CHAPTER 3

# Illness and Injury Prevention

## Objectives

***After completing this chapter, you will be able to:***

1. Describe the incidence, morbidity, and mortality of unintentional and alleged unintentional events.
2. Identify the human, environmental, and socioeconomic impact of unintentional and alleged unintentional events.
3. Identify the role of EMS in local municipal and community prevention programs.
4. Identify situations in which you can intervene in a preventive manner.
5. Document primary and secondary injury prevention opportunities.
6. Recognize the ways in which culture plays a role in injury patterns.
7. Identify national resources available for injury prevention data, strategies, and activities.

## Chapter Outline



### *Case Scenario*

You and your first-response engine company respond to a new residential neighborhood for a "child who fell out of a window." On arrival, you find a police officer maintaining manual cervical spine stabilization for a 4-year-old girl. According to the child's father, they were playing in his daughter's bedroom when she fell backward, popping the screen out of the window, and falling 20 to 25 feet onto the concrete driveway. She was unconscious for a brief period. She is awake and alert, her skin is pale, and she appears quite frightened.

#### *Questions*

1. *What is your general impression of this patient?*
2. *What physical assessment findings are most pertinent at this time?*
3. *What treatment should be immediately initiated?*

Paramedics are in a perfect position to decrease the rate of injuries and make a difference in communities. This chapter provides a broad overview of the science of injury prevention, specifically as it relates to patients. The following anecdote illustrates the conflicting nature of injury prevention.

A small, mountaintop community was experiencing a major problem. The narrow and winding road that led up to the town had been plagued by deadly motor vehicle accidents. In fact, at one hairpin turn nearly one vehicle "went over the side" each week, resulting in numerous serious injuries and deaths. So many accidents had occurred that the local towing company could barely keep up. The town council held an emergency meeting to determine a plan to deal with the crisis. The town civil engineer had suggested reinforcement of the guardrails to prevent cars from going over the side. The police chief thought they should reduce the speed limit and post more traffic officers on the road for enforcement. The local trauma surgeon wanted to see a community education program, targeted at the high-risk population to alert them of potential hazards. The town council, however, mulled over all these suggestions before it came to its own conclusion: purchasing more tow trucks!

## AN ESSENTIAL ACTIVITY

Several years have passed since the publication of "The Consensus Statement on the EMS Role in Primary Injury Prevention" (National Highway Traffic Safety Administration [NHTSA], 1996). The authors of the statement, representing every possible EMS constituency, make it clear that **primary injury prevention**, or keeping an injury from occurring (Figure 3-1), is an "essential" activity. Moreover, it is an activity that must be undertaken by the leaders, decision makers, and providers of every EMS system. The old adage "an ounce of prevention is worth a pound of cure" is essential to modern EMS. From a medical standpoint, avoiding an injury has a much greater effect on a (potential) patient's life than any treatment the medical community can provide after the fact. Looking at the problem from a financial view, prevention is much less expensive than treatment and any associated rehabilitation. Of course, avoiding the impact of traumatic incidents on the victim and family is incalculable. Traditionally, however, EMS providers have focused on **secondary injury prevention**, or preventing further injury from an event that has already occurred (e.g., providing spinal immobilization to motor vehicle accident victims). Fortunately, over the last several years this view of EMS has been changing and more departments are involved in injury prevention activities. A perfect example of this model involves fire departments and the decrease in fires as a result of prevention activities. The EMS profession must similarly continue to increase its efforts in injury prevention.

**Figure 3-1** More lives can be saved by preventing injuries from occurring.

## AN EXTENSIVE PROBLEM

[OBJECTIVE 1]

To many health experts, unintentional injuries are the largest public health problem currently facing the country. In fact, unintentional injuries historically are the leading killer of Americans aged 1 to 44 years, according to data collected by the National Center for Health Statistics (Figure 3-2). Two exceptions to this were in 1999 and 2001, when unintentional injury was the leading cause of death in Americans aged 1 to 34 years and the second leading cause of death in Americans aged 35 to 44 years. In the 35- to 44-year-old age group, **unintentional injury** was only slightly behind malignant neoplasms, the leading cause of death in this age group. However, even during these years, if unintentional and intentional injuries (homicide and suicide) are combined, injury was by far the leading cause of death in people aged 35 to 44 years as well as those aged 1 to 34 years. For all ages unintentional injuries are the fifth leading killer, behind heart disease, cancer, cerebrovascular events (stroke), and the effects of chronic lower airway disease. When unintentional and intentional injuries are combined, traumatic injury becomes the fourth leading cause of death for all age groups (Centers for Disease Control and Prevention [CDC], 2004).

More than 150,000 people die from unintentional injuries in the United States each year. When an additional 33 million visits to the emergency department for unintentional injuries are added to this figure, the results are staggering (Figure 3-3). The "costs of trauma" are far reaching. They include the loss of years of productive life for the trauma patient, financial impact on both families and the healthcare system, the emotional effect on patients and their families, and the financial impact on the community in terms of increased costs of governmental programs and increased insurance costs to pay for trauma care.

The director of the Center for Injury Prevention Policy and Practice at San Diego State University, David Lawrence, explains that people simply get accustomed to these numbers. He adds, "When you look at the number of people who are injured and killed in motor vehicle crashes [alone], we have the equivalent of a medium-size plane crash every day" (Krimston & Griffiths, 2003). When the numbers are spread across 50 states, however, they become so common as to be almost invisible to the national media (Figure 3-4).

## THE SCIENCE OF INJURY PREVENTION

To prevent injuries, the nature of these injuries must be understood. An **injury** is defined as intentional or unintentional damage to a person that results from acute exposure to thermal, mechanical, electrical, or chemical energy or from the absence of essentials such as heat or oxygen. **Unintentional injuries** occur without intent to harm. In contrast, **intentional injuries** include all

## 10 Leading Causes of Death by Age Group, United States – 2003

| Rank | Age Groups | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | <1 | 1-4 | 5-9 | 10-14 | 15-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65+ | Total |
| 1 | Congenital Anomalies 5,621 | Unintentional Injury 1,717 | Unintentional Injury 1,096 | Unintentional Injury 1,522 | Unintentional Injury 15,272 | Unintentional Injury 12,541 | Unintentional Injury 16,766 | Malignant Neoplasms 49,843 | Malignant Neoplasms 95,692 | Heart Disease 563,390 | Heart Disease 685,089 |
| 2 | Short Gestation 4,849 | Congenital Anomalies 541 | Malignant Neoplasms 516 | Malignant Neoplasms 560 | Homicide 5,368 | Suicide 5,065 | Malignant Neoplasms 15,509 | Heart Disease 37,732 | Heart Disease 65,060 | Malignant Neoplasms 388,911 | Malignant Neoplasms 556,902 |
| 3 | SIDS 2,162 | Malignant Neoplasms 392 | Congenital Anomalies 180 | Suicide 244 | Suicide 3,988 | Homicide 4,516 | Heart Disease 13,600 | Unintentional Injury 15,837 | Chronic Low. Respiratory Disease 12,077 | Cerebro-vascular 138,134 | Cerebro-vascular 157,689 |
| 4 | Maternal Pregnancy Comp. 1,710 | Homicide 376 | Homicide 122 | Congenital Anomalies 206 | Malignant Neoplasms 1,651 | Malignant Neoplasms 3,741 | Suicide 6,602 | Liver Disease 7,466 | Diabetes Mellitus 10,731 | Chronic Low. Respiratory Disease 109,139 | Chronic Low. Respiratory Disease 126,382 |
| 5 | Placenta Cord Membranes 1,099 | Heart Disease 186 | Heart Disease 104 | Homicide 202 | Heart Disease 1,133 | Heart Disease 3,250 | HIV 5,340 | Suicide 6,481 | Cerebro-vascular 9,946 | Alzheimer's Disease 62,814 | Unintentional Injury 109,277 |
| 6 | Unintentional Injury 945 | Influenza & Pneumonia 163 | Influenza & Pneumonia 75 | Heart Disease 160 | Congenital Anomalies 451 | HIV 1,588 | Homicide 3,110 | Cerebro-vascular 6,127 | Unintentional Injury 9,170 | Influenza & Pneumonia 57,670 | Diabetes Mellitus 74,219 |
| 7 | Respiratory Distress 831 | Septicemia 85 | Septicemia 39 | Chronic Low. Respiratory Disease 81 | Influenza & Pneumonia 224 | Diabetes Mellitus 657 | Liver Disease 3,020 | Diabetes Mellitus 5,658 | Liver Disease 6,428 | Diabetes Mellitus 54,919 | Influenza & Pneumonia 65,163 |
| 8 | Bacterial Sepsis 772 | Perinatal Period 79 | Benign Neoplasms 38 | Influenza & Pneumonia 72 | Cerebro-vascular 221 | Cerebro-vascular 583 | Cerebro-vascular 2,460 | HIV 4,442 | Suicide 3,843 | Nephritis 35,254 | Alzheimer's Disease 63,457 |
| 9 | Neonatal Hemorrhage 649 | Chronic Low. Respiratory Disease 55 | Chronic Low. Respiratory Disease 37 | Benign Neoplasms 41 | Chronic Low. Respiratory Disease 191 | Congenital Anomalies 426 | Diabetes Mellitus 2,049 | Chronic Low. Respiratory 3,537 | Nephritis 3,806 | Unintentional Injury 34,335 | Nephritis 42,453 |
| 10 | Circulatory System Disease 591 | Benign Neoplasms 51 | Cerebro-vascular 29 | Cerebro-vascular 40 | HIV 178 | Influenza & Pneumonia 373 | Influenza & Pneumonia 992 | Viral Hepatitis 2,259 | Septicemia 3,651 | Septicemia 26,445 | Septicemia 34,069 |

