Violence captures our attention like few other human events. Accounts of murder, assault, and rape are a regular staple of newspaper and television reports; often the lead story. Violence is also a common element of mass entertainment via television or the cinema. As one result, a common perception is that the issue of violence is a growing problem in the United States.

Recent data, though, indicate a decline in crime-related violence. Still, the impact of violence is sizeable. Nearly 2 million Americans are victims of violent injury each year from crime (FBI, Uniform Crime Reports).

The objectives of this lecture are to introduce you to the epidemiologic basis of the study of violence and injuries from violence, and to highlight the limitations which affect current injury data and data systems for intentional events.
Violence often appears to be an intractable problem in the United States. Crime, and specifically homicide, has been an important problem for many years. Concerns about violence have led to interest in finding better ways to prevent and control violence.

One of the debates regarding the epidemiologic investigation of violence is the definition of violence. Just what exactly is violence?

From the injury perspective, violence is intentional injury. As opposed to motor vehicle crashes which represent unintentional injuries. However, there is much more to the story of the definition of violence.
In general, our understanding of violence is muddled. The classification of violence as intentional injury in the injury community has not eliminated an underlying problem; that society often views violence in many different ways.

The perception of violence to the public may vary markedly. Most will probably agree that homicide represents violence, but differences begin to come into play when you consider violence as entertainment or the actions of governments, police agencies, etc.

More importantly for this lecture, the assessment of violence means different things to different audiences. Relevant audiences may include criminal justice, social service, legal, medical, and public health perspectives, amongst others.

Historically, most research and reports on violent behaviour have focused on events related to crime.
Violence very frequently takes place in the home. More recently, attention has focused upon the impact of familial violence or domestic violence. Domestic violence is characterized by physical abuse, threats, neglect, intimidation, etc. against a family member. It’s discussion primarily centers around violence against women, but may also include child and elder maltreatment.
Most attention focuses upon interpersonal violence (aggression by one or more persons against another). Another category of violence outside of this realm is violence directed against oneself. In lay terms, this refers to suicides or suicide attempts. In the injury community, this refers to “self-directed” violence. When compared to interpersonal violence, self-directed violence receives considerably less attention and far fewer resources for preventive interventions. Significant research, though, has emerged on the topic over the last decade. Several public health professionals now argue that self-directed violence should be viewed as a preventable event.
To understand the importance of a problem, you first need to define it. Several definitions of violence have been used to this time. These include definitions from a criminal justice perspective, a domestic violence perspective, an injury perspective, a medical perspective, and a sociological perspective, among others.
There are few agreed upon standards regarding the appropriate definition for violence. The earliest works all considered violence primarily from the perspective of police-reported crimes. Recent works have broadened the characterization of violence.

In its 1993 report entitled, “Understanding and Preventing Violence”, the National Research Council focused upon violence defined as: “behavior by persons against persons that intentionally threatens, attempts, or actually inflicts physical harm.” By design, the authors of this report focused upon a definition that was wide-ranging, but also one that considered violent behavior related to crime. This definition includes both physical injury and threats. It does not include self-directed violence.
As illustrated frequently in this introduction, violence can be characterized into many differing forms. A broad overview is presented here. The major categories of violence discussed in the literature include crime-related violence, events involving firearms, suicides, and domestic violence.

Violent crime, as characterized by the FBI, includes homicide, robbery, rape and aggravated assault.
Suicide events include both successful and unsuccessful attempts.

Domestic violence is most often characterized as violence against women (previously known as spouse abuse), but also includes child abuse and elder abuse.
The public health community did not pay a great deal of attention to the issue of violence for many years. It is only within the last two decades that violence has come to be seen as a public health problem (before it was just a criminal justice problem) that could be studied with public health principles.

The foundation of the public health approach to violence is very similar to that used for other diseases. From the public health perspective, monitoring of the frequency of violence is the first step in nearly all efforts to reduce violence. Monitoring systems are needed to identify the number of events that occur, the victims of violence and their characteristics, as well as the outcomes of violence.

The second step includes an examination of the risk factors of both victims and perpetrators of crime. There is currently much debate over the role of various social and environmental factors in violence. Now, there is also discussion of potential genetic links to violence. The third step is the development and implementation of intervention programs to reduce violence.
Surveillance

Monitoring → Identify risk factors → Intervene → Evaluate

↑
Several surveillance systems exist to identify the frequency of violence. The longest running system is death certification of homicides and suicides. Rising crime rates in the 1960s and 1970s brought interest in the subject from the criminal justice perspective. At this time, two systems were established; one to examine the frequency of violence from police reports, and the other from a survey in a sample of the US population (the NCVS).

