Establishing an Injury Surveillance System

Student's Guide

Learning Objectives

After completing this case study, the participant should be able to:

- List potential sources for surveillance data and recognize the strengths and weaknesses of these sources;
- List the characteristics of problems/events for which surveillance would be useful and appropriate;
- Calculate years of potential life lost;
- Define an active versus a passive surveillance system and the relative merits of each system;
- Describe the decisions and trade-offs which need to be made in establishing a surveillance system;
- Define sensitivity and specificity in the context of a surveillance case definition.

This case study is partly fictional and partly based on the Massachusetts Statewide Injury Prevention Program. The case study was originally written in 1986 by Douglas Klaucke, Jose Rodriguez, and Helene Gayle, and rewritten in 1990 by Richard Dicker. Revisions were completed by Richard Dicker with input from Mel Kohn and the EIS Summer Course instructors. The current version was revised by John Horan and Shunling Tsang with input from Lee Annest.
PART I

In 2003 the leadership of State Health Department X decided that injury prevention and control should become a priority for the department. The Director of the State Division of Family Health in the health department thus asked her staff to assist in developing a proposal for a childhood injury prevention program in the State. They agreed that their first task should be to describe the magnitude of the problem of childhood injuries.

**Question 1:** What existing sources of information might be helpful in describing and assessing the problem of childhood injuries?

**Answer 1:**
Question 2: What criteria might you use to evaluate these sources of health data in order to get a snapshot of the magnitude of childhood injuries in the State?

Answer 2: Readily available data were obtained from the National Center for Injury Prevention and Control - using their WISQARS (Web-based Injury Statistics Query and Reporting System) interactive database. The WISQARS database provided a fatal injury report for State X, as shown below:

| Table 1. Mortality Rates (per 100,000) from Childhood Injuries (age #19 years), State X, 2000 |
|-----------------------------------------------|-----------------------------------------------|
| External Injuries | Rate per 100,000 pop. #19 yrs | Percentage of total injury deaths within age group |
|                  | (1-4) | (5-9) | (10-14) | (15-19) |
| Homicide         | 1.17  | 16.7  | 10.0    | 7.1    | 5.3    | 12.0    |
| Suicide          | 1.42  | 0.0   | 0.0     | 0.0    | 15.8   | 17.2    |
| Unintentional Drowning | 0.74  | 16.7  | 25.0    | 21.5   | 5.3    | 1.7     |
| Unintentional Falls | 0.12  | 0.0   | 5.0     | 0.0    | 5.3    | 0.0     |
| Unintentional Fire/Burn | 0.49  | 0.0   | 20.0    | 14.3   | 10.5   | 0.0     |
| Unintentional MV Traffic | 4.75  | 0.0   | 20.0    | 42.9   | 31.5   | 52.6    |
| Unintentional Suffocation | 0.49  | 50    | 15      | 0.0    | 10.5   | 0.0     |
| Undetermined Poisoning | 0.62  | 0.0   | 0.0     | 0.0    | 0.0    | 8.6     |
| All others       | 0.99  | 16.6  | 5.0     | 14.2   | 15.8   | 7.9     |
| All injuries     | 10.79 | 100.0%| 100.0%  | 100.0% | 100.0% | 100.0%  |

The staff recognized that mortality data alone were insufficient to characterize childhood injuries in the state, and to choose appropriate types of injuries on which to focus prevention programs.
**Question 3:** What factors in addition to mortality should you consider in deciding on which type of injury or injuries to focus the prevention program?

**Answer 3:**

A search for other data sources in the State revealed that the smaller of the two poison control centers in the State maintained some basic statistics on victims of childhood poisonings and that a few of the large hospitals had computerized discharge records. Additionally, some State information on motor vehicle occupant injuries was available from the National Highway Traffic Safety Administration. The staff decided that the currently available data would be inadequate for establishing and monitoring a prevention program, and they recommended that the State establish a system of ongoing childhood injury surveillance.

