

ESTABLISHING AN INJURY SURVEILLANCE SYSTEM

Objectives

By the end of this case study, the student should be able to:

1. List potential sources for surveillance data and recognize the strengths and weaknesses of these sources.
2. List the characteristics of problems/events for which surveillance would be useful and appropriate.
3. Calculate years of potential life lost.
4. Describe the decisions and trade-offs which need to be made in establishing a surveillance system.
5. Define sensitivity and specificity in the context of a surveillance case definition.

Part I

A recent EIS graduate was named as the new Director of the State X Division of Maternal and Child Health. One of her first tasks was to develop priorities for the Division and a strategy to address those priorities. She asks you to assist in developing a proposal for a childhood injury prevention program in the State. Your first task is to describe the magnitude of the problem of childhood injuries.

QUESTION 1a: What existing sources of information about childhood injuries might be helpful in describing and assessing the problem of childhood injuries?

QUESTION 1b: What criteria would you use in evaluating sources of health data? Evaluate the sources you listed according to these criteria.

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The only data readily available at the Health Department are age- and cause-specific injury mortality data published by the State Vital Registrar's office. An examination of these data for the past 10 years demonstrated the following:

Table 1
Mortality from Childhood Injuries (up to age 19 yrs),
State X, 1977-1987

<u>External Injury</u>	<u>Rate per 10,000 child-yrs</u> (Age 0-19 yrs)	<u>Percentage of total injury deaths within age group</u>		
		(0-5 yr)	(6-12 yr)	(13-19 yr)
Burns	0.21	18.8	13.8	3.2
Drowning	0.31	16.3	18.1	8.9
Falls	0.10	11.2	3.4	1.5
Motor-vehicle occupant	1.06	9.2	11.6	60.8
Motor-vehicle pedestrian or cyclist	0.43	18.7	34.5	11.6
Poisoning	0.08	2.2	0.5	4.0
Suffocation	0.14	17.1	6.0	1.6
All other	0.22	6.5	12.1	8.5

QUESTION 2a: Based on the mortality data, which type of injury would you choose as a target for your prevention program?

QUESTION 2b: What factors in addition to mortality should you consider in deciding which type of injuries should serve as the focus for a prevention program?

A search for other data sources in State X reveals that the smaller of the two poison control centers in the State maintains some basic statistics on victims of childhood poisonings and that a few of the large hospitals have computerized discharge records. Additionally, some information on motor vehicle occupant injuries is available for the State from the National Highway Traffic Safety Administration. It becomes apparent that the currently available data would be inadequate for establishing and monitoring a prevention program. You suggest that the State establish a system of ongoing childhood injury surveillance.

QUESTION 3a: What would be some of the potential uses of the surveillance data that could be used to justify the establishment of a new surveillance system?

Considering the difficulty in establishing a new surveillance system, the MCH Director wonders whether it might be better to perform a baseline survey followed by a second survey after the intervention program had been in place for a couple of years.

QUESTION 3b: Discuss the advantages and disadvantages of using surveys versus surveillance to collect the needed data.

After additional discussions, the MCH Director was finally convinced that a surveillance system would be useful to monitor temporal trends of childhood injury and determine the characteristics of those at risk for being injured so that interventions could be more effectively targeted. However, the State Health Department has limited funds. To justify funding of the surveillance system, the MCH Director asks you to put the injury problem in a public health perspective. She suggests you calculate years of potential life lost for some of the leading causes of death. The following 1987 U.S. mortality data are available from the National Center for Health Statistics:

Table 2
Selected Causes of Death by Age Group, United States, 1987

Age (in years)	Heart Dis (390-429 x401,403)	Cancer (140-208)	Cerebrovasc (430-438)	Injuries (E800-E949)	Suicide (E950-E959)	Homicide (E960-E978)	HIV Infection (*042-*044)
0-4	1,272	649	181	3,871	0	607	191
5-14	324	1,138	73	4,198	251	407	47
15-24	1,062	1,939	244	18,695	4,924	5,354	492
25-34	3,652	5,371	967	16,622	6,655	6,546	5,026
35-44	12,222	14,934	2,410	10,862	5,132	3,722	4,794
45-54	32,708	38,240	4,672	6,982	3,707	1,803	1,838
55-64	90,017	98,424	11,488	7,825	3,650	1,204	761
65-74	178,072	149,046	27,767	8,686	3,428	763	230
75-84	238,101	120,765	52,330	9,929	2,402	449	73
85+	202,816	46,388	49,687	7,223	634	147	13
Unknown	107	33	16	127	13	101	3
Total	760,353	476,927	149,835	95,020	30,796	21,103	13,468

QUESTION 4a: Which causes account for the greatest number of deaths among those under age 25? Which causes of death account for the greatest number of deaths among those under age 65?

QUESTION 4b: Calculate and compare years of potential life lost (to age 65) for each cause of death in Table 2.

Your efforts have resulted in a tentative allocation of funds for childhood injury surveillance. After considering several possible sources of surveillance data, you decide that hospitals and emergency rooms should be the primary sites for data collection because the yield would be highest from these sites.

An expert panel is convened to discuss further details of the surveillance system. At the first meeting, the issue is raised of whether the surveillance should be active or passive. The MCH Director had initially envisioned a passive surveillance system in which the physicians who examine patients with injuries would fill out a brief reporting form on each patient seen; the forms would be mailed to the health department using an attached stamped envelope. The representative of the local chapter of the American Academy of Pediatrics suggests that such a reporting system may not work since the physicians who would be seeing the patients are too busy to fill out yet another form. He wonders if it would be possible to have someone from the health department call or come by each of the hospitals and emergency rooms every week and abstract data from the emergency room log or the patient charts.