The initial public health response has included efforts to examine violence identified from medical databases. Medical systems, though, are not very good at distinguishing crime-based violence from other forms of violence. The basis of medical databases is not focused so much on determining the type of violence, but the injury outcomes.
With respect to all forms of violence, the greatest wealth of evidence available in the literature is that related to homicide. There are several reasons for this, including the heightened attention of the police to homicides, and the involvement of state health authorities via death certification.

In public health, the primary monitoring or surveillance system is death registration. Violence consistently ranks as one of the ten leading causes of death in the United States. Deaths from homicide (in red) are particularly high in the young (under age 35 years). Suicides also rank in the top ten causes for many age groups. Deaths from violence are extremely high in the urban youth, particularly so for African Americans.
Vital statistics programs have been in place for many years. This allows researchers to examine if changes in the frequency of violence (in this case fatal events) have occurred over time. This figure portrays the rate of homicide per 100,000 population from 1910-1996. In general, the homicide rate has followed the pattern of violent crime over time. Noted fluctuations in homicide have been observed throughout the 20th century. The homicide rate has peaked in the early 1930s, 1980, and 1991. The lowest rates of homicide were observed in the late 1950s. At present, the homicide rate in the US is in a period of decline.
For some time, individuals have pondered the question of the degree of violence in the United States. Is the rate of violence higher in the U.S. compared to other countries? A recent effort by the International Collaborative Effort (ICE) on Injury Statistics provides some insight into this question. Collaborators from 11 countries furnished information on injury mortality, including E-code groupings. This figure highlights the annual homicide rate for these countries for the most recent year(s) available. The difference between the United States and the other countries is striking, with the United States having a significantly higher rate of homicide than several other developed nations. A similar pattern was also observed in a study of homicide rates amongst children under age 14 years in the U.S. and 25 other industrialized nations.


Most of our current knowledge in crime-based violence originates from government funded data systems that record crime, and the characteristics of victims and offenders.

Two national data systems actively identify the frequency of violent crime; the Uniform Crime Reporting (UCR) program, and the National Criminal Victimization Survey (NCVS). The UCR is based upon reports of crime filed by the police. It defines violent crime as events related to murder and non-negligent manslaughter, rape, robbery, and aggravated assault.

The NCVS surveys the general population over age 12 on crimes experienced in the previous 6 months. Violent crime in the NCVS includes attempted or completed events of assault, rape, sexual assault, or robbery. Homicide events are not included, as the NCVS is based upon a personal interview.
Data from the UCR is the source for evaluating changes in crime-based violence in the United States. Every year, reports are issued regarding increases or decreases in crime. This information comes from the UCR.

An example of changes observed in Pennsylvania over time is shown here. It indicates that the number of acts of criminal violence has declined over time.
The UCR system, though, is a voluntary reporting system. Local police agencies are not obligated to report their crime data, though most do. Of more concern is the alteration of data reported by the police departments to reflect better crime data in one community or another. The police in Philadelphia, for example, have consistently downgraded crimes in the past. This presents a problem for comparing crime patterns across cities or over time.
Perhaps a more comprehensive assessment of crime-based violence is available from the National Crime Victimization Survey (NCVS).

Because of its interview format, the NCVS provides important findings regarding the reporting of and injuries associated with violent crime. In general, the NCVS suggests that most incidents of violent crime are not reported to the police, that a smaller proportion of violent crimes result in injury, and that less than 15% receive medical attention. This figure outlines the nature of violent crime in the United States in 1994. The bottom of the pyramid illustrates the large number of crimes, which occur overall, an estimated 10,860,000 events in 1994. The top of the pyramid portrays the comparatively small number of crimes associated with the use of medical care. Many individuals believe that these crimes represent “tip of the iceberg” events and identify more severe and more costly episodes.

These data point out the potential degree of under-reporting of events that may exist in the police record reporting system and medical databases.
Another major category of violent crime in the United States today is forcible rape. Historically, society has ranked forcible rape as the second most important violent crime, trailing only homicide in importance, and preceding robbery and aggravated assault. While rape ranks as a major crime, several issues limit our understanding of the frequency and outcomes of rape. Most notably, questions remain over the number of rapes committed, as many offenses are never reported, and definitions of rape vary from narrow to broad categorizations of this crime.