**Question 4:** What is public health surveillance?

**Answer 4:**
Question 5: 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?

Answer 5:

Considering the difficulty in establishing a new surveillance system, the Division Director wondered 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 6: Discuss the advantages and disadvantages of using surveys versus surveillance to collect the needed data.

Answer 6:
After additional discussions, the Division 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 Division Director asked that the staff put the injury problem in a public health perspective. She suggested that the staff calculate years of potential life lost for some of the leading causes of death. Table 2 shows the number of deaths for selected causes in the U.S. in 2000. Table 3 shows the rankings by cause of death for different age groups.

### Table 2. Selected Causes of Death by Age Group, United States, 2000

<table>
<thead>
<tr>
<th>Age group</th>
<th>Heart Disease</th>
<th>Malignant Neoplasms</th>
<th>Cerebrovascular</th>
<th>Unintentional Injuries</th>
<th>Diabetes Mellitus</th>
<th>Suicide</th>
<th>Homicide</th>
<th>HIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>674</td>
<td>512</td>
<td>171</td>
<td>2,707</td>
<td>10</td>
<td>0</td>
<td>705</td>
<td>24</td>
</tr>
<tr>
<td>5-14</td>
<td>271</td>
<td>1,014</td>
<td>76</td>
<td>2,979</td>
<td>26</td>
<td>307</td>
<td>371</td>
<td>46</td>
</tr>
<tr>
<td>15-24</td>
<td>1,031</td>
<td>1,713</td>
<td>199</td>
<td>14,113</td>
<td>162</td>
<td>3994</td>
<td>4939</td>
<td>179</td>
</tr>
<tr>
<td>25-34</td>
<td>2,958</td>
<td>3,916</td>
<td>602</td>
<td>11,769</td>
<td>623</td>
<td>4792</td>
<td>4164</td>
<td>2437</td>
</tr>
<tr>
<td>35-44</td>
<td>13,181</td>
<td>16,520</td>
<td>2,599</td>
<td>15,413</td>
<td>1926</td>
<td>6562</td>
<td>3219</td>
<td>5919</td>
</tr>
<tr>
<td>45-54</td>
<td>35,480</td>
<td>48,034</td>
<td>6,011</td>
<td>12,278</td>
<td>4954</td>
<td>5437</td>
<td>1755</td>
<td>4142</td>
</tr>
<tr>
<td>55-64</td>
<td>63,399</td>
<td>89,005</td>
<td>9,956</td>
<td>7,505</td>
<td>9186</td>
<td>2945</td>
<td>738</td>
<td>1239</td>
</tr>
<tr>
<td>65-74</td>
<td>122,405</td>
<td>150,131</td>
<td>23,649</td>
<td>7,698</td>
<td>16,674</td>
<td>2292</td>
<td>443</td>
<td>397</td>
</tr>
<tr>
<td>75-84</td>
<td>220,060</td>
<td>165,099</td>
<td>57,020</td>
<td>11,758</td>
<td>22,184</td>
<td>2181</td>
<td>301</td>
<td>85</td>
</tr>
<tr>
<td>85+</td>
<td>251,242</td>
<td>77,136</td>
<td>67,376</td>
<td>11,595</td>
<td>13,556</td>
<td>833</td>
<td>100</td>
<td>9</td>
</tr>
<tr>
<td>Unknown</td>
<td>59</td>
<td>11</td>
<td>2</td>
<td>85</td>
<td>0</td>
<td>7</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>710,760</td>
<td>553,091</td>
<td>167,661</td>
<td>97900</td>
<td>69,301</td>
<td>29,350</td>
<td>16,765</td>
<td>14,478</td>
</tr>
</tbody>
</table>
### Table 3. Rankings of Selected Causes of Death by Age Group, United States, 2000