**Source:** National Vital Statistics System, National Center for Health Statistics, CDC.
**Produced by:** Office of Statistics and Programming, National Center for Injury Prevention and Control, CDC.

**Figure 3-2** Unintentional injuries are the leading cause of death in the United States for ages 1 to 44 years.

**Figure 3-3** More children die from unintentional injuries than from childhood illnesses.

**Figure 3-4** More than 150,000 people die in the United States each year from unintentional injuries.

injuries and deaths that are self-inflicted or perpetrated by another person, usually involving some type of violence.

Some people are more prone to injuries because of their actions or the actions of those around them. In general, these persons are at risk for injury. An **injury risk** is defined as a real or potentially hazardous situation that puts individuals at risk for sustaining an injury. Recently, injury risk has escalated because of an increased perceived need for "pushing the envelope" and the development of extreme sports (e.g., human catapulting) and related products (e.g., small motorcycles known as *pocket bikes*).

To track these potential hazards and create prevention programs, **injury surveillance** is conducted. Injury surveillance is an ongoing systematic collection, analysis, and interpretation of injury data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of the data to those who need to know. **Epidemiology** is the study of the causes, patterns, prevalence, and control of disease in groups of people. The run reports that paramedics are required to write after each call are read and analyzed by **epidemiologists**. These epidemiologists then pass their findings to injury prevention specialists. The specialists create programs and campaigns to prevent the injury from occurring.

In most cases, measuring death **(mortality)** rates is much easier than measuring nonfatal injury **(morbidity)** rates. Nearly all reported deaths involve some type of tracking, either through the medical examiner's office, the police department, or a personal physician. However, nonfatal injuries are difficult to track because reporting systems are not in place or are not well developed for clinics, physicians' offices, school nurses' offices, and even the home medicine cabinet. Great strides have been taken to glean important injury data from places such as emergency departments and trauma centers, yet these figures are only a small part of the big picture.

## THE COST OF INJURIES

[OBJECTIVE 2]

Roxanne Hoffman, coordinator for the San Diego Safe Kids Coalition and strong proponent of using EMS personnel in injury-prevention activities, believes that changing the way society views unintentional injuries requires eliminating the word *accident* from society's vocabulary. Hoffman explains, "People still tend to dismiss them [unintentional injuries] as accidents"—as though they were destined to happen. "These are not accidents; they can be prevented." She adds, "People don't realize how many lives are affected by unintentional injuries—physically, emotionally, and economically" (Krimston & Griffiths, 2003).

The cost of these injuries to society, beyond personal suffering, must be considered as well as how it compares with the cost of other major diseases or conditions.

**Figure 3-5** Only 20% to 25% of cyclists currently wear helmets.

According to the National Safety Council's 2005 U.S. injury statistics, "Accidents also accounted for more than 24 million nonfatal injuries in 2005, putting major stress on our nation's health care system. The economic cost of all fatal and nonfatal injuries amounted to $625.5 billion nationally, or $5,500 per household" (National Safety Council, 2007).

For instance, consider the case of the bicycle helmet (Figure 3-5). According to NHTSA, the estimated cost of bicycle-related injuries and deaths for all ages is approximately $8 billion (NHTSA, 2004). For every $10 bicycle helmet, this country saves approximately $30 in direct health costs and an additional $365 in associated societal costs. The NHTSA estimates that if 85% of all child cyclists wore helmets every time they rode a bicycle for only 1 year, the lifetime medical cost savings would total between $109 and $142 million. Unfortunately, only 20% to 25% of cyclists currently wear helmets.

Who pays for these costs? Unfortunately, everyone pays through either higher taxes (public sources such as federal, state, and local government pay approximately one fourth of associated injury costs) or higher insurance premiums (private sources such as insurance companies pick up nearly three fourths of all injury-related costs) (CDC, 2001).

Full societal costs of injuries can be measured by using **years of potential life lost (YPLL)** to calculate the costs. This method assumes that, on average, most people live a productive life until the age of 65 years. For example, if a 22 year old is killed in a bicycle accident, 43 years of potential life are lost (YPLL = 65 – Age at death). The YPLL associated with injuries is far greater than the YPLL linked with cancer or heart disease. Several reasons exist for this. First, younger people typically participate in more risk-taking activities than do older generations and as a result are more susceptible to fatal injuries. Older people do die from injuries, but when they do fewer YPLL are lost than in a younger patient. In the example above, the 22-year-old patient had 43 YPLL. Suppose that the patient was 64

years old when he was struck on the bicycle; in this case only 1 year was lost.

Because medical conditions such as heart disease and cancer cause death at a later age, they typically result in a lower YPLL than trauma. However, in some instances, such as congenital heart disease, a medical condition can cause a significant loss of years of potential life. Finally, years of life lost are associated with death secondary to injury or illness as well as disability. Consider again the 22-year-old in a bicycle crash. If the patient did not die, but rather remained in a comatose state for the rest of his life, the term YPLL could still be applied. Although the patient did not lose potential life, he did lose years in which he would be earning income, paying taxes, and making other contributions to society.

EMS leaders at national and state levels have initiated a movement to introduce science to injury prevention and make it a more important part of the EMS mission. Most persons involved with EMS readily admit that many of the providers in the field who were to implement these programs originally were not enthusiastic. Many still are not, but attitudes are changing. A study conducted by Herb Garrison, MD, Director of the East Carolina Injury Prevention Program, used the National Registry of EMTs to measure provider attitudes toward injury prevention (Griffiths, 1999). The results clearly showed a positive attitude by EMS providers. A survey that included questions about injury prevention was mailed to EMTs, EMT-intermediates, and paramedics scheduled for recertification. Approximately 19,000 of 29,000 who applied for recertification returned the survey, a return rate of nearly 66%. Of those polled, 58% believed that EMS should be involved in conducting community-oriented injury prevention programs. Thirty-five percent said EMS involvement in injury prevention programs should be limited to programs and training focused on preventing injuries to the EMS provider. Only 5% thought that EMS should have no involvement in injury prevention (Griffiths, 1999).

## REASONS FOR EMS INVOLVEMENT

**[OBJECTIVE 3]**

Unlike any other medical professional, EMS providers are unique in that they see citizens in their own homes and environments and during activities of daily life. As a result, EMS providers have ample opportunities for prevention education that other health care professionals do not have. Additional advantages of EMS involvement in prevention education are listed below. As previously stated, more benefits exist for both the community and the healthcare system from preventing injuries and illness than from trying to treat them after they have already occurred.

- *EMS providers are widely distributed among the population.* Nearly every community in the United States is covered by some form of emergency medical services, from Maine's seaside town of Lubec (Lubec 55) to the California border town of San Ysidro (Medic 30).
- *EMS providers reflect the makeup of the community.* From its earliest days in Pittsburgh, EMS has often tapped the local populace to care for its own.
- *In a rural setting, EMS providers may be the most medically educated individuals available.* EMS providers may be the only source of help, whether they are an hour drive down the mountain to the nearest emergency department or 200 miles offshore on an oil platform.
- *The United States has more than 840,000 EMS providers.* Even a fraction of these providers would create a formidable injury prevention army.
- *EMS providers are high-profile role models.* Since the early days of Johnny Gage and Roy DeSoto (from the television show *Emergency!*), EMS providers have always been looked upon as mentors.
- *EMS providers are considered a champion of the healthcare consumer.* EMS providers work in concert with their patients and their patients' families.
- *EMS providers are welcome in the schools and other environments.* In today's climate of standardized testing and assessments, cuts in programs, and diminishing funding, EMS providers are still offered unparalleled access to students (Figure 3-6).
- *EMS providers are considered authorities on injury and prevention.* Because they see the results of injury


**Figure 3-6** In today's climate of standardized testing and assessments, cuts in programs, and diminishing funding, EMS providers are still offered unparalleled access to students.


