Name_____

Midterm Exam
Health Science 161
March 6, 2002

Part I: Terms and Definitions - Match the definition to its corresponding term. Note: Not all terms will be used. (2 points each)

1. _____ A state of complete physical, mental, and social well being and not merely the absence of disease or infirmity.
2. _____ A biological, physical, or chemical factor whose presence, absence, or relative amount is necessary for the disease to occur.
3. _____ The point at which the ecology of disease reaches a balance representing a steady state of new cases flowing into a population and old cases leaving it.
4. _____ The study of the distribution, determinants, and occurrence of disease and health-related conditions in populations.
5. _____ The occurrence of disease at or near the usual rate.
6. _____ A form of political and social activism that aims to protect, promote, and restore the people's health.
7. _____ The occurrence of disease in clear excess of normal expectancy.
8. _____ The time between exposure to a pathogen and the appearance of clinically discernible effects.
9. _____ The point at which a pathogen leaves one host and enters another.
10. _____ Disease-causing.
11. _____ The broad scope of manifestations and severity of non-infectious diseases, from silent to progressive and fulminating.
12. _____ Factors that must be present for disease to occur.
13. _____ Events and factors related to or caused by disease or disablility.
14. _____ All factors that alter the likelihood of infection and disease once the agent is encountered.
15. _____ Ability of an agent to cause disease within the host.
16. _____ External conditions, other than the agent, that contribute to the disease process.
17. _____ Factors that always lead to disease.
18. _____ The severity of disease caused by the agent once it has invaded the host.
19. _____ Health-causing.
20. _____ Any mechanism by which and infectious agent is spread to another host.
21. _____ The interaction of indirect and direct causes of disease.
22. _____ Epidemics that affect several countries or continents.

23. _____ Factors that when combined with other factors, increase the likelihood of disease.
24. _____ The normal habitat in which an agent lives, multiplies, and grows.
25. _____ The period of time that it takes for noninfectious diseases to manifest the first symptom after exposure has occurred.

agent	causal web	contributory factors
endemic	environment	epidemic
epidemiologic homeostasis	epidemiology	etiology
gradient of infection	health	host
host immunity	incubation period	latent period
morbidity	mortality	necessary factors
pandemic	pathogenicity	portal of entry and exit
prevalence	public health	reservoir
salutogenic	spectrum of disease	sufficient factors
time	transmission	virulence

Part II: Multiple Choice (2 points each)

26. All of the following are portals of entry **except**:
    A. respiratory tract
    B. central nervous system
    C. gastrointestinal tract
    D. conjunctiva
    E. skin

27. Which of the following is **not** part of the scientific method?
    A. Review existing information
    B. Design study
    C. Theory or observation
    D. Collect and analyze data
    E. All of these are part of the scientific method.
28. Someone who transmits a disease prior to the onset of symptoms is known as a(n):
    A. inapparent carrier
    B. incubatory carrier
    C. convalescent carrier
    D. vector
    E. none of these

29. A necessary factor
    A. must be present for the disease to occur

B. always leads to disease
C. increases the likelihood of disease
D. A and B
E. A, B, and C

30. Which form of prevention is directed toward the stage of subclinical disease?
A. primary prevention
B. secondary prevention
C. tertiary prevention
D. none of these

31. John Snow was most famous for…
A. laying the foundation for the scientific method.
B. investigating and discovering the cause of a cholera outbreak.
C. developing the germ theory of disease.
D. developing the smallpox vaccine.

32. Which of the following is an example of a true rate?
A. Cumulative incidence
B. Period prevalence
C. Point prevalence
D. Incidence density
E. Mortality rate

33. Components of the infectious disease process include:
A. agent
B. reservoir
C. transmission
D. host immunity
E. all of the above

34. The beginning of the stage of clinical disease is characterized by what significant event?
A. exposure
B. onset of symptoms
C. diagnosis
D. resolution of disease
E. pathogenic changes

35. What level of prevention is used during the stage of susceptibility?
A. primary
B. secondary
C. tertiary
D. quatranary
E. no level of prevention is used during this stage of disease.

