examiner’s or Coroner’s Office,” provides an overview of the development of the coroner system and operations of a modern Medical examiner and coroner’s office, including data generated from the office. The next chapter provides an in-depth examination of the multiple functions of the death certificate and a detailed examination of its various sections.

Click here to read an exclusive interview with Dr. Steven A. Koehler.

Further chapters explore “Natural Deaths,” “Accidental Deaths,” “Death by Suicide,” and “Death by Homicide. Particularly interesting is the last chapter entitled “The Forensic Epidemiologist: Consultant and Expert Witness”. This chapter defines the role of a forensic epidemiologist functioning as a consultant or as an expert witness, the Federal Rules of Evidence, and the experiences faced by an expert witness during a trial.

Overall, this is a very informative book. The information is not easily available elsewhere, and provides the reader with an insight into this new specialty. I would recommend this book highly to all forensic practitioners, who want to explore this new specialty.

Excerpts from the book:

This book is the very first which deals with the way the knowledge of epidemiology may be used for forensic and medicolegal purposes. It would thus be of immense use not only to forensic and medicolegal professionals, but also to edidemiologists and community medicine professionals. The editors at this journal office believe that this book would prove useful to every forensic practitioner, if only to show how the field of epidemiology and forensics are intertwined. Here is how the authors describe various types of epidemiology (pages 7-11)

Types of Epidemiology

There are many fields of study within epidemiology. These include study of aging; cancer; chronic disease; injury epidemiology; clinical trials; environmental epidemiology; infectious disease; genetic epidemiology; physical activity; psychiatric epidemiology; reproductive, perinatal, and pediatric epidemiology; telecommunications and public health; women's health; and forensic epidemiology. Some of these subspecialties are briefly described next.

Aging Epidemiology

The epidemiology of aging focuses on two primary areas: (1) etiological research related to important health problems of older adults, and (2) research on methods to promote healthy active aging. Evaluation of potentially disease preventive methods and the interaction of genetic and environmental factors that may influence the progression of "aging" are examined. Primary research focuses on cardiovascular disease, stroke, falls, frailty, physical activity, osteoporosis, arthritis, Alzheimer's disease, and cancer. The goal of aging epidemiology is to optimize health in older adults by emphasizing and promoting disease prevention, healthy aging, longevity, and prevention of disability. Students interested in this field are educated in biology and physiology of aging; epidemiology of aging; epidemiology of cardiovascular diseases; cancer epidemiology; methodological issues in behavioral lifestyle intervention; introduction to molecular epidemiology; human genetics; dimensions of aging, culture, and health; and research methods in aging.

Cancer Epidemiology and Cancer Control and Prevention Programs

Cancer epidemiology and prevention specialists require multidisciplinary training. Cancer prevention requires three basic tools: (1) knowledge of etiology, host response, and malignant processes; (2) the ability to measure risk at the individual and population levels; and (3) effective intervention methods. The ability to succeed within any one of the three conceptual domains requires a complete knowledge base, including relevant biology and special methodological skills. The goals of the program include (1) understanding the molecular and genetic bases of cancer, including the laboratory techniques involved; (2) having a working knowledge of the variety of disciplines concerned with disease prevention and control; (3) possessing the analytic skills required to develop and test hypotheses in cancer etiology, prevention, and control; and (4) know how to measure and modify behavioral risk factors.

Graduates serve in a variety of positions, from academic institutions to state and local health departments to clinical practice. The program emphasizes the importance of understanding disease etiology and identifying risk factors as critical components in devising successful prevention programs as well as in reducing the morbidity and mortality associated with cancer.

Cardiovascular/Diabetes (Chronic Disease) Epidemiology

The major emphasis in this field is the investigation of the etiology of chronic diseases, especially diabetes, coronary heart disease, and cancer; evaluating the effects of intervention on key risk factors; the translation of clinical trial findings into clinical practice; and the pursuit of community studies. Research examines the etiology and natural history of types of diabetes and methods of preventing the complications associated with the disease. The study of the risks of cardiovascular

disease focuses on early identification of individuals at risk and the development of effective strategies for prevention.

Environmental Epidemiology

Environmental epidemiology studies provide expertise in the special problems associated with conducting epidemiological research into the health effects of environmental pollution. Students receive training in epidemiological research methods and in aspects of environmental measurements. Current interests include health effects of low-level radiation, noise, chemical contamination, environment, trace elements, and disease.