**Figure 3-7** Because they see the results of injury every day, EMS providers are in a unique position to discuss the facts and consequences of injuries and prevention.

every day, EMS providers are in a unique position to discuss the facts and consequences of injuries and prevention (Figure 3-7).

If paramedics have the duty to respond to injuries and illness, then they have the duty to prevent injuries and illness. The fire service has successfully incorporated fire prevention into its profession. In fact, the prevention activities of fire departments have saved more lives than has pulling victims out of burning buildings. In fact, fire-related deaths have steadily decreased since President Calvin Coolidge proclaimed the first National Fire Prevention Week in October 1925. Since that call for action, the number of fire-related deaths has dropped from approximately 1 in 8000 Americans to 1 in 95,000 (United States Fire Administration, 2006).

## Essential Leadership Activities

Injury and illness prevention for the public is obviously important, but so is injury and illness prevention for EMS providers. This responsibility lies with both the individual EMS professional and the management and leadership of EMS departments. Currently, all employers are required to have policies and procedures in place that address workplace safety. These include the use of personal protective equipment on calls and safe driving strategies. One in every five emergency responders is estimated to be injured each year (Dailey, 2006). Because the job is physically demanding and inherently dangerous, both employer and employee should take responsibility for provider safety.

**BOX 3-1 Causes of Job-Related Injury and Illness at Rural Metro Corporation**

- Loading and unloading patients into an ambulance
- Patient transfer (bed to gurney, gurney to chair, scene to gurney)
- Transferring patient down stairs
- Gurney operations on uneven ground (gurney in pothole, gurney through grass)
- Compensating for patient movement on gurney
- Not using partner correctly
- Moving or transferring equipment (drug box, oxygen cylinder, monitor)
- Transporting obese patients
- Entering or exiting the vehicle

One good example of an employer-led program designed to reduce worker injury was developed by the Rural Metro Corporation, Scottsdale, Ariz. The company studied the leading causes of job-related injury and illness and used the findings to develop new policies and procedures to reduce those causes (Box 3-1). Next, it developed a comprehensive six-part training program to be implemented companywide. Finally, it created and distributed a 20-minute awareness video to more than 6000 field employees.

EMS leadership must identify and support employees interested in participating in primary injury prevention activities within the community. This may be accomplished with budgetary support providing salary for off-duty personnel involved in injury-prevention activities or by allowing personnel to conduct activities while on duty, in uniform, and with the full sanction of their host agency.

## Essential Provider Activities

EMS personnel can contribute to injury prevention efforts in their communities in many ways. Contribution is possible whether you work on an ambulance that responds to only a few calls per shift or a unit that runs nonstop from start to finish. Possible injury prevention activities include car seat safety checks, safe railroad crossing checks, bicycle safety fairs, fall prevention in the elderly, and drowning prevention activities, among countless other opportunities. The format in which the EMS professional provides education also has many possibilities. It

may be a prepared program, a program developed by an individual, a formal education event, or education of citizens during your daily interaction with them.

Regardless of what the topic is or how the education is delivered, the first step in any injury prevention program is to determine what education is needed in the community and where to target this education. This information can be gained in a variety of ways. Often personnel will notice they are responding to several of the same types of calls and begin to wonder if a pattern to these incidents exists. A review of run reports or hospital records might then indicate that many calls of a specific type do occur.

For example, if a community were to recognize an increase in injuries and fatalities from motor vehicle collisions, residents would likely want to reduce the number of these accidents. Rather than using a shotgun approach to the problem, which may not be effective, the problem should be studied to determine the most effective strategy for that particular community. In one case, a review of EMS and hospital records revealed that the highest number of injuries and fatalities were among 16- to 24-year-old males involved in street racing. It also was noted that all the individuals were wearing their seatbelts at the time of the crash. Had the community chosen to fund a seat belt campaign, few results would have occurred from their efforts. However, by realizing that street racing in young men was the issue, their education efforts could be more closely focused, potentially yielding a better result.

Injury prevention activities do not always have to be directly focused on the patient. An EMS service in one community responded to several calls in a 2-month period for children age 3 years and younger falling out of second- and third-story windows. Working directly with this patient group obviously would have little effect on the problem. However, by working with local builders and contractors to develop prevention strategies for both new and existing construction, these types of incidents were dramatically reduced.

Once a problem is identified, an injury prevention program must be developed that provides the greatest benefit for the resources available. Several tools can be used to identify how best to approach the problem, such as in the preceeding examples in which education about the dangers of street racing and collaboration with housing contractors were the best prevention approaches.

## EPIDEMIOLOGIC TRIAD

One tool for injury prevention is the epidemiologic triad (Figure 3-8). This model of injury prevention has been in use for decades and examines the three main factors of injury and illness: the host, agent, and environment. When using this tool, the interrelations of each element are examined. Injury prevention is then targeted at disrupting one of the "legs" and breaking the triad.

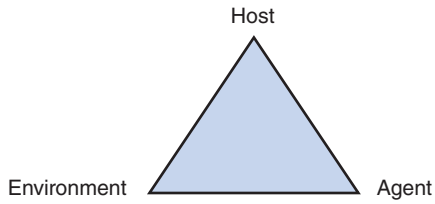


**Figure 3-8** The epidemiologic triad.

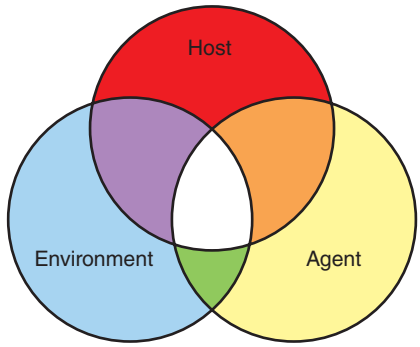


**Figure 3-9** An alternate view of the epidemiologic triad.

Host factors can include age, risk-taking activity, gender, psychological profile, judgment, and other items that determine an individual's risk of injury.

In the classic view of this triad (for illness prevention), agent factors typically refer to a disease-causing microorganism or behavior (e.g., smoking). In injury prevention, agent factors typically refer to the amount of energy exchange causing injury to the body. Factors that affect these primarily are speed, distance, time, and other factors that increase the amount of available energy to destroy body tissues.

Environment factors include the environment in which the injury occurred, such as icy roads, distracted drivers, paths too close to a cliff edge, and trip hazards in the home.

An alternative view of this triad has been developed over the years in which each element is seen as a circle that has a certain amount of overlap with the other two circles (Figure 3-9). This model is preferred by many because it recognizes the fact that although all injuries and illnesses have several factors, some factors are unique to each element and cannot be changed. Targeting prevention activities as close as possible to the point at which all three circles overlap achieves the greatest outcome.

To put this model into action, take the example of reducing injuries and fatalities among teenage drivers. The host factors include the age of the drivers, risk-taking activity, and judgment compromise based on the lack of driving experience. Agent factors may include increased speed. Environmental factors may include distractions in the vehicle from friends or electronic devices.

Addressing each factor individually may cause a slight decrease in teen-involved accidents; however, addressing all three factors will have a much greater effect. In fact, many states have done this by increasing the driving age (host factor), restricting who can be in the car with a teenage driver (environmental factor), and increasing education regarding the dangers of speed (agent factor).

## HADDON MATRIX

In the early 1960s, Dr. William Haddon expanded on the principles of the epidemiologic triad. Through his work, Haddon determined that all injuries have three time phases. He called these the pre-event, event, and post-event phases. By combining these time phases with the epidemiologic triad, he developed what is now known as the Haddon Matrix (Figure 3-10). By further evaluating all the components of an injury before it occurs, during the injury process, and after it occurs, better and more effective prevention strategies can be performed because each square of the matrix represents a possible intervention point. With this tool the EMS provider can determine which point(s) will have the greatest effect on injury prevention.

