Case Study

Cost-Benefit Calculations of a Vaccination Program in a Hospital

You are employed in the General Medicine Department of a mid-size hospital with 600 beds in South India. All the common departments are there like e.g. surgery, general medicine, chest medicine, infectious diseases ward, paediatrics, ENT, ophthalmology, OPD, maintenance & repair, waste handling & utilities, administration. All in all there are around 300 persons handling blood: doctors, nurses, lab technicians, garbage collectors, maintenance persons etc.

Some nurses complained with you about needlestick injuries in the last months. Allegedly one case of hepatitis B infection in a PG student was also connected to a needlestick injury - so goes the rumour.

Management knows that you are currently undergoing training in Industrial Health. They approach you and ask for recommendations on how best to proceed. You are well trained and also an extraordinary student, so you know the answers: **What do you tell them?**

Question 1
How could management investigate the occurrence of needlestick injuries in the hospital? Describe a possible method (or methods) they or you could use to get a better picture of the problem.

You decide to conduct a questionnaire survey. You find out that every health care worker who handles blood experiences about 5 needle stick injuries with a bloody needle per year.

You look up the literature and find that the infection rates after needlestick injury with bloody hollow needles are

30,0% for hepatitis B
03,0% for hepatitis C
00,3% for HIV

The prevalence of these diseases in the hospital population is estimated to be:

Hepatitis-B[1] 3.00%
Hepatitis-C[2] 1.85%
HIV[3] 2.30%

[1] Hep-B: Others report rates between 1,2% and 2,3% for Tamil Nadu according to WHO-Regional Office South-East Asia, New Delhi 2002: Prevention of Hepatitis-B in India – An Overview, p. 53. See for discussion: Anant Phadke 2002: HBV carrier rate in India. Indian Paediatrics 2002; 39:787-788 with estimates between 2.4 and 4.3% and up to 8%.
[2] Hep-C: WHO estimates 1,85% of prevalence in India (WHO: Weekly Epidemiological Record 'Hepatitis-C: Global Prevalence' 1997, 72, 341-348)
[3] HIV: Prevalence rate of 2,3% from Andhra Pradesh in the patient population of 14 General Hospitals in Andhra Pradesh. Prevalence rates were between 1.06% and 9.94% in Vijayawada's University General Hospital (The HINDU 5 Sept 2002). WHO estimates the overall prevalence in Tamil Nadu in antenatal women >1% classifying

Question 2
Make an estimate and calculate how many infections of hep B, hep C and HIV you are statistically likely to occur per year in this hospital alone!

About 20% of all hepatitis B cases will fall clinically ill and be on sick leave for 4 weeks in average. An employee in this hospital is paid about 6000 INR in average.

Question 3
How much money does the "non-prevention of needle stick injuries" cost the hospital every year in direct accident cost?

Question 4
What other, indirect cost can you think of which you would have to include in order to be more correct in your estimate?

You are told that a three dose vaccination series for hepatitis B costs about 150 INR including dose, working time of the nurse, consumables and control titer after the last dose.

Question 5
How much would a comprehensive hepatitis B prevention programme cost for this hospital?

When the investment in prevention is equal to the cost of non-prevention a company "breaks even". Up from there the company is saving money by preventing.

Question 6
After how many months would the hospital break even, i.e. the investment in prevention is equal to the cost of non-prevention?

Tamil Nadu as 'high HIV prevalence' state (WHO Regional Office for South-East Asia and Western Pacific 2001: HIV/AIDS in Asia and the Pacific Region).