

Contagious Diseases

GROUP ASSIGNMENT 2

EBOLA OUTBREAK

In an Ebola outbreak, the chance of a patient at a hospital in West Africa showing Ebola symptoms and having Ebola is 0,2. The chance of a patient, having Ebola and not displaying any symptoms is 0,01. The chance of a patient having ebola symptoms is 0,5.

5 patients are admitted to the hospital with Ebola symptoms. And 5 are admitted without Ebola symptoms.

1. What is the total probability that an admitted patient has ebola?
2. What is the probability, given that a patient have Ebola that the person did not have any symptoms?
3. What is the probability that at least one of the admitted patients has ebola?
4. Simulate in Matlab and verify the results from question 1-3.
5. You know that only one of the patients have Ebola, but not which one. How many of the patients do you need to test on average to find the infected patient?
6. Verify your result in matlab.
7. Out of ten patients waiting in front of the hospital, you know that 2 is infected, how many different combinations of two patients can you select out of the ten?
8. What is then the probability that if you select any two patients out of the ten that you get the infected ones.
9. Verify your results in matlab.
10. Make a matlab program that simulates an outbreak in the hospital:
 - (a) Day 1: Draw a random sample of the ten admitted patients.
 - (b) Day 2 and onwards: All old and new Ebola patients either infects or does not infect another person with probability 0,5.
 - (c) Run the simulation of the hospital 200 times, on average how many days does it take for 100 people to be infected?
 - (d) Change the probability of infecting another person to 0,01 pr. day. Assuming that no patients die, how long does it take on average now for 100 people to be infected?
11. What is the risk that 100 people or more are infected after 10 days with an infection probability of 0,5?