<table>
<thead>
<tr>
<th></th>
<th>Deaths &lt;25 yrs</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number Rank</td>
<td>Number Rank</td>
<td>Number Rank</td>
<td></td>
</tr>
<tr>
<td>Heart disease</td>
<td>1,976 5</td>
<td>116,994 2</td>
<td>710,760 1</td>
<td></td>
</tr>
<tr>
<td>Malignant Neoplasms</td>
<td>3,239 4</td>
<td>160,714 1</td>
<td>533,091 2</td>
<td></td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>446 6</td>
<td>19,614 5</td>
<td>167,661 3</td>
<td></td>
</tr>
<tr>
<td>Unintentional Injuries</td>
<td>19,799 1</td>
<td>66,764 3</td>
<td>97,900 4</td>
<td></td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>198 8</td>
<td>16,887 6</td>
<td>69,301 5</td>
<td></td>
</tr>
<tr>
<td>Suicide</td>
<td>4,301 3</td>
<td>24,037 4</td>
<td>29,350 6</td>
<td></td>
</tr>
<tr>
<td>Homicide</td>
<td>6,015 2</td>
<td>15,891 7</td>
<td>16,765 7</td>
<td></td>
</tr>
<tr>
<td>HIV</td>
<td>249 7</td>
<td>13,986 8</td>
<td>14,478 8</td>
<td></td>
</tr>
</tbody>
</table>

**Years of Potential Life Lost** (YPLL) is a measure of the impact of premature mortality on a population. Because of the way in which YPLL is calculated, this measure gives more weight to a death the earlier it occurs.

YPLL before age 65 (YPLL<sub>65</sub>) is derived by multiplying the annual number of deaths in each age category up to 65 years by the difference between 65 years and the age at the midpoint of each category. An YPLL rate may be calculated by dividing YPLL<sub>65</sub> by the midyear population age < 65 years.

The steps in calculating YPLL<sub>65</sub> areas follows:

1. Determine the midpoint of each age group below age 65. (Do not include age groups for 65 and over.)
2. Subtract the midpoint from 65 to get the number of years to 65.
3. Multiply the years to 65 times the number of deaths in that age group to get the age-specific YPLL.
4. Add up the age-specific YPLLs.

**EXAMPLE:**
Calculate YPLL<sub>65</sub> for the heart disease data in Table 2.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Midpoint</th>
<th>Midpoint minus 65</th>
<th>Heart Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ! 4</td>
<td>2.5</td>
<td>62.5</td>
<td>42,125</td>
</tr>
<tr>
<td>5 ! 14</td>
<td>10</td>
<td>55</td>
<td>14,905</td>
</tr>
<tr>
<td>15 ! 24</td>
<td>20</td>
<td>45</td>
<td>46,395</td>
</tr>
<tr>
<td>25 ! 34</td>
<td>30</td>
<td>35</td>
<td>103,530</td>
</tr>
<tr>
<td>35 ! 44</td>
<td>40</td>
<td>25</td>
<td>329,525</td>
</tr>
<tr>
<td>45 ! 54</td>
<td>50</td>
<td>15</td>
<td>532,200</td>
</tr>
<tr>
<td>55 ! 64</td>
<td>60</td>
<td>5</td>
<td>316,995</td>
</tr>
<tr>
<td>65 ! 74</td>
<td>na</td>
<td>na</td>
<td>0</td>
</tr>
<tr>
<td>75 ! 84</td>
<td>na</td>
<td>na</td>
<td>0</td>
</tr>
<tr>
<td>85+</td>
<td>na</td>
<td>na</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>na</td>
<td>na</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1,385,675</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that the midpoint of the first interval is 2.5, since the true limits of the interval are from 0 to 4.999... years.
**Question 7:** Calculate years of potential life lost before age 65 for each cause of death in Table 2.

**Answer 7:**

---

**Question 8:** How do the YPLL\(_{65}\) rankings compare with the rankings based on number of deaths among persons age < 65 years? What does this indicate about the average age at which injury deaths occur in comparison with cancer and heart disease deaths?