Infectious Disease Epidemiology

This field is designed to prepare health professionals (e.g., physicians, nurses, and nurse practitioners) for infectious disease surveillance, investigation, prevention, control, quality assurance, and research activities in the hospital, health department, or general community. Students in the program are typically collaborating and conducting joint training/research between the graduate school and Division of Infectious Diseases of the Departments of Medicine and Pathology of the School of Medicine, and the local county health department. Research interests include the epidemiology of HIV, human T-lymphotropic virus type I, and tuberculosis; the epidemiology of meningitis and other invasive bacterial infections in the United States; outbreak investigation; molecular epidemiology; and the genetic susceptibility and progression of hepatitis C virus infection. Students are exposed to epidemiology of infectious diseases, public health statistics, introduction to database management systems, health program evaluation, community health assessment, health survey methods, geographic information systems and spatial data analysis, experimental design, data analysis using computer packages, applied regression analysis, and constructing questionnaires and conducting surveys.

Reproductive, Perinatal, and Pediatric Epidemiology

These epidemiologists are trained to understand the patterns, risk factors, and interventions that might improve reproductive, perinatal, and pediatric health. Their education includes an integration of advanced epidemiologic training with coursework and experiences in obstetrics, gynecology, neonatology, pediatrics, psychiatry, adolescent medicine, and the basic sciences of genetics, molecular biology, and developmental biology.

The goals of reproductive, perinatal, and pediatric epidemiology are to:

- develop skills in epidemiology and biostatistics with particular emphasis on the application of methods needed to address important research questions in reproductive epidemiology;
- understand the pathophysiologic, genetic, behavioral, and environmental determinants of important diseases and disorders of pregnant women and children, emphasizing normative reproductive and developmental physiology, as well as subclinical aberrations on the way to clinical onset of disease;
- understand the domains of exposure, such as infection and inflammation, environmental toxicants, nutrition, injury, mood, substance use and abuse, and genetic susceptibility;

- comprehend the intersections of reproductive, perinatal, and pediatric outcomes such as fertility, preterm birth, growth restriction, fetal death, pre-eclampsia, and diseases of childhood and adolescence; and
- integrate the many different disciplines of science to develop cutting- edge approaches to the etiology, prevention, and treatment of diseases relating to pregnancy and childhood.

Students study reproductive epidemiology; epidemiology of women's health; analysis of cohort studies, epidemiology, and health services; public health genetics; and behavioral factors in disease.

Injury Epidemiology

In the early 1980s, the field of injury epidemiology was born. The field specializes in understanding injuries and their occurrence, outcome, and prevention. Academic curricula illustrate and emphasize the multidisciplinary nature of injuries, including the biomedical, behavioral, social, and risk sciences. Areas of research include the risk factors associated with falls among the elderly, the role of medication, assessments of violence, poisoning, highway safety, child maltreatment, traumatic brain injury, and outcomes from the acute care of injuries.

Genetic Epidemiology

In the late 1960s, genetic epidemiology became a separate field to examine the intertwined role of genetics and disease. Curricula include understanding the interaction between the individual's genetic predisposition and disease, the role of inheritance and prevention, and the interaction between genetics and environmental risk factors. Areas of research training in genetic epidemiology include aging, cancer, cardiovascular disease, diabetes obesity, and osteoporosis.

Psychiatric Epidemiology

This program provides advanced training in psychiatric epidemiology by emphasizing the use of epidemiologic methods and techniques to explore risk factors and the dissemination of psychiatric disorders. Students typically gain experience by working in a local psychiatric institution or clinic. Research opportunities include projects in depression, schizophrenia, geriatric psychiatry, substance use disorders, social and community psychiatry, behavioral medicine, antisocial behavior, delinquency, and assessment in psychiatry. Students are exposed to psychiatric epidemiology, assessment techniques in psychiatric epidemiology, epidemiology of children's psychiatric disorders, and behavioral factors in disease.

Physical Activity Epidemiology

The physical activity epidemiology track is one of the first to be offered within a U.S. school of public health. It is designed for students who already have training in exercise physiology (or a similar discipline) and are seeking an epidemiology graduate degree (master's or doctoral) with an emphasis in physical activity assessment and intervention research. Students are provided with the opportunity to work with a variety of local, national, and international studies examining the role of physical inactivity in the development of chronic diseases and/or the benefits of activity intervention in prevention efforts. A special emphasis in this program is placed on activity assessment and intervention efforts pertaining to minority populations.