EMS traditionally has only participated in the post-event phase, the "you crash, we dash" model. As the EMS profession has developed, however, more agencies are using this matrix to take a proactive approach in their communities. An example of this is a community that noticed an increase in pediatric head trauma resulting from bicycle collisions. A review of the data showed that helmet use was minimal in these patients. The local EMS agency targeted the pre-event phase in both the host and agent. They stocked their ambulances with bicycle helmets, and whenever they saw a child riding without a helmet they took the opportunity to educate the child about bicycle safety (host) and gave the child a helmet (agent). As a result, these types of injuries were significantly reduced. A completed Haddon Matrix for a motor vehicle crash is depicted in Figure 3-11.

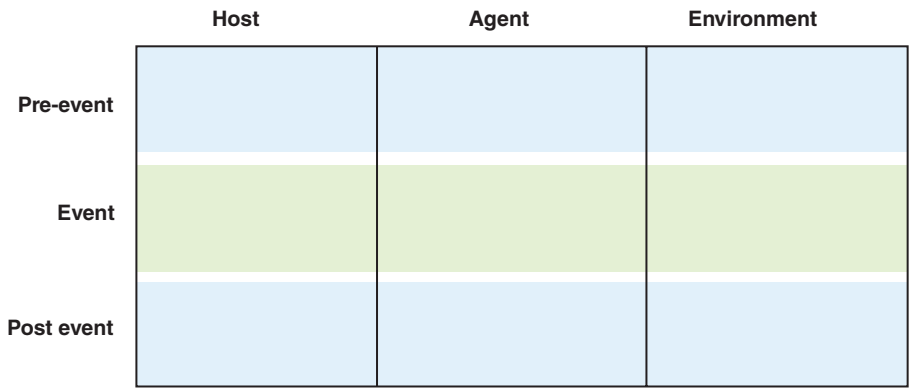


**Figure 3-10** The Haddon Matrix.

| | Host | Agent | Environment |
|---|---|---|---|
| **Pre-event** | Driver's:<br>Age<br>Judgment<br>Physical condition<br>Tired<br>Impaired<br>Experience | Condition of car<br>Safety features | Road hazards<br>Road conditions<br>Distractions in car |
| **Event** | Safety device use<br>Physical condition | Speed<br>Objects in car<br>Type of collision<br>Interior surfaces struck | Other vehicles<br>Object struck<br>"Landing" surface |
| **Postevent** | Age<br>General health status<br>Type of injury | Time until found<br>Continued injury | EMS response time<br>Trauma system access |

**Figure 3-11** A completed Haddon Matrix for a motor vehicle crash.

In the early 1970s Haddon developed what he called his "10 countermeasures for injury prevention." Each countermeasure provides a point at which the EMS professional can target injury prevention activities, as follows:

1. Prevent the initial creation of the hazard.
2. Reduce the hazard being produced.
3. Prevent the release of the hazard.
4. Slow the rate of the release of the hazard.
5. Separate the hazard in terms of time and space.
6. Provide protection from the hazard with a barrier.
7. Modify the hazard.
8. Increase strength or resistance against the hazard.
9. Minimize the damage done by the hazard.
10. Stabilize and repair or rehabilitate what is damaged by the hazard.

## THE "EP5" MATRIX

Successful injury prevention programs must be based on how well they integrate the critical elements of injury prevention into the program or intervention. Once the EMS professional knows what the problem is and where to target prevention activities, a prevention program can be developed. Prevention efforts are commonly based on the "Five *E*'s" of injury prevention (Table 3-1). Many times addressing one of these alone will be unsuccessful in reducing injury, requiring programs to address several items. The use of this plan along with the methods in the preceding paragraphs will ensure a strong injury prevention program. In addition to the five *E*'s listed, many experts also add ***e***conomic incentives and ***e***valuation to their programs. An injury prevention programs components, the "Five *P*'s," are explained in Table 3-1.

**TABLE 3-1 Specific Interventions (*E*'s) and Overall Program Components (*P*'s)**

| Five *E*'s | Definitions |
|---|---|
| ***E***ducation | The education of the target population. Usually a gradual process that is difficult to measure. |
| ***E***ngineering | Creating an effective product or device that requires minimal effort on the part of the user or offers automatic or passive protection without thought on the part of the user. Examples include air bags in cars, smoke detectors in homes, and ground fault interrupter outlets in bathrooms and kitchens. |
| ***E***nforcement | Legislation, regulations, or litigation that modifies behavior and ensures compliance. Examples include blood alcohol level limits and laws requiring children to wear bicycle helmets. |
| ***E***nvironment | A change in the physical environment or culture of the environment that creates or enhances effectiveness of a program, product, or device. |
| ***E***MS | Engaging EMS personnel into participating in the program. |
| **Five *P*'s** | **Definitions** |
| ***P***roblem | Problem identification through the use of data or studies. Compare problem magnitude with other injuries that affect the community. |
| ***P***rogram | Strategies for implementing a variety of interventions with an evaluation component that creates continuous feedback on effectiveness. |
| ***P***artnership | Collaboration with other organizations or public or private agencies. |
| ***P***reparation | Readying for implementation with training of participants, data collection, identification of resources, analysis of similar interventions cited in the literature, and follow-up with community partners. |
| ***P***olicy | Advocacy or actual public or private policy change or law that addresses an identified issue. |

### *Education*

Education was long considered the mainstay of injury prevention and is still often the first strategy chosen when considering a new program. Education alone, however, has been shown to not be an effective method of preventing injury. This is because education only affects the host in the epidemiologic triad and does nothing to affect the agent or environment. Add to that the fact that most educational programs are short in duration compared with the time necessary to modify an individual's behavior. As a result, although education is an important piece of any injury prevention program, it rarely works when used alone.

### *Engineering*

Engineering interventions are built into the agent or the environment and are most effective when they do not require any interaction by the host. Examples include airbags in a motor vehicle, the emergency stopping devices in the event of an elevator failure, and other automatic safety devices. Other engineering interventions depend on interaction from the host, which makes

them vulnerable to not being used. Fall protection devices for window washers, seatbelts, and helmets all require host interaction to be effective.

### Enforcement

Enforcement activities are based on the ability of a governmental agency to mandate or disallow certain activities or the production of certain items deemed to be dangerous. Enforcement is only effective, however, if the public chooses to obey the regulations. In short, the answer to the question "Is the penalty for being caught so low that the activity is worth it?" must be "no." When choosing this strategy the penalty for the infraction must be a deterrent. Although in general the populace tends to follow enforcement actions, they generally do not work alone. People are much more likely to follow rules and regulations if they understand why they are in place; as a result, enforcement should always be paired with education.

### Environment

As previously discussed, one factor of the epidemiologic triad is the environment. Activities that change the environment or remove the environmental factor will "break" the triangle, thereby reducing injury. Other environmental factors may include changing the view of the community in a way that increases their receptiveness of an injury prevention program or increases their compliance with existing enforcement activities.

### Emergency Medical Services

These activities are specific to the EMS profession in injury prevention. As previously discussed, EMS professionals can play a large role in injury prevention based on numbers of providers, knowledge and experience, and public visibility.

### Economic Incentives

The treatment of trauma is expensive, and all members of the community must pay for this treatment in one way or another. Highlighting the cost savings of avoiding injury can be an effective prevention method. These strategies also are common in the business and manufacturing sectors. Products that lead to injury often result in litigation against the companies that produced them. As a result, companies make great efforts to produce safe products in an effort to avoid injuries to consumers.

### Evaluation

Evaluation is crucial to any injury prevention program. The question "Is this working?" must be asked. If a program is not effective, then valuable resources are being used with no outcome and a new strategy must be implemented. Although evaluation should begin early in any prevention program, EMS providers must also realize that reduction in injury may not be immediate. Just as a review of data is needed to identify a problem, enough data must be available to review to determine if the program had an effect. Always evaluate, but be sure not to dismiss the program in the absence of overnight success.

In short, an effective injury prevention program begins with identifying the problem (research available data), determining which intervention points will be the most effective (Haddon Matrix), and developing a plan that will best address these intervention points (the five *E*'s). If any component is missing, injuries are unlikely to be reduced. Table 3-1 summarizes these components using the EP5 matrix.