**Answer 8:**

The Division Director convened a steering committee to help develop the surveillance system. At the first meeting, the steering committee considered several potential sources of surveillance data, and concluded that hospitals and emergency rooms should be the primary sites for data collection because they would provide the highest yield of serious childhood injuries. They also were asked to discuss whether the surveillance should be active or passive.

The health department staff had 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 suggested that such a reporting system might not work since the physicians who would be seeing the patients would be too busy to fill out yet another form. He wondered 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 9:** Define an “active” versus a “passive” surveillance system.

**Answer 9:**

**Question 9a:** Discuss the relative merits of a “passive” system versus an “active” system to collect data from these sources.

**Answer 9a:**

The Division Director stated that she did not know exactly the level of funding that would be available for injury surveillance, but she felt 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. A member of the Steering Committee, the Director of Maternal and Child Health (MCH) from a neighboring state with a childhood injury surveillance system in place, suggested using a sample of hospitals and emergency rooms for active surveillance.
**Question 10:** If you do not use all the hospitals and emergency rooms, how might you select your sample?

**Answer 10:**

After further researching the situation, the Division Director agreed to set up an active surveillance system covering residents of 14 communities, chosen because they represented a cross section of urban centers, suburbs, and small rural towns. These communities include 23 hospitals and a population of 87,000 children and adolescents. The 23 hospitals to be recruited into the system accounted for 93% of the pediatric discharges in these communities. The surveillance system would be 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 would be performed by two specially trained data collectors.

At the second meeting of the Steering Committee, the proposed design of the system was reviewed and the case definitions to be used in the surveillance system were discussed.

The Steering Committee members vigorously debated how to define a case. For example, when the issue of spinal injuries was discussed, the director of pediatric emergency services at the large public hospital suggested 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 suggested 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 neighboring state reported their case definition as: "A person having spinal injury as a discharge diagnosis or cause of death."
Question 11: What are the advantages and disadvantages of including all hospitals and emergency rooms in your surveillance system as compared to a sample of them?

Answer 11:

Question 11a: Which of these definitions is the most sensitive?

Answer 11a:

Question 11b: Which of these definitions is the most specific?

Answer 11b:

Question 12: What components are missing from the case definition?

Answer 12:
PART II

Ultimately, the steering committee agreed to define a case as:

- **Person:** any child or adolescent (ages 0-19 years),

- **Place:** with home address in one of the 14 communities,

- **Diagnosis:** with any unintentional injury coded on the chart (excluding insect bite, sunburn, food poisoning, or contact dermatitis not caused by a drug or product),

- **Time:** diagnosed after September 1 of the current year.

**Question 13:** What information would you collect on a questionnaire or data abstraction form for each case? Keep in mind that the form must be kept brief and that the data must come from a hospital or emergency room chart.

**Answer 13:**
The Division Director presented the plans for the surveillance system to the State Health Commissioner, who responded enthusiastically. The Commissioner asked her, however, how the information she was collecting would be disseminated, and to whom.

**Question 14:** Who needs to know the findings of the childhood injury surveillance system? How might you disseminate this information?

**Answer 14:**
Two years later, the surveillance system had proven highly useful both for describing the epidemiology of unintentional childhood injuries and for assessing the effectiveness of the interventions developed as part of the State Childhood Injury Prevention Program.

The interventions started in 9 communities after one year of data collection, with the remaining 5 communities serving as control communities. Data in Table 3 were obtained from the injury-related hospital discharge database in State X.