36. An example of secondary prevention is:
    A. administering CPR
    B. screening a population for high blood pressure
    C. prescribing cholesterol reducing medication
    D. administering childhood immunizations
    E. distributing anti-smoking literature

37. Live attenuated vaccinations confer:
    A. innate immunity
    B. natural immunity
    C. active immunity
    D. passive immunity
    E. adoptive immunity

38. Becoming infected with Malaria by getting bitten by a mosquito carrying the disease is an example of transmission through:
    A. direct contact
    B. indirect contact
    C. vector born
    D. droplet
    E. propagative transmission

39. Which of the following characteristics describes a proportion.
    A. numerator is included in the denominator
    B. has a dimension
    C. ranges between 0 and 1.0
    D. A and C
    E. B and C

40. Which of the following is a physical barrier to infection?
    A. natural killer cells
    B. stomach acid
    C. intact skin
    D. antibodies
    E. bone marrow stem cells

41. Which of the following is an example of an inapparent carrier of tuberculosis?
    A. a person who is hospitalized
    B. a person who appears healthy
    C. a person who is coughing
    D. a person who is receiving treatment
    E. a person who has already recovered from the illness

42. Which of the following is not a potential reservoir for bacteria?
    A. water
    B. food
    C. symptomatic cases
    D. a doorknob
    E. an animal

43. Which of the following is an environmental factor that could shift the epidemiologic homeostasis to favor the agent?
    A. an increase in pollution
    B. a decrease in the population
    C. social pressure to practice abstinence
    D. improved water filtration
    E. improved food preparation techniques

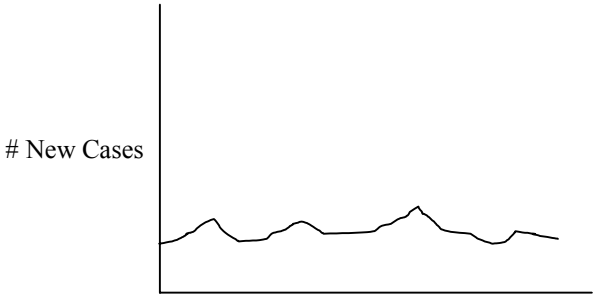
44. What was John Snow's contribution to epidemiology?
    A. He was one of the first physicians to realize that his obligations went beyond treating the ill.
    B. He was one of the first people to use epidemiologic strategies to solve an epidemic.
    C. He isolated the cause of a cholera outbreak without even knowing the organism causing the outbreak.
    D. He used information from outliers to support his theories.
    E. All of the above

45. Non-specificity of effect refers to:
    A. different pathogens can cause the same disease
    B. different diseases can be caused by the same pathogen
    C. similar looking diseases can be caused by different organisms
    D. the same pathogen causes the same disease in many different people
    E. the same pathogen causes disease in many different kinds of animals

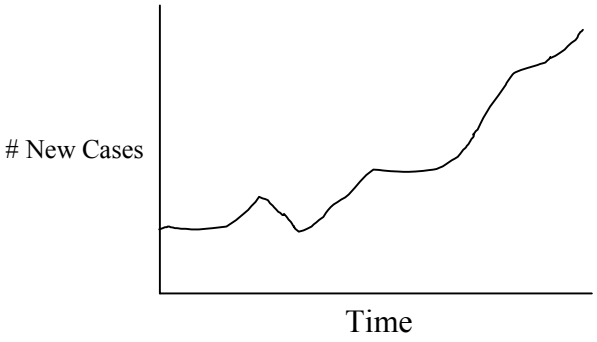
46. Which kind of immunity would be most effective against agents whose mode of transmission is via droplet nuclei?
    A. wearing sterile gloves when examining patients
    B. using sterile instruments when performing dental procedures
    C. washing your hands after using the restroom
    D. wearing a sterile gown when examining patients
    E. wearing a sterile mask when examining patients

47. An example of serial transfer is:
    A. a food poisoning outbreak in which the cook had typhoid fever then passed the agent on to people who consumed the food.
    B. five different individuals use the same contaminated needle and contract HIV.
    C. everyone attending a convention contracts legionellosis disease because the air conditioning system was contaminated.
    D. an elementary school experiences an outbreak of chicken pox when one student contracts the disease from her sibling then contaminates her own class after which her classmates contaminate the classrooms of their siblings.
    E. the refrigeration unit of a restaurant breaks down and all of the food spoils.