QUESTION 5: Discuss the relative merits of a "passive" system (where the reporting persons initiate reports on their own), as compared to an "active" system (where public health employees contact them to request reports) to collect data from these sources.

The MCH Director states at that point that she does not know exactly the level of funding that would be available for injury surveillance, but she feels that it would probably be inadequate to hire enough staff to visit all the hospitals and emergency rooms in the State on a periodic basis. The MCH Director from the adjacent State, which has a childhood injury surveillance system in place, suggests using a sample of hospitals and emergency rooms for active surveillance.

QUESTION 6: What are the advantages and disadvantages of including all hospitals and emergency rooms in your surveillance system as compared to a sample of them? If you do not use all the hospital and emergency rooms, how might you select your sample?

After further researching the situation, the MCH Director decides to set up an active surveillance system covering residents of 14 counties, chosen because they represent a cross section of urban centers, suburbs, and small rural towns. The 23 hospitals to be recruited into the system account for 93% of the pediatric discharges in these counties. The system covers a population of 87,000 children and adolescents. The surveillance system is based on abstraction of all injury-related hospital discharge records and a systematic 25% sample of emergency room visit records from the participating hospitals. The abstraction is to be performed by two specially trained data collectors.

At the second meeting of the expert committee, the proposed design of the system is reviewed and the case definitions to be used in the surveillance system are discussed. There is considerable debate about how a case should be defined. When the issue of spinal injuries was discussed, for example, the director of pediatric emergency services at the large public hospital suggests the following definition: "A person with acute traumatic injury to the spinal canal with evidence on physical exam of motor dysfunction, sensory loss, and/or bladder dysfunction."

The professor of pediatrics at a local medical school, noted for his research in management and rehabilitation of childhood trauma, then suggests the following: "A person with acute traumatic injury to the spinal canal with neural dysfunction confirmed by a neurologist and documented by an abnormal electromyelogram."

Finally, the MCH Director from the adjoining state reports that the case definition they use is: "A person having spinal injury as a discharge diagnosis or cause of death."

QUESTION 7a: Which of these definitions is the most sensitive?

QUESTION 7b: Which of these definitions is the most specific?

QUESTION 7c: What components are missing from each of these case definitions?

QUESTION 7d: What would you use as your case definition?

Ultimately, cases are defined as children and adolescents (ages 0-19 yrs), living in one of 14 counties, who have any nonintentional injury (excluding animal and insect bites, sunburn, food poisoning, and contact dermatitis not caused by a drug or product) diagnosed after September 1 of the current year. Injuries to residents of other communities using the same hospitals are not included.

QUESTION 8: What information would you like to collect on a questionnaire/ abstraction form for each case, keeping in mind that the form must be kept brief?

The MCH Director presents the plans for the surveillance system to the State Health Officer, who is enthusiastic. He asks her, however, how the information she was collecting would be disseminated.

QUESTION 9: Who needs to know the findings of the childhood injury surveillance system? How might you disseminate this information?

EPILOGUE

It is now two years later and the surveillance system has proved highly useful both to describe the epidemiology of unintentional childhood injuries and to assess the effectiveness of the interventions developed as part of the State Childhood Injury Prevention Program. The interventions started in 9 counties after one year of data collection, with the remaining 5 counties serving as control counties. After two years, the surveillance system has three components: a review of death certificates, the emergency room and hospital surveillance system in the 14 counties, and periodic random digit dialing telephone survey conducted before and after the interventions to ascertain the frequency of less severe injuries.

The following data were obtained from the emergency room and hospital system:

Table 3
Morbidity from Childhood Injuries (up to age 19 yrs),
State X, 1988-1989

<u>External Injury</u>	Rate per <u>10,000 child-yrs</u> (Ages 0-19 yrs)	Percentage of total injuries <u>within age group</u>		
		(0-5 yr)	(6-12 yr)	(13-19 yr)
Falls	548	45.8	27.9	13.3
Sports	402	0.8	16.9	25.9
Struck by object	370	15.8	19.4	15.0
Cutting, piercing	300	8.8	13.6	15.2
Other	147	7.1	6.4	6.5
Motor-vehicle occupant	98	1.9	1.8	7.1
Overexertion	88	3.0	2.4	5.3
Bicycle	73	1.8	6.1	2.0
Foreign body	53	4.1	1.4	2.3
Burns	50	4.6	1.0	2.0
Poisoning	33	3.6	0.3	1.3
Other transport	32	1.2	0.8	1.9
Pedestrian	16	0.5	1.0	0.6
Motor-vehicle hitting bicycle	14	0.1	0.6	0.8
Choking	5	0.8	0.0	0.1
Explosives, arms	4	0.0	0.2	0.3
Motorcycle	4	0.0	0.0	0.4
Electricity	1	0.1	0.0	0.0
Drowning	1	0.0	0.0	0.0

QUESTION 10: Do these data alter your view of these injuries compared with the mortality data in Table 1?

Although the State Health Officer was highly impressed with the program and the surveillance system, the State Health Department suffered a 19% budget cut, and he was forced to cut the funding for the childhood injury prevention program drastically.

QUESTION 11: How might you continue to monitor trends and evaluate the efficacy of your prevention efforts on a substantially reduced budget? What considerations should be taken into account in deciding which components might be maintained?

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