### Table 4. Morbidity from Childhood Injuries (ages 0-19 yrs), State X, 2001

<table>
<thead>
<tr>
<th>Type of Injury</th>
<th>Rate per 100,000 child-yrs (Ages 0-19 yrs)</th>
<th>Percentage of total injuries within each age group (&lt;1yr)</th>
<th>(0-4 yrs)</th>
<th>(5-9 yrs)</th>
<th>(10-14 yrs)</th>
<th>(15-19 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>72.7</td>
<td>38.7</td>
<td>39.7</td>
<td>38.5</td>
<td>32.5</td>
<td>12.4</td>
</tr>
<tr>
<td>Poisoning</td>
<td>51.0</td>
<td>5.1</td>
<td>16.3</td>
<td>2.5</td>
<td>12.2</td>
<td>26.3</td>
</tr>
<tr>
<td>Motor-vehicle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>traffic-related occupant</td>
<td>30.4</td>
<td>0.8</td>
<td>1.1</td>
<td>5.4</td>
<td>4.2</td>
<td>18.5</td>
</tr>
<tr>
<td>Struck by, against</td>
<td>26.0</td>
<td>2.4</td>
<td>4.6</td>
<td>7.5</td>
<td>12.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Motor-vehicle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>traffic-related other</td>
<td>17.4</td>
<td>0.0</td>
<td>3.4</td>
<td>10.4</td>
<td>6.4</td>
<td>5.2</td>
</tr>
<tr>
<td>Cut/Pierce</td>
<td>17.1</td>
<td>3.2</td>
<td>2.6</td>
<td>4.4</td>
<td>4.8</td>
<td>8.0</td>
</tr>
<tr>
<td>Other specified &amp; classifiable</td>
<td>16.1</td>
<td>15.0</td>
<td>10.5</td>
<td>7.2</td>
<td>4.5</td>
<td>3.2</td>
</tr>
<tr>
<td>Natural/environmental</td>
<td>9.6</td>
<td>2.8</td>
<td>7.8</td>
<td>5.4</td>
<td>3.5</td>
<td>1.4</td>
</tr>
<tr>
<td>Unspecified</td>
<td>9.6</td>
<td>17.4</td>
<td>2.8</td>
<td>2.2</td>
<td>2.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Pedal cyclist, other</td>
<td>8.5</td>
<td>0.0</td>
<td>0.8</td>
<td>6.8</td>
<td>5.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Other specified, not classifiable</td>
<td>6.3</td>
<td>6.7</td>
<td>1.5</td>
<td>1.9</td>
<td>2.2</td>
<td>1.9</td>
</tr>
<tr>
<td>Other transport</td>
<td>6.2</td>
<td>0.0</td>
<td>0.5</td>
<td>2.1</td>
<td>3.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Overexertion</td>
<td>5.7</td>
<td>0.8</td>
<td>0.8</td>
<td>1.2</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>Fire/burn</td>
<td>3.8</td>
<td>2.8</td>
<td>2.9</td>
<td>2.1</td>
<td>1.0</td>
<td>0.6</td>
</tr>
<tr>
<td>Firearms</td>
<td>3.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.4</td>
<td>2.2</td>
</tr>
<tr>
<td>Suffocation/hanging</td>
<td>2.7</td>
<td>4.0</td>
<td>2.6</td>
<td>0.9</td>
<td>0.7</td>
<td>0.3</td>
</tr>
<tr>
<td>Drowning/submersion</td>
<td>1.5</td>
<td>0.4</td>
<td>0.4</td>
<td>1.1</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Machinery</td>
<td>1.1</td>
<td>0.0</td>
<td>0.2</td>
<td>0.0</td>
<td>0.3</td>
<td>0.6</td>
</tr>
<tr>
<td>Pedestrian, other</td>
<td>1.1</td>
<td>0.0</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
<td>0.2</td>
</tr>
<tr>
<td>Total:</td>
<td>290.1</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Question 15**: Compared with the mortality data in Table 1, do the morbidity data in Table 4 alter your view of the injuries under surveillance?

**Answer 15**: 
After two years, the surveillance system had three components: a review of death certificates, the emergency room and hospital surveillance system in the 14 communities, and periodic random digit dialing telephone survey conducted before and after the interventions to ascertain the frequency of less severe injuries.

Although the State Health Commissioner 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 16:** How might you continue to monitor trends and evaluate the effectiveness of your prevention efforts on a substantially reduced budget? What considerations should be taken into account in deciding which components might be maintained?