## THE TEACHABLE MOMENT

[OBJECTIVE 4]

Not all educational events take place through formal injury prevention programs. EMS personnel are in a unique position to educate their patients and their family members as well as bystanders. One way to impart this education is through the **teachable moment**. This is the time immediately after an injury has occurred when the patient and observers remain acutely aware of what has happened and may be more receptive to learning how the event or illness could have been prevented (U.S. Department of Transportation/NHTSA, 1998). Speaking with patients or bystanders immediately after they have experienced a crisis may be the best way to deliver effective injury prevention messages.

Teachable moments can also be preemptive, or take place before an injury happens. If you happen to be at an elderly patient's home for a medical call and notice a trip hazard in the home, educating the patient at that time may avoid an injury from a fall later. These moments can also be unrelated to trauma. You may find a patient who has difficulty understanding his or her prescription instructions. By taking the time to clarify them, you could prevent that patient from succumbing to the effects of an overdose or underdose of medication.

Of course, these teachable moments take a back seat to patient care. However, when the situation stabilizes, you can then proceed with prevention education, which may include discussing seatbelts, helmets, unsafe driving, or driving under the influence. You should remain calm and positive and project a caring and supportive demeanor. Humiliating a patient or yelling will most likely result in the opposite effect (Figure 3-12).

Teachable moments may occur on the scene or in the back of the ambulance. They can involve family members, friends, caregivers, or strangers. The teachable moment

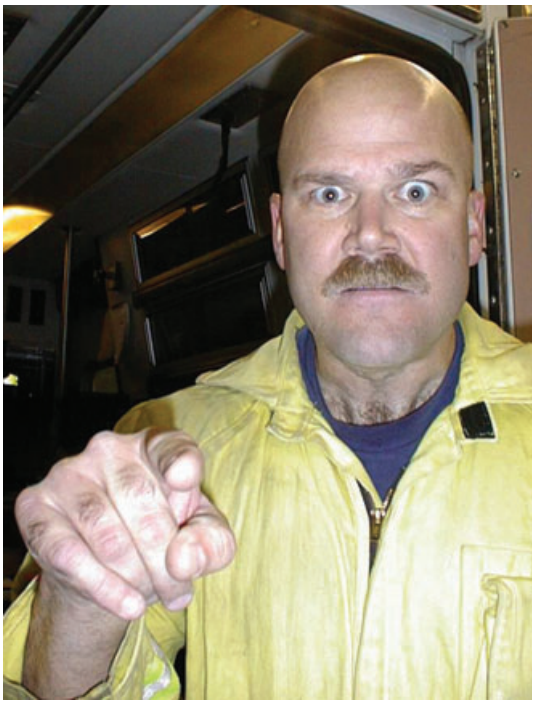

**Figure 3-12** The prevention message can be delivered the right way or the wrong way. Avoid being accusatory or judgmental during the teachable moment.

**Figure 3-13** Be sure to completely fill out all the required fields in an EMS report no matter how minute the details may seem.

also can be an emotional outlet for experienced EMS providers who have responded to the same preventable injuries time and time again.

Paramedics are often able to draw from their previous experiences in dealing with tragedies and effectively communicate their concerns to diverse audiences.

## Documentation

[OBJECTIVE 5]

The first way EMS professionals can help is by properly documenting calls involving injuries. These data are imperative for local injury-prevention efforts as well as state and national monitoring. **Epidemiologists**, people who study the causes, distribution, and control of disease in populations, have identified leading causes of injury and how to correct them by sifting through EMS paperwork. To guarantee "clean" data, you must completely fill out all the required fields in an EMS report no matter how minute the details may seem (Figure 3-13). Information such as a patient's gender or whether he or she was restrained during a motor vehicle crash is imperative for accurate analysis. Your narrative section is equally important. Be as accurate and detailed as possible when reporting the circumstances behind an injury. Although you may have checked the appropriate box on your prehospital care report for the presence of a car seat after a crash, do not forget to describe where the car seat was found, whether it was forward or rear facing, if it was properly installed, and where the child was on your arrival. Narratives are used to paint a picture of what happened from the paramedic's point of view and from the viewpoint of the patient and bystanders. According to the NHTSA Public Information, Education, and Relations in EMS (PIER) curriculum, "Only a narrative can fully portray the physical and emotional characteristics at a scene, detail the **chronology** [the arrangement of events in time] of events, picture the conditions of a road or other features, and depict the conditions, actions, and reactions of the people involved in an injury event." This firsthand information is often "lost" in hospital and police reports that rely on third- and fourth-hand information hours or days later.

The analyzed data are used to develop focused prevention activities, acquire public support, and justify funding.

**Case Scenario**—continued

Shortly after you begin treatment, the ambulance arrives and you transfer patient care to the paramedic on the ambulance. While speaking with the girl's parents, they angrily comment that this is the second child who has fallen out of a window in their neighborhood. The child's father takes you upstairs to the bedroom, where you see that the window's location in the room and height on the wall make it highly likely that it will be immediately adjacent to a child sitting on the bed. When the father shows you the screen construction, you see that the clips that hold it in place could be easily bent or broken with minimal pressure.

After returning to your station, you mention the conversation to your battalion chief. Together you search the department's records and find three similar calls in the neighborhood during the previous year. After further investigation, you discover that all three calls involved the same model of home.

### Questions

4. *Should you and your department share this injury trend with anyone? Why or why not? If you chose to communicate the information, whom should you contact?*
5. *What organization in your community is responsible for injury prevention?*
6. *Should EMS organizations interact with organizations responsible for injury prevention? How?*

## A SUCCESSFUL DROWNING PREVENTION PROGRAM

In 1994 drowning was the second leading cause of accidental death for children and youths younger than 20 years old in Alaska. From the period of 1991 to 1994, 37 fatalities occurred, an average of nine per year. This rate was more than twice the national average. Most of the fatalities occurred in open skiffs or canoes, more than half occurred in lakes and rivers, and 22% of boating fatalities occurred among those younger than 19 years old. Of critical importance, more than 90% of those who died had not been wearing a life jacket.

Bob Painter, assistant fire chief of the Homer, Ala., Fire Department, knew two children who had drowned in his jurisdiction. For a population of approximately 4000, two is both very personal and statistically significant. Painter proposed a project that he called "Kids Don't Float" (KDF). It was named after a successful program in New York City called "Kids Can't Fly," aimed at preventing children from falling out of windows. KDF zeroed in on the fact that 90% of victims had not used flotation devices (determination of problem). So KDF combined a life jacket loaner program at the harbors with a water safety education program (educate). Painter's project was developed through collaboration with local groups: the Homer Fire Department, Homer Safe Kids, the Coast Guard Auxiliary, and the Homer School District (develop a plan).

Beginning in spring 1996, these groups erected 15 signboards on which to hang the loaner life jackets in communities around Katchemak Bay, where the town of Homer is situated. The concept was simple—make it easy for people to grab a life jacket on their way to a boat and return it when they are done. The signboards also provided an opportunity for an effective educational message. In 1997 and 1998, Painter evaluated the effectiveness of the life jacket loaner board program in promoting life jacket use. The observed wear rate went from 16% to 35%—an increase of 119%—in the target community after the signboards were erected compared with no increase in the control community (evaluate).

Now, 12 years later, 268 KDF life jacket loaner boards are located by lakes, rivers, and bays in nearly every region of the state (Figure 3-14). The success of this project can also be measured in lives saved in Alaska. A 10-year-old Kotzebue boy was playing near the sound when his friend got swept into deeper water by the current. Neither child could swim, but the boy bravely grabbed a KDF life jacket, dog paddled out to his friend, and pulled her to shore. Three other likely saves have been reported. Two children wearing KDF jackets survived a boating accident on the


**Figure 3-14** Personal flotation device loaner boards are a key component of the "Kids Don't Float" program and have helped increase the wear rate by 119%.

Kenai River. A child fell off the dock in Klawock, and his friends acted quickly by throwing him a KDF life jacket until he could be rescued.

KDF has truly been a collaborative effort both at the state level and in the communities where each of these loaner boards was built and is maintained. The KDF program became a prominent component of the Alaska Boating Safety Bill and was frequently mentioned in testimony by those supporting the bill. The law was passed by the Alaska legislature in May 2000. Along with the legislation came funding for more boards and more life jackets (enforcement). The National Safe Boating Council and National Safe Kids have adopted this program for national promotion.

National recognition is gratifying, but the real reward, Painter will tell you, is seeing kids don life jackets whenever they go out on the water (Griffiths & Maxwell, 2002).