Forensic Epidemiology

The most recent field to emerge is forensic epidemiology. This is the application of the basic scientific methods of epidemiology to the science of forensics. A detailed examination of this field is covered in later chapters.

The book then goes on to describe many aspects of forensic epidemiology. The editors decided to excerpt some portions from the last chapter, which highlights the work of a forensic epidemiologist (pages 259-263)

Forensic Epidemiological Consultant

Private forensic epidemiologists are frequently hired by individuals, companies, and attorneys. The next of kin of the decedent or other family members are concerned because they have questions regarding the death of a loved one. They may not understand the reasons why the death was ruled as it was, information within the autopsy report, or whether the level of investigation was carried out correctly. The consultant begins the investigation by obtaining and reviewing all documents relating to the case; this may include medical records, death investigation reports, the autopsy report, and police reports. The role of the consultant is to assess whether the proper procedures were followed, the methods of testing the evidence were appropriate, and the conclusions reached by the testing laboratories were correct.

In addition, the consultant notes the weaknesses of the investigation. For example, if the death was due to a firearm, were the hands of the victim tested for gunshot residue (GSR)? If the last will and testament was in question, was an examination of the brain conducted? If a suicide note was located at the death scene, was the writing style compared to that of the deceased? In most cases, the concern revolves around the family not understanding what constitutes a proper death investigation and wanting to know that all possible explanations for the death were in fact explored. In many cases, the family refuses to accept the manner of death listed on the death certificate (usually death by suicide) and wants the forensic epidemiological consultant to review the case and provide a second opinion to that provided by the ME/C office. The major role of a forensic epidemiological consultant is to evaluate the scientific and forensic investigation and analysis of the evidence and provide a written report indicating the conclusions of that review. Furthermore, he or she will provide guidance if further investigation is warranted and, if so, advise the direction in which it should proceed.

Companies typically employ forensic epidemiological consultants to perform evaluations of their product in order to counter claims by outside organizations or assess the risk to their product under certain conditions. Many manufacturers and companies have to defend themselves against claims made by outside organizations. These claims are often based on nonscientific data analysis, small sample size, or, in most cases, simply anecdotal information; nevertheless, they do require a response from the company. The consultants are provided with complete access to the company's research and data.

Consider the following example. Company X has produced a new type of extension cord. The media have linked a number of fatal house fires to the extension cord. The consultant would start by obtaining all the information about all fires within a large geographic area where the new extension cord had been distributed. The following reports would be obtained: fire marshal's investigation reports containing the determination as to the cause of the fire, the death

investigation reports, autopsy reports, and toxicology reports. The objective of the consultant would be to determine what percentage of the fires were directly attributed to the new cord and, in cases where the cord was identified as contributing to the fire, whether it was used properly or whether it overloaded the line. In addition, the consultant would obtain data regarding the national average of fires started by extension cords and compare them to other fire-related data for sources such as space heaters, TVs, toasters, and other electrical devices to place the risk of the extension cord in perspective with other household items.

Companies also hire forensic epidemiological consultants to perform evaluations of the potential risk to their product under specific conditions— for example, whether the introduction of a few strands of hair from an individual with a blood-borne disease poses any risk to the end product. When the consultant is hired by a company, he or she performs a statistical and scientific analysis of the data and provides a report that is unbiased and scientifically accurate.

Attorneys most frequently utilize the skills of a forensic epidemiological consultant. Primarily due to the increased complexity of current cases and the increased utilization of forensic science evidence in the courtroom, lawyers are increasingly seeking out and utilizing consultants to assist them in understanding and evaluating evidence, as well as to offer advice on ways to proceed. Lawyers are using these consultants to:

1. understand highly complicated, highly technical, complex scientific processes and procedures to analyze forensic data and the meanings and significance of the results;

2. assist them in pretrial evaluation of the strengths and weaknesses of the forensic evidence in a case; and

3. act as nontestifying consultants.