**Answer 16:**
REFERENCES


A GUIDE FOR ESTABLISHING PUBLIC HEALTH PRIORITIES

Establishing priorities from the multitude of public health problems facing communities today is a necessary and increasingly difficult task. Public health administrators and managers often are faced with an increasing range of pressing problems in light of decreasing resources. A method to establish priorities which is fair, reasonable, and easy to calculate is a necessary management tool.

The method described here provides means to compare different health problems in a relative, not absolute, framework, as equally as possible, and in a somewhat objective manner.

This method, which has been called both the Hanlon method and the Basic Priority Rating System (BPRS), is described in *Public Health Administration and Practice*, Hanlon and Pickett, Times Mirror/Mosby College Publishing and *Basic Health Planning Methods*, Spiegel and Hyman, Aspen Systems Corp.

The method has three major objectives:

- To allow decision-makers to identify explicit factors to be considered in setting priorities.
- To organize the factors into groups that are weighted relative to each other.
- To allow the factors to be modified as needed and scored individually.

**Basic Priority Rating Formula**

Based on review of repeated trials conducted in identifying priority health problems, a consistent pattern of criteria became apparent. This pattern is reflected in the components of this system.

Component A = Size of the problem.
Component B = Seriousness of the problem.
Component C = Estimated effectiveness of the solution.
Component D = PEARL factors

P = propriety
E = economic feasibility
A = acceptability
R = resource availability
L = legality

These components translate into two formulas that will provide a numerical score that gives highest priority to those diseases/conditions with highest scores.

Basic Priority Rating (BPR) = \( \frac{(A+B) \times C}{3} \)

Overall Priority Rating (OPR) = \( \frac{(A+B) \times C}{3} \times D \)

The difference in the two formulas will become apparent as the component D (PEARL) is described.

It is important to recognize that, as with many such processes, a substantial amount of subjectivity will be present. The choice, definition, and relative weights assigned to the components are a group decision and flexible. Further, the ratings are the judgments of the individual raters. However, some scientific control can be achieved by using precise definition of terms, using exact rating procedures, and using appropriate and accurate statistical data.
COMPONENTS

Component A - Size of the problem

This component is one in which the factors are few in number. Choices usually are limited to a percentage of the population directly affected by the problem, i.e., incidence, prevalence, or mortality rates and numbers.

Size can be determined in more than one way. Both the entire population and potential target populations can be considered. Also, diseases with common risk factors that are amenable to a common solution might be included together. For example, if tobacco-related cancers were being considered, lung, esophagus, and oral cancers might all be included. Depending on the analysis, cardiovascular diseases and other tobacco-related conditions might be included as well.

The maximum value of this component is 10. The decision of how to define size is usually by group consensus.

Component B - Seriousness

The group should consider possible factors which define the seriousness of the problem. However, the number of factors should be kept reasonable. The group should be careful not to bring the issue of size or preventability into the discussion, as they fit elsewhere into the equation.

The maximum score in this component is 20. The factors must be carefully defined and weighted. By using this number (20), seriousness is given twice as much weight as size.

Factors that could be used are:

- Urgency - emergent nature of the problem; trends in incidence, mortality, or risk factors; importance to the public; current access to needed services.

- Severity - survival rates, average age at death, disability; relative premature mortality.

- Economic loss - to the community (city, county, or State), to the individual.

- Involvement of others - potential impact on populations (measles) or impact on family groups (child abuse, homicide).

Each of the factors must be weighted. The factors could be given equal weight or could be given any combination of weights that sum to 20. It is usually helpful to establish a minimum and maximum for each factor to maintain some perspective in the numerical rating, such as the following for a factor with a weight of 5:

- 0 = none
- 1 = some
- 3 = more
- 5 = most
Component C - Effectiveness of Intervention

This component should be considered as “How well can this problem be solved, if at all?” The factor is scored from 0 to 10. Any literature that documents how successful interventions have been should be brought to bear on this factor.