## DRAWING FROM PERSONAL EXPERIENCE: SAFE

In Vince Easevoli's 20 years as a firefighter/paramedic for Miami-Dade Fire Rescue, he has responded to nearly every imaginable call for help. However, he noticed a disproportionate number of calls involving teenagers and tragic car accidents, which seemed to have a common denominator: the teens were not wearing seatbelts.

In 1987, Easevoli decided to stop the cycle of preventable injuries and deaths. With the help of fellow firefighter/paramedic Ralph Jiminez and others, he started Stay Alive From Education (SAFE).

Much work was necessary; unintentional injuries continued to be the leading cause of death for Floridians ages 1 to 34 years. Seatbelt use statewide was only 58%, well below the national average. The goal of the SAFE program is to offer young adults information that allows them to make educated and rational decisions concerning their safety and well-being in an effort to reduce injuries and fatalities and give them the opportunity to become responsible and healthy adults.

SAFE program instructors, all experienced paramedics, use a hands-on approach to teach students about the consequences of irresponsible actions. Students learn about crash dynamics and participate in dramatic demonstrations of what happens to trauma patients.

Since the program's start in Dade County, it has grown to include teams in six other counties in Florida as well as teams in California and New Jersey. On average, more than 55,000 students attend the SAFE program each year. The University of Miami recently conducted a study on Florida SAFE's effectiveness and documented a dramatic increase in seatbelt use by SAFE graduates (Krimston & Griffiths, 2003).

### *Case Scenario* CONCLUSION

The patient whom you originally treated was admitted to the hospital with a skull fracture, a small subdural hematoma, and a fractured humerus. Your battalion chief decided to contact the company that built the homes to inform them of what you learned. The builder was quite interested in the information and immediately changed the window height for future projects. The builder also provided alternative clips to existing homeowners to improve the security of the screen. Your department has not responded to any further calls related to this problem.

#### *Looking Back*

7. *Was contacting the builder appropriate? Should you have contacted the family instead? What about a public health entity?*
8. *Bringing this injury trend to the attention of the builder or family may have resulted in legal action by the family. You and/or your department may have been called to testify. Does this reality affect the decision to follow up on the trend? How?*
9. *Had the girl not had severe injuries, would following up on the injury trend not have been as appropriate? Why or why not?*

### CULTURAL*Considerations*

[OBJECTIVE 6]

Motor vehicle crashes are the leading cause of death for Latinos ages 1 to 34 years and the third leading cause of death for all ages, surpassed only by heart disease and cancer, according to new statistics released by the Centers for Disease Control and Prevention. The death rate from motor vehicle crashes for Hispanic children between the ages of 5 and 12 years is 72% higher than the rate for non-Hispanic children, according to NHTSA. Furthermore, young Latinos drive half as many miles as their non-Hispanic white counterparts, but they are twice as likely to die in a traffic fatality (NHTSA, 2008)

"The biggest problem is that the Latino community has not received information about car seats and seat belt use in a

way that resonates with them," said Rebéca Barrera, president of the National Latino Children's Institute (NLCI). Barrera added, "Many Latinos think that they can keep their children safe by hugging them tightly on their laps in the front seat of the car. And although this is one sign of love, in today's fast-paced world a more effective way to keep your child safe is in a car seat or a booster seat."

Corazón de mi Vida, which was developed by NLCI, in partnership with NHTSA and Nationwide Insurance, uses the cultural strengths of the Latino community as the foundation for passenger restraint education, emphasizing the valuable role children play in the lives of their families and society. Cultural values, traditions, and spirituality are incorporated into the program to help change behavior.

"The words 'corazón de mi vida' mean 'you are the center of my life.' This phrase captures the essence of child passenger safety for Latinos. The belief in this message is so powerful that it will change the behaviors of Latinos who may not know how urgent it is for their children to ride in the back seat, buckled up in a safety seat," Barrera explains.

NLCI found that more than half of the parents attending Corazón de mi Vida events around the country did not own safety seats until they participated in the program. In addition, almost every child safety seat checked at Corazón de mi Vida events failed inspection.

"By taking into account Latino cultural traditions and lifestyles, NLCI outreach strategies recognize the good things parents are already doing for their children. Corazón de mi Vida builds on parents' love for their children and invites them to become partners in keeping their children safe—all with a distinct Latino sabor [flavor]," Barrera added.

NLCI also found that the Latino extended family structure, coupled with poverty, can create difficult situations when it comes to using child safety seats.

"Safety seats are expensive, and they take up space," explained Conrad Gonzales, NLCI's director of safety programs. He continued, "Many Latino families are large, and some work in businesses that require trucks, and this may be the only family vehicle. Accommodating the whole family in a small car or truck poses problems.

"Only the most expensive trucks can accommodate more than two persons in seats, and because elders ride in the most comfortable seats, some children ride in the bed of the truck. Frequently, mothers hold the youngest child in their lap, thinking this is the safest place for them."

In addition to space and economic considerations, religious and cultural views can be misinterpreted when it comes to passenger restraints. "Phrases handed down through the centuries," Barrera said, "such as 'lo que Dios quiera' [whatever God wills], might suggest, 'What's the point? I have no control over my destiny.' Instead of ignoring or blaming the concept of fatalism, Corazón de mi Vida incorporates spiritual beliefs by holding car seat blessings and encouraging people to 'help God keep them safe.' "

Tested in 12 cities with diverse Latino populations, Corazón de mi Vida has proven that Latinos will respond to messages and buckle up their children when the message speaks to their hearts.

The program uses appealing culture-based materials combined with four unique community activities. At parent plática, often hosted at child care centers, churches, clinics, and community centers, parents discuss child passenger safety and common attitudes. Culturally based materials are distributed and participants watch a demonstration of the correct installation of a safety seat. At safety seat blessings, a religious leader blesses the car seats to be distributed and reminds parents that they have been entrusted with their child's well-being.

## EXAMPLES OF SUCCESSFUL EMS-CONCEIVED PROGRAMS

### *Safety Corridor*

Lt. John Creel, a 20-year veteran EMT and firefighter from Hoodland (Oregon) Fire District 74, has the rare gift of bringing people together toward a common goal. The ability to build coalitions among diverse interests to obtain cooperation is critically important for injury prevention challenges that cross agencies and geographic boundaries. In the early 1990s motor vehicle accidents on a stretch of highway through Oregon's Cascade Range near Mount Hood claimed eight to 10 lives per year (Figure 3-15). One mountainous stretch of U.S. Highway 26 from Sandy, Ore., to the Highway 35 junction had the worst record, with Hoodland Fire responding to an average of nearly 200 accidents per year in that segment.

Creel initially wanted to find a way to reduce the number of crashes occurring near Hoodland. He began a local effort to raise awareness of the problem. In a short time, his efforts mushroomed into a regional and statewide effort to reduce motor vehicle crashes throughout the 25 miles of the Mount Hood corridor. Creel successfully enlisted the help of other fire agencies, the Oregon Department of Transportation, the state police, and the county sheriff and organized a local community group to apply the necessary political pressure.

Creel developed an important tool in his safety efforts: a map. This map showed where crashes occurred as well as displayed the hidden dangers of the route. He released statistics in community flyers and wrote columns for local newspapers. Through public education, stepped-up traffic enforcement (fines were doubled in the "safety corridor"), and highway engineering, motor vehicle accidents have declined by 60% (Griffiths &


**Figure 3-15** Increases in traffic fines, redesigned roads, increased signage and striping, and reduced speed limits are all part of the Mount Hood safety corridor.

Maxwell, 2002). An EP5 breakdown of the plan is shown in Table 3-2.

The next time you are called to the scene of a car accident, fall, drowning, or other injury, think about how the incident could have been prevented. Consider ways that you could have helped prevent it. The time is always right to do something about unintentional injuries.