The goal of consultants is to help explain the meaning of detailed forensic analysis and the significance of these results, as well as to provide background to the death scene protocol and procedures. Their function is to review and evaluate medical records, autopsy reports, police reports, technical data, and the level of investigation and testing conducted on the evidence in order to provide a written report indicating the strengths and weaknesses of the cases, as well as technical advice on how to proceed with the case. Forensic epidemiological consultants do not testify in court.

Forensic Epidemiologist as Expert Witness

In contrast to a consultant, an expert witness is hired to testify in a court of law and to express his or her opinion regarding a particular aspect of a case. An expert witness is an individual who, through training, experience, or education, has special and precise knowledge in a specific field. With the advances in forensic science and the increased use of such technology, the justice system is relying on this field in the courtroom much more than ever before. In addition, with the popularity of television shows such as CSI, Forensic Files, and Crossing Jordan, reruns of the classic Quincy series, and the public airing of high-profile cases such as the O. J. Simpson trial, prosecutors, defense attorneys, and even jurors expect the presentation of forensic evidence during the trial. These experts are often sought out by members of the legal community because they are needed to assist during the pretrial evaluation of the evidence and to testify in a court of law.

There are two basic types of expert witness: the professional expert witness and the individual sought out by lawyers to testify in a case because of his or her special knowledge. The latter type

typically comes from the world of academia or industry and has little experience in or understanding of the legal arena into which he or she is about to be drawn. Individuals in the traditional sciences of biology, engineering, chemistry, microbiology, epidemiology, and medicine normally have little or no experience with or exposure to the legal system. To them, the process of testifying can be alien or an experience filled with feelings of excitement, intimidation, or anger. This is especially true for those coming from the “ivory towers” of academia and, to a lesser degree, for those coming from industry. Although a forensic epidemiologist transitioning from the role of consultant to that of expert witness will possess a deeper understanding of the legal system, he or she is still entering a world much different from that of science.

One must ask, “Why is there such a great disconnect between the worlds of science and medicine and that of the legal community”? In general, this is because the two disciplines serve different purposes and share no common ground. Several reasons account for this great disconnect, including education, objectives, and terminology.

First, the educational backgrounds of the two disciplines differ. Lawyers are taught about laws, case law, procedures, and the mechanics of a trial. During their 3 years of formal education, they are not exposed to topics such as the scientific method, statistical evaluation, or hypotheses testing. In addition, they are not instructed on how fields of science can assist in their cases. Conversely, individuals emerging from engineering or medical schools, PhD programs in forensics or epidemiology, or other fields within public health have no exposure to the legal system. In turn, in their training programs, forensic epidemiologists and physicians have no familiarity on how to prepare and present an opinion in court, the mechanism of testifying, or the techniques used by the opposition during the trial.

Second is the concept of objective. The law is concerned with ordering human conduct in accordance with certain standards, values, and societal goals. Science, on the other hand, is designed to describe and explain occurrences and data in neutral, objective terms. The goal of the scientist is to try to ask specific questions and discover the truth or facts with regard to a particular question. Lawyers are trying to win a case by presenting the jury only information favorable to their case; they have no interest in presenting all sides of an issue or alternate explanations. There is a purposeful difference between science and medicine and the law. The goal of science and medicine is to follow objective methodology to find the cause or multiple causes of a condition, while the purpose of the legal system is to settle disputes.

Third is the terminology. Those in the scientific community use words and phrases like “relative risk,” “bias,” and “statistically significant”; the law dictionary contains terms such as “admissibility,” “beyond a shadow of doubt,” and “reasonable doubt.” In addition, the word “significant” has a different meaning in the legal context compared to its meaning within the scientific community. The scientist or physician and the attorney speak two different languages. The term “causation” illustrates this point the best. The law assumes that the expert can quantify his or her opinion in such terms as “reasonable medical certainty” or “reasonable probability.” This is driven by the fact that causation in the legal world is testimony that is sufficient to support a verdict in favor of the plaintiff even though it may not meet the scientific level of causation.

The book is full of important information like the one above. It is also a good repository of facts and medicolegal implications related to epidemiology. We are sure our readers would enjoy the book as much as we at the journal office did.

View this book on Amazon

Request a PDF file of this review by clicking here. (If your screen resolution can not be increased, or if printing this page is giving you problems like overlapping of graphics and/or tables etc, you can take a proper printout from a pdf file. You will need an Acrobat Reader though.)