Reports on the frequency of rape indicate that between 100,000 and 1 million rapes are committed each year. This is a fairly wide range of estimates. The lowest rape figures originate from the UCR program. The view here is that many women may be unwilling to report the crime to the police. The highest numbers are those derived from the National Violence Against Women Survey. This was a telephone interview of a sample of women 18 years and older in the U.S. The NVAWS used a broader definition of rape in their questioning.
Injuries from Crime

Medical Sources and Police Sources

“You look at them as victims, we look at them as suspects”

Surveillance systems for criminal violence take several perspectives. A nice illustration of the potential impact of differing perspectives is shown here. This is a quote from a police officer in a hospital emergency department. It clearly illustrates that two major systems for monitoring violence serve two different and distinct purposes. One of the challenges of confronting the problem of violence is in getting individuals from different backgrounds to work with each other.
Definition of Health Care Events Related to Violence

- Based on E-codes
  - E960-969 Homicide and injury purposely inflicted
  - E coding to distinguish crimes is relatively poor

Medical databases have been another source of information on the frequency and impact of violence. Events involving violence are usually identified in the databases by External Cause of Injury Codes (E-codes). These codes allow for identification of the cause of an injury, and supplement medical diagnosis codes. The E-codes from E960 through E969 pertain to assaults in the ICD classification scheme (ICD-9-CM). While these codes identify interpersonal violence, in most situations, they don’t allow one to distinguish the crime involved in the event. Rape is an exception. It has an E-code to itself. It may also be possible to monitor homicide outcomes to some extent from this source. For example, one can link discharge data (deceased) to the E-codes for this purpose. However, not all homicide victims are likely to be seen in a medical setting. A review of homicide data in Pennsylvania, for example, found that only one-half (50%) of all homicides were seen in a medical setting.
Even with a distinct E-code, the health care consequences of rape are not yet clearly understood. Data from the NCVS show that several victims of rape do not seek immediate medical attention in the aftermath of their attack. Most appear to be treated outside of a hospital facility. About 5% of all rape/sexual assault offenses had an associated emergency department visit (n=20,000). Three percent of the victims had severe injuries that required an overnight stay in hospital.
Problems in Crime Violence Surveillance

- Definition of violence may not be standard across sources
- Reporting of violence by victims varies considerably
  - Rape
- Reporting of violence by the police may vary

While many surveillance systems exist to identify the frequency of violence, there are three major issues that affect their usefulness for implementing public health interventions on violence. First, there are differing systems with differing definitions of violence. Comparisons across systems are not yet possible.

Second, violence may be under-reported in many of the surveillance systems. The most notable circumstance involves the crime of rape. Third, there are situations where the reporting of violent crimes to the UCR by the local police may not be forthright.
A key step in the public health approach to violence is to understand the factors that places one at risk for being a victim or, more importantly, for being a perpetrator.

Our review here will begin with a focus on the characteristics of victims identified in the aforementioned surveillance systems. Following that, we will briefly overview some emerging information regarding perpetrators.
The classic epidemiologic model of understanding disease notes interactions between the host, agent, and environment. In the violence field, the model can be adapted to consider the victim (as host), the perpetrator (as agent), and the environment surrounding both. With respect to injuries from violence, the perpetrator is more correctly the vehicle, and the agent is the energy transfer involved in the perpetration of violence.
Distinct demographic traits have been frequently noted among victims of violent crime. Age is a very strong characteristic, with most victims being the young. In Pennsylvania, for example, the highest percentage of victims were those individuals between the ages of 15-24 years, followed closely by persons aged 25-34 years. This pattern is also noted in the United States overall.

Race and gender are also a strong traits among victims of crime. The overall risk of being a victim of violent crime in Pennsylvania was 1 in 261. The danger, though, was heightened for African Americans (1 in 62), young adults between the ages of 15-24 years (1 in 103) and 25-34 years (1 in 143), and males (1 in 204).

Note: the violent crime category includes homicides, robberies, rapes, and aggravated assaults.
Racial differences are particularly evident when considering homicides. In this slide, the high rates of homicide in African Americans are clear, and far surpass that for Caucasians, Native Americans, and Asian Americans. Homicide rates in young, African American, males are a significant problem. Among African American males aged 15-24 years, homicide is the leading cause of death.
For rape, one of the most striking findings is that an overwhelming percentage of rape victims are children. Evidence from police reports indicate that about one-half of all rape victims were under age 18 years at the time of the rape or attempted rape. In the National Crime Victimization Survey, the highest rates of rape and sexual assault are seen among 16-19 year olds.
Much attention has recently been paid to the issue of violence in schools, particularly with respect to firearms in schools. Two surveillance mechanisms now examine the frequency of school violence; the Youth Risk Behavior Survey and the School Crime Supplement to the National Crime Victimization Survey.