48. How would an increase in the proportion of the number of people susceptible to a disease affect the epidemiologic homeostasis?
    A. There would be no effect.
    B. There would be a shift favoring the host.
    C. There would be a shift disfavoring the environment
    D. There would be a shift favoring the agent.
    C. There would be a temporary shift favoring the host, but then it would return to normal.



49. The above epidemic curve is describing which phenomenon?
    A. propagating epidemic of disease
    B. point epidemic
    C. sporadic disease
    D. pandemic disease
    E. endemic disease



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    D. pandemic disease
    F. endemic disease

Part III: Short Answer/Calculations

49. One hundred and fifty adults at high risk for developing diabetes were followed for an average of ten years, during which sixty-two of them developed diabetes. Calculate the approximate incidence density (per 100 person-years). Interpret the results. (6 points)

Use the following information to answer questions 52 and 53.

Five thousand two hundred and forty-three people were followed over five years to determine the risk for developing lung disease in a heavily polluted region of the country. The data collected is summarized in the table below.

Year	Number of new cases
1	152
2	203
3	174
4	215
5	193

49. Calculate the cumulative incidence of lung disease after the first year. Interpret the results. (6 points)

50. Calculate the point prevalence at the end of the study. Interpret the results. (6 points)

Use the tables below to answer questions 54-56.

Population Data (in millions)

age group	Region A	Region B	Standard
<5	1.5	3.5	5.8
5-19	2.4	4.4	7.4
20-44	4.7	6.4	12.1
45-64	4.4	5.8	10.2
>65	3.4	5.0	7.6

Mortality Rates (per 100,000)

age group	Region A	Region B	Standard
<5	65.7	69.4	79.1
5-19	99.9	97.3	98.6
20-44	206.8	195.3	210.9
45-64	327.6	345.9	338.8
>65	1023.6	1187.8	1190.5

49. Calculate the crude mortality rate for Region A, Region B, and the Standard population. (21 points)

50. Use the direct method of age adjustment to calculate the expected mortality rate for Region A and Region B. (16 points)

51. Compare the crude mortality rates for Region A and Region B. Compare the crude mortality rates with the age adjusted mortality rates for Region A and Region B. Based on your results, explain why age adjustment is a useful tool. (10 points)

52. In a closed population, what effect will each of the following have on the prevalence of disease, assuming the population in question does not otherwise change? (2 points each)

A. Emigration of cases out of the population.

B. Increase in the case fatality rate

C. Improvement in treatment that quickens recovery

D. Improvement in treatment that improves survival, but lengthens duration of illness

Formula Sheet

$$\text{Cummulative Incidence=Attack Rate=Incidence Proportion} = \frac{\text{\# new cases}}{\text{\# in population at risk}}$$

$$\text{Point Prevalence} = \frac{\text{Total \# of cases}}{\text{\# in the population at risk}}$$

$$\text{Incidence Density} = \frac{\text{\# of new cases}}{\text{disease-free person-time at risk}}$$

$$\text{Period Prevalence} = \frac{\text{Total \# of cases}}{\text{total population at midpoint of observation}}$$

Approximate person-time = (# at risk at beginning of study) x (average length of observation)

Exact person-time = sum of years of observation

$$\text{Crude mortality rate} = \frac{\text{\# of deaths}}{\text{\# in population}}$$

Direct method for age adjustment

1) Calculate each age specific expected deaths by multiplying the age specific population from the standard population by the age specific mortality rate of the study population. This needs to be done for each age group for each study population.
2) Calculate the total number of expected deaths by adding all the age specific expected deaths together. This needs to be done for each study population.
3) Calculate the expected mortality rate for each region by dividing the total number of expected deaths by the total number of people in the standard population.