**Activity F: Economic Analysis**

**Case Study: Hepatitis B Vaccination Program — Denver, CO, 1996–1997**

*Source*: Deuson, RR, Hoekstra, EJ, et al. Denver School-Based Adolescent Hepatitis B Vaccination Program: a cost analysis with risk simulation. American Journal Public Health 1999: 89:1722–27

**Context**

In 1996, the Colorado State Board of Health mandated that all students complete a 3-dose hepatitis B vaccination series before entering the 7th grade. Consequently, the Denver Public School (DPS) System offered a free, voluntary, school-based, hepatitis B vaccination program to students in the 6th grade during the 1996–97 school year.

This cost study compares the program costs of the vaccine delivery programs for the school-based system and for the network HMOs.

1. **Cost Analysis**
2. Identify need/issue/problem
3. Synthesize evidence, assess current local policy, and generate policy options (alternatives)

|  |  |
| --- | --- |
| Item | Content |
| Alternatives |  |
| Target population |  |
| Policy site |  |
| Study design |  |
| Time frame |  |
| Study perspective |  |

1. Develop a cost inventory & evaluate resource use

Cost inventory

|  |  |  |
| --- | --- | --- |
| Classification | School-based program | Network HMO |
| Direct cost |  |  |
| Indirect costs |  |  |
| Intangible costs |  |  |

Evaluate resource use

1. Cost for School-Based Program

* Vaccination Costs
* Education and Outreach Costs

* Program management Costs

1. Cost for PacifiCare HMO Vaccination Delivery Program

* Cost to the PacifiCare Network HMO

* Cost to the patient

1. Obtain data on effectiveness outcome
2. Analyze costs.

* Calculate average cost per dose and per completed series when both wife and husband worked full time. Include both start-up and on-going costs.

Cost-effectiveness ratios of the school-based hepatitis B vaccination program vs. PacifiCare — Denver, CO, September 1996–May 1997

|  |  |  |
| --- | --- | --- |
|  | School-based program | PacifiCare |
| Per dose |  |  |
| Per completed series |  |  |

* Conclusion:

1. **Cost-Benefit Analysis**

* Suppose we quantify long-term outcomes, benefit-cost over the life expectancy of the children in this population. We care only about 3,359 children who returned the consent form and also focus on benefit-cost of the complete 3-dose series of hepatitis B vaccine.
* We make the following assumptions:
* Vaccination produces protective levels of antibody in 95% of vaccines after 3 doses. So, 5% are still at risk even after the students complete the vaccine series.
* The incidence rate of chronic or acute liver disease is 5%.
* 1 dose or 2 doses not effective.
* Lifetime cost of chronic or acute liver disease $10,000/person.
* Quantify the benefits of the school-based program vs. doing nothing

1. School-based program: Number of students who completed the vaccine series but might develop liver disease = the number of students at risk×incidence rate =
2. Doing nothing: Number of students who return the consent form×incidence rate =
3. Calculate benefits (= costs of liver disease averted)
   1. Calculate costs of illness for the school-based program:
   2. Calculate costs of illness for the doing nothing option:
   3. (ii) – (i) =

* Results
* Total costs for the school-based program = $272,298 (From Table 2).
* Benefit-to-costs ratio =
* Net rate of return =
* Conclusion

1. **Cost-Effectiveness Analysis**

* Now suppose that the Denver Public School (DPS) implements a hybrid school-based hepatitis B vaccination program during the 1996–97 school year. This program offers a free, voluntary, school-based, hepatitis B vaccination to students in the 6th grade, and also a free vaccination in public clinics and homes.
* As with the original program, the hybrid program successfully enrolled 3,359 children, of whom 3,023 students (90%) completed the 3-dose vaccine series. The cost per completed series is $150. Therefore, compared to the DPS’s original school-based program, the hybrid program is more effective but more expensive.
* Compute and interpret ICER using completed 3-dose vaccine series as an intermediate outcome.