The School Crime Supplement focuses on self-reported crimes against students aged 12-19 years while at school. In 1995, the violent victimization rate in this setting was 4.2%. Higher frequencies of victimization were noted in males, blacks, and those in public schools. School violence also was highest in the younger grades (shown here). This may be due to a larger number of fist fights in the younger crowd. At least at my old school!
Weapon involvement is another category of information often contained in police reports. Data from the UCR, for example, show that firearms are heavily involved in homicides. The firearm involvement rate for homicides in Pennsylvania is illustrated here. Over 60 percent of the homicides in Pennsylvania in 1994 were related to firearms.

Firearms were less frequently involved in robbery (43%) and aggravated assault (20%) events in Pennsylvania. Strong arm tactics were more common in these categories.
Victims of successful and unsuccessful robberies generally have the same demographic traits as victims of other violent crimes. Data from the NCVS, though, indicate that over 75% of robberies occur among strangers. This high proportion of stranger involvement appears to be a unique characteristic to robberies.

Perhaps one reason for high involvement of strangers is that robberies tend to occur in public places. Information from the UCR show that most robbery crimes occur on the street or places of business. Commercial businesses at risk for robbery appear to be convenience stores, grocery stores, gas stations, and banks.
Robberies are also heavily involved in workplace homicides. The characteristics of victims of workplace homicides in North Carolina from 1977-1991 were recently reviewed. In this study, robberies and probably robberies were linked to 60% of all fatal events. By occupation, taxi drivers carried the highest occupational risk. Taxi driver homicide rates were four times higher than those of the next highest risk categories (security guards, law enforcement officers, retail cashiers…).

The context of our discussion now switches to our current understanding of perpetrators of violent crime.

Most of the information available in criminal violence involves victims. Far fewer studies have examine the traits of perpetrators. Criminal justice studies suggest that the demographic characteristics of perpetrators are usually similar to those of their victims. Some reports even suggest that victims often become involved as perpetrators at some point. Solid scientific studies of perpetrators, though, are infrequent. This is a noted deficiency because an understanding the the factors that leads one to crime can be used in designing interventions to reduce violence.
Recently, though, cohort studies of youths have begun in attempt to understand the factors linked to juvenile violence. In 1986, the Department of Justice began support for three longitudinal studies of delinquency. One study is underway here in Pittsburgh by Dr. Loeber. The other projects are in Denver and Rochester.

In Pittsburgh, over 1500 boys in grades 1, 4, and 7 were enrolled in a baseline survey in 1987. They have been followed on an annual basis with fairly high response rates. Serious violence was assessed through self-report, and includes elements of aggravated assault, robbery, rape, and gang fights. The prevalence of serious violence by age is shown here. It is highest in the adolescent years. A similar pattern to that noted among victims.
The prevalence of serious violence was also consistently higher among African American youths; peaking at age 13 years.
Patterns of serious violence were not markedly different in Pittsburgh than in Denver or Rochester. Males in all three locations had very similar cumulative prevalence rates of violence. Information on violence committed by young females was also available in Rochester and Denver. It shows, generally, that females are less likely to commit serious crimes than males.

Further work is underway to link baseline characteristics to future criminal events. In Pittsburgh, for example, the characteristics of youths who go on to commit homicide are under study and will be published shortly.
The ultimate goal of public health professionals and others is to reduce the level of violence noted in the United States and other locations. From the public health perspective, this step is best accomplished when solid information on the risk factors for violence are well known and clear. Intervention programs can then be designed to reduce the level of risk.
Prevention Strategies

- Criminal Justice
- Behavioural
- Environmental
- Public Health

Current prevention approaches are being advocated from four differing perspectives. Criminal justice strategies generally revolve around the concepts of incarceration or policing strategies. Environmental strategies might include curfews. Behavioral approaches often focus on reducing the role of gangs in neighborhoods. Public health strategies can take many forms. Perhaps the largest initiative at the moment is to include trigger locks on firearms.
The philosophies of William Haddon have extension to the violence arena. Researchers in this field have turned to the strategies that Haddon espoused for motor vehicle injury reduction as a model for reducing injuries from violence.
For those interested in further reading on this subject, more information on the epidemiology of violence, its health care impact, and its role in Pennsylvania can be found in the online publication, Violence in Pennsylvania. The report is 140 pages in length, so be prepared for a long download if you have a modem connection.