**TABLE 3-2 EP5 Breakdown of Safety Corridor**

| Five *E*'s | Application |
|---|---|
| ***E***ducation | Distributed maps showing locations of crashes on Highway 26 corridor; placed crashed vehicle in front of fire station to serve as a reminder to passing motorists |
| ***E***ngineering | Redesigned road to include rumble strips and turnouts for disabled vehicles |
| ***E***nforcement | Reduced speed limit in corridor, doubled traffic fines, and added signs to warn drivers of increased fines |
| ***E***nvironment | Added chain-up areas, increased signage, improved striping, increased winter maintenance, and de-icers |
| ***E***MS | Hoodland Fire District |
| **Five *P*'s** | **Application** |
| ***P***roblem | Increased number of vehicle crashes on 25-mile stretch of highway |
| ***P***rogram | Six months of meeting and planning, enforcement help from Oregon State Police, engineering assistance from Oregon Department of Transportation, education provided by Hoodland Fire District |
| ***P***artnership | Citizens Advisory Committee, Oregon Department of Transportation, United States Forest Service, Federal Highway Administration, U.S. Army Corps of Engineers |
| ***P***reparation | Conducted Mount Hood corridor study, analyzed data, trained and educated partners |
| ***P***olicy | Lowered speed limit for corridor, increased traffic fines |

## EPIC Medics

On May 8, 1996, a San Diego County paramedic unit responded to a call to assist a 2-year-old boy named Nicholas Rosecrans who had wandered away from a daycare center and into the unfenced pool of the house next door. The paramedics' resuscitative efforts were successful only to the point of return of a pulse; 12 hours later, Nicholas was released from life support and pronounced dead. A few days later, the paramedics who responded to the accident received a heartbreaking letter from Nicholas' mother Lynn, thanking the paramedics for their efforts and for the time they had given her to say goodbye to her son.

This incident and its aftermath so touched paramedic Paul Maxwell that he vowed to do everything in his power to try to end the rash of preventable child drownings occurring in his district and to make Nicholas' death the last child drowning he would have to answer.

Maxwell contacted the San Diego Safe Kids Coalition, which welcomed him with open arms. The coordinator of the coalition immediately recognized the value of using a paramedic as a spokesperson to influence public policy and deliver the prevention messages. "Our paramedic should know . . . he sees it everyday," she would say to the press. Together they used EMS data, the media, and many other strategies to help influence the passage of Bill AB3305, which requires barriers surrounding all new pool construction in California.

Fellow paramedic Josh Krimston joined Maxwell in organizing other paramedics to use their professional experience to turn this tragedy into action. Together they founded Eliminate Preventable Injuries of Children (EPIC) Medics.

Members of EPIC Medics have received numerous awards, including State of California Paramedic of the Year, Emergency Medical Services for Children (EMS-C) National Heroes Award, and other leadership awards.

## *Case Scenario* SUMMARY

1. *What is your general impression of this patient?* This patient is high priority. Her mechanism of injury, loss of consciousness, and pallor demonstrate high potential for a neurologic injury and shock.
2. *What physical assessment findings are most pertinent at this time?* Assessment should focus on signs of shock and neurologic injury. Skin color, temperature, level of orientation and mental status examination, sensory/motor examination, and vital signs are all important. She should also be checked for other injuries.
3. *What treatment should be immediately initiated?* High-flow oxygen and spinal stabilization.
4. *Should you and your department share this injury trend with anyone? Why or why not? If you chose to communicate the information, whom should you contact?* You should communicate information about community injury risks immediately. Injury prevention is a part of the stated mission of many EMS organizations and is a community responsibly for all healthcare professionals. In some communities, failing to report such information places liability on the organization. Depending on the community, information should be reported to public health officials, local injury prevention organizations, or EMS regulatory agencies. If in doubt, begin by informing your medical director.
5. *What organization in your community is responsible for injury prevention?* As previously noted, all healthcare organizations and professionals share responsibility for injury prevention. In most communities, the public health department has oversight of injury prevention, although specific injury prevention organizations may also exist.
6. *Should EMS organizations interact with organizations responsible for injury prevention? How?* Yes. Because EMS organizations are in a good position to monitor injury patterns (as this case demonstrates), they should become active in local prevention activities such as bicycle helmet, seatbelt, and child safety programs. Because they are trusted by the citizens, EMS organizations have an opportunity to communicate prevention plans to the public and collaborate with other organizations to reduce injury frequency rates.
7. *Was contacting the builder appropriate? Should you have contacted the family instead? What about a public health entity?* The outcome of this case makes it hard to fault the battalion chief for contacting the builder. However, in most cases contacting the builder may be a more appropriate action for public health or other injury prevention organizations. However, one thing is certain: contacting *someone* is better than hesitating because you are not sure whom to contact. Again, if in doubt, start by communicating the information to your medical director.
8. *Bringing this injury trend to the attention of the builder or family may have resulted in legal action by the family. You and/or your department may have been called to testify. Does this reality affect the decision to follow up on the trend? How?* Injury prevention involves identifying injury patterns, looking for the root causes behind patterns, and applying interventions that reduce those causes. None of these activities is specifically focused on assessing blame. Nevertheless, because people or organizations are sometimes related to root causes, a risk that blame will be assigned is always present, along with accusations of liability. As true advocates for patient health and safety, EMS cannot avoid injury prevention activities because of fear of causing anger or getting too involved in a situation. If our actions result in genuine reductions in death and injury, the efforts are worthwhile.
9. *Had the girl not had severe injuries, would following up on the injury trend have been as appropriate? Why or why not?* Studies in injury-causing behavior demonstrate that risky activities may be repeated hundreds of times before they cause any significant injury. Our job in injury prevention is to identify and reduce root causes *before* significant injuries occur. The fact that three children incurred the same preventable injury is adequate justification to investigate a root cause, regardless of whether any of the injuries was severe.

# Chapter Summary

- Paramedics are in a perfect position to decrease injuries and make a difference in communities.
- Primary injury prevention, or keeping an injury from occurring, is an essential activity. It must be undertaken by the leaders, decision makers, and providers of every EMS system. Traditionally, EMS providers have focused on secondary injury prevention, or preventing further injury from an event that has already occurred.
- In the United States, unintentional injuries are the leading cause of death for individuals aged 1 to 34 years.
- An injury is defined as intentional or unintentional damage to a person that results from acute exposure to thermal, mechanical, electrical, or chemical energy or the absence of essentials such as heat or oxygen.

## Chapter Summary—continued

- Unintentional injuries occur without intent to harm. In contrast, intentional injuries include all injuries and deaths that are self-inflicted or perpetrated by another person, usually involving some type of violence.
- Some people are more prone to injuries as a result of their actions or the actions of those around them. An injury risk is defined as a real or potentially hazardous situation that puts individuals at risk for sustaining an injury.
- Injury surveillance is the ongoing systematic collection, analysis, and interpretation of injury data essential to the planning, implementation, and evaluation of public health practice. Your run reports contribute to this collection of data.
- Measuring death (mortality) rates is much easier than measuring nonfatal injury (morbidity) rates. Nearly all reported deaths involve some type of tracking, whereas nonfatal injuries are quite difficult to track because reporting systems generally exclude clinics, physicians' offices, school nurses' offices, and the home medicine cabinet.
- Unintentional injuries are predictable and therefore are preventable.
- EMS personnel are well suited to injury prevention education for the following reasons:
  - They are widely distributed among the population
  - More than 600,000 are in the United States
  - They are high-profile role models
  - They are welcome in schools and other environments
  - They are champions of the healthcare consumer
  - They reflect the composition of the community
  - They may be the most medically educated individuals in a rural setting
  - They are considered authorities on injury and prevention
- If paramedics have the duty to respond to injuries and illness, then they have the duty to prevent injuries and illness.
- Because the job is physically demanding and inherently dangerous, both employer and employee should take responsibility for EMS provider safety.
- All employers are required to have policies and procedures in place that address workplace safety, including topics such as the use of personal protective equipment on calls and safe driving strategies.
- A teachable moment is the time immediately after an injury has occurred when the patient and observers remain acutely aware of what has happened and may be more receptive to learning how the event or illness could have been prevented. Speaking with patients or bystanders after they have experienced a crisis may be the best way to deliver effective injury prevention messages.
- KDF, SAFE, and EPIC Medics are examples of provider-driven community injury prevention programs.
- To start your own local injury prevention program, first evaluate the five *E*'s (***e***ducation, ***e***nforcement, ***e***ngineering, ***e***nvironment, and ***E***MS). Components of an injury prevention program include the five *P*'s (***p***roblem, ***p***rogram, ***p***artnership, ***p***reparation, and ***p***olicy).