The effectiveness rating, based on known success rates from the literature, is multiplied by the percent of the target population expected to be reached.

Example: Smoking cessation

- Target population = 45,000 smokers
- % attempting to quit = 30%, or 0.30
- # attempting to quit = 45,000 x 0.30 = 13,500
- Effectiveness of smoking cessation classes = 32%, or 0.32
- Population reached x effectiveness = 0.30 x 0.32 = 0.096, or 0.1 or 1 per 100

Example: Childhood immunization

- Target population = 200,000 children
- Expected coverage (%) = 97%, or 0.97
- Effectiveness of vaccine = 94%, or 0.94
- Population reached x effectiveness = 0.97 x 0.94 = 0.91, or 91 per 100

An advantage in considering the target population and the number expected to be reached is getting a realistic feel for the resources needed and the expected ability to meet set objectives.
Component D - PEARL

The PEARL is a set of factors that, although not directly related to the health problem, nonetheless have a high degree of influence in determining whether a particular problem can be addressed.

P - Propriety Is the problem one that falls within the agency’s overall mission?
E - Economic feasibility Does it make economic sense to address the problem? Are there economic consequences if the problem is not addressed?
A - Acceptability Will the community and/or target population accept the problem being addressed?
R - Resources Are resources available to address the problem?
L - Legality Do current laws allow the problem to be addressed?

Each of these qualifying factors is considered, and the scoring for each factor of the PEARL is 1 if the answer is “yes” and 0 if the answer is “no.” When scoring is complete, all of the numbers are multiplied to obtain a final answer.

Since PEARL is a product rather than a sum, if any of the five factors is “no,” then D will equal 0 (otherwise D=1, in which case OPR=BPR, and PEARL factors have no impact on changing BPR rankings). Because D is the final multiplier in the formula, if D=0, then the health problem will not be addressed in the OPR regardless of how high the problem ranks in the BPR.

However, part of the total planning effort might include addressing the intermediate steps needed to address the PEARL positively in the future. For example, if the intervention is not acceptable to the population, steps might be taken gradually to educate the population as to the potential benefits of the intervention so that it can be considered in the future.

Examples of where the Hanlon Method otherwise know as the Basic Priority Rating System (BPRS) been used in public health practice:

- New York State Department of Health – Workshop on “Building on Community Health Assessments”, 2002
- Healthy Plan-it: Workshop in a box to teach priority setting and public health program planning. Developed by the Sustainable Management Development Program, Public Health Practice Program Office, Centers for Disease Control and Prevention.
Appendix A

Beyond Years of Productive Life Lost: (YPLL) Other measures of morbidity and mortality:

**QALYs: Quality-Adjusted Life Years:** The standard unit of measure in a cost-utility analysis that reflects the quality, or desirability, as well as the duration of survival. Quality of life is integrated with length of life using a multiplicative formula and discounting length of life by quality of life expected.\(^1\) QALYs can be used to assess how an individual, or the public, values a given health state. The measures are based on surveys of individuals, where individuals are asked to weigh a particular health state against perfect health and against death.\(^2\)

**DALYs: Disability-Adjusted Life Years:** A variant of QALYs used by the World Health Organization that measures the burden of disease, not only from premature mortality, but also from disability.\(^3\) It is a composite measure (sum) of time lost due to premature mortality (YPLL, with life expectancy of 82.5 years for females and 80 years for males), and time lived with a disability (YLD), adjusted for the severity of the disability. An expert panel weights the severity of disability using standardized methods: person trade-off, time trade-off, and standard gamble. (Individuals also use these methods in determining QALYs.) Also included in DALYs are years lived with a disability, age-weights (different values of life for each age), and discounted future years of life.

**Willingness to Pay:** A method of measuring the value an individual places on reducing risk of death and illness by estimating the maximum dollar amount an individual would pay in a given risk-reducing situation.\(^4\) Dollar amounts most often come from surveys of individuals (contingent valuation), but may also come from required compensation for risky jobs and from consumer market studies.