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## SUGGESTED RESOURCES

[OBJECTIVE 7]

**4 R Kids Sake**
PO Box 77693
Corona, CA 92877-0123
(951) 278-1820
www.4rkidssake.org

**AAA Traffic Safety**
607 14th Street NW
Suite 201
Washington, DC 20005
(202) 638-5944
www.aaafoundation.org

**American Association of Poison Control Centers**
(800) 222-1222
www.aapcc.org

**American Trauma Society**
8903 Presidential Parkway, Suite 512
Upper Marlboro, MD 20772
(800) 556-7890
www.amtrauma.org

**Bicycle Helmet Safety Institute**
4611 Seventh Street South
Arlington, VA 22204-1419
(703) 486-0100
www.bhsi.org

**Centers for Disease Control and Prevention**
1600 Clifton Road
Atlanta, GA 30333
(800) CDC-INFO
www.cdc.gov

**Children's Safety Network**
(619) 594-1995
www.injuryprevention.org

**Designated Drivers Association**
PO Box 81362
San Diego, CA 92138-1362
(866) 373-SAFE
www.ddasd.org

**Emergency Medical Services for Children**
Health Resources and Services Administration
Maternal and Child Health Bureau
Parklawn Building, Room 18-05
5600 Fishers Lane
Rockville, MD 20857
(202) 884-4927
www.ems-c.org

**EPIC Medics**
4775 Maple Avenue
La Mesa, CA 91941
(619) 303-4228
www.epicmedics.org

**Every 15 Minutes**
PO Box 20034
Lehigh Valley, PA 18002-0034
(610) 814-6418
www.every15minutes.com

**Farm Safety 4 Just Kids**
PO Box 458
Earlham, IA 50072
(800) 423-5437
www.fs4jk.org

**Foundation Center**
(800) 424-9836
www.fdncenter.org

**Governor's Highway Safety Association**
750 First Street NE, Suite 720
Washington, DC 20002
(202) 789-0942
www.ghsa.org

**The Grantsmanship Center**
PO Box 17220
Los Angeles, CA 90017
(213) 482-9860
www.tgci.com

**Harborview Injury Prevention & Research Center**
325 Ninth Avenue, Box 359960
Seattle, WA 98104
(206) 744-9430
depts.washington.edu/hiprc

**Home Safety Council**
1250 Eye Street, NW, Suite 1000
Washington, DC 20005
(202) 330-4900
www.homesafetycouncil.org

**Injury Free Coalition**
www.injuryfree.org

**International Child Abuse Network**
4024 N. Durfee Avenue
El Monte, CA 91732
(626) 455-4585
www.ican-ncfr.org

**International Play Equipment Manufacturers Association**
4305 North Sixth Street, Suite A
Harrisburg, PA 17110
(888) 944-7362
www.ipema.org

**Kids and Cars**
2913 West 113th Street
Leawood, KS 66211
(913) 327-0013
www.kidsandcars.org

**Kids in Cars**
918 Glenn Avenue
Washington, MO 63090
(636) 390-8268
www.kidsincars.org

**Kids in Danger**
116 West Illinois Street, Suite 5E
Chicago, IL 60610-4532
(312) 595-0649
www.kidsindanger.org

**Mothers Against Drunk Driving**
511 E. John Carpenter Freeway, Suite 700
Irving, TX 75062
(800) GET-MADD
www.madd.org

**National Fire Academy**
16825 South Seton Avenue
Emmitsburg, MD 21727
(301) 447-1000
www.usfa.fema.gov/training/nfa

**National Fire Protection Agency**
1 Batterymarch Park
Quincy, MA 02169-7471
(800) 344-3555
www.nfpa.org

**National Institute on Alcohol Abuse and Alcoholism**
5635 Fishers Lane, MSC 9304
Bethesda, MD 20892-9304
www.collegedrinkingprevention.gov

**National Safety Council**
1121 Spring Lake Drive
Itasca, IL 60143-3201
(800) 621-7619
www.nsc.org

**National Highway Traffic Safety Administration**
400 Seventh Street, SW
Washington, DC 20590
(888) 327-4236
www.nhtsa.gov

**No Dog Bites**
2100 L Street, NW
Washington, DC 20037
(202) 452-1100
www.hsus.org/pets/pet_care/dog_care/stay_dog_bite_free/index.html

**Safe Kids Worldwide**
1301 Pennsylvania Avenue NW, Suite 1000

Washington, DC 20004-1707
(202) 662-0600
www.safekids.org
**Safe Routes to School**
730 Martin Luther King, Jr. Blvd, Suite 300
Campus Box 3430
Chapel Hill, NC 27599-3430
(919) 962-7419
www.walktoschool-usa.org
**SafeUSA**
624 North Broadway
Baltimore, MD 21205
(410) 955-2397
www.safeusa.org
**Stay Alive From Education (SAFE)**
71 Jean Lafitte Drive
Key Largo, FL 33037
(305) 852-2651
www.safeprogram.com
**Think First**
26 South La Grange Road, Suite 103
La Grange, IL 60525
(800) 844-6556
www.thinkfirst.org
**U.S. Consumer Product Safety Commission**
4330 East West Highway
Bethesda, MD 20814
(800) 638-2772
www.cpsc.gov
**Water Awareness in Residential Neighborhoods**
5351 East Thompson, #138
Indianapolis, IN 46237
(317) 536-1874
www.warnonline.org

# Chapter Quiz

**1.** Unintentional injuries are the leading cause of death for what age group(s) in the United States?

_____

**2.** True or False: Most injuries have predictable and preventable components.

**3.** List five reasons why EMS providers should be involved in injury prevention.

_____
_____
_____
_____
_____

**4.** Why are data imperative for injury prevention efforts? Who looks at the data?

_____
_____
_____

**5.** Give an example of a teachable moment unique to the paramedic profession.

_____
_____
_____

**6.** The five *E*'s of injury prevention are:

_____
_____
_____
_____
_____

**7.** Give an example of a grassroots community group and what role it might play in a community prevention effort.

_____
_____
_____

Questions 8 to 18 describe different situations that result in injuries to children. A list of injury prevention strategies is provided. Next to each question, write the letter(s) of the strategy(ies) that could prevent the injury from occurring or reduce the severity of the injury. Each question may have more than one answer.

## Injury Prevention Strategies

**A.** Mandatory flame-retardant sleepwear for children
**B.** Separate bike trails and road traffic with cement medians
**C.** A low-cost child car seat program for newborns and toddlers
**D.** Media campaign to promote safe storage of firearms
**E.** Enforcement of bicycle helmet law for riders younger than 14 years
**F.** Required fencing around private pools
**G.** Required window railings on upper-story windows
**H.** Stop! Drop! Roll! School education programs
**I.** Firearm and hunter safety program
**J.** Required safety helmets during youth equestrian events
**K.** Education and public awareness campaign about childhood pedestrian safety

**8.** _____ A 13-year-old unhelmeted bicycle passenger is killed in a crash.

**9.** _____ A child on a bike falls from a curb into traffic.

**10.** _____ A 7-year-old boy darts out from parked cars onto a busy street and is hit by a moving car.

**11.** _____ An unsupervised toddler falls from a second-story apartment window.

**12.** _____ A 7-year-old boy plays with his dad's loaded, unsecured gun and shoots a friend.

**13.** _____ A 2-year-old is unrestrained and killed in a motor vehicle crash.

**14.** _____ An unsupervised 2-year-old drowns in a neighbor's backyard pool.

**15.** _____ A newborn is ejected from a vehicle during an accident and dies.

**16.** _____ A 10-year-old is cooking breakfast and her pajamas catch on fire.

**17.** _____ A 12-year-old sustains a head injury from a fall while riding a horse.

**18.** _____ An 8-year-old shoots a pellet gun at his younger brother, causing an eye injury.

## Terminology

**Chronology** The arrangement of events in time.
**Epidemiology** The study of the causes, patterns, prevalence, and control of disease in groups of people.
**Epidemiologist** Medical professional who studies the causes, distribution, and control of disease in populations.
**Injury** Intentional or unintentional damage to a person that resulted from acute exposure to thermal, mechanical, electrical, or chemical energy or from the absence of such essentials as heat or oxygen.
**Injury risk** A real or potential hazardous situation that puts individuals at risk for sustaining an injury.
**Injury surveillance** An ongoing systematic collection, analysis, and interpretation of injury data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of the data to those who need to know.
**Intentional injury** Injuries and deaths self-inflicted or perpetrated by another person, usually involving some type of violence.
**Morbidity** Nonfatal injury rates.
**Mortality** Death rate.
**Primary injury prevention** Keeping an injury from occurring.
**Secondary injury prevention** Preventing further injury from an event that has already occurred.
**Teachable moment** The time just after an injury has occurred when the patient and observers remain acutely aware of what has happened and may be more receptive to learning how the event or illness could have been prevented.
**Unintentional injury** Injuries and deaths not self-inflicted or perpetrated by another person (accidents).
**Years of potential life lost (YPLL)** A method that assumes that, on average, most people will live a productive life until the age of 65 years.