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Question1

1.1 Endemic refers to the habitual presence of a disease within a geographic given area.

1.2 The incubation period is the time interval from the receipt of infection to the time of clinical illness.

1.3 Misclassification bias is a type of bias that arises from a measurement error e.g. a study participant could be categorized in an incorrect category hence altering the results of a study.

1.4 A retrospective cohort is a historic cohort as it uses historical data of participants who already have the condition of interest, then try to determine why they have the condition e.g. do the people that have lung cancer now develop it because they smoked in their teenage-hood ?.

1.5 A positive predictive value shows the proportion of patients who test positive for a disease and turn out to have the disease. It is all the non-false positive tests.

Question2

2.1 A prospective cohort study takes a group of similar people and observes them over a period of time. The investigator identifies the original population at the beginning of the study then observes them until the disease develops or does not develop for example the investigator may observe children from kindergarten into their teenage age whether or not they decide to smoke then observe who gets lung cancer or does not.

2.2 Validity distinguishes between who has the condition of interest and who does not, reliability focuses on the overall consistency of a measure. Reliability is necessary for validity; however, it is not sufficient, even though we may get a test to be completely reliable it's possible for that measure to be invalid.

2.3 The Ethical issues facing epidemiology reflects on an epidemiologist's obligation to participate in epidemiological and clinical studies, as well as the challenges resulting from the major position that the discipline occupies at the interface of science and public policy. Most issues arising are often complex and have no simple answer. There is a need for patient consent, protection of privacy and confidentiality of family members.

2.4 Public health is defined as the health of a population as a whole, it is normally monitored, regulated and controlled by the state. It is basically a science of improving the health of the people and the community.

2.5 Sequential testing is a form of a 2 stage testing whereby in the first stage less invasive tests are performed to screen a certain object of interest, those that test positive are recalled for further more invasive testing, yielding greater specificity and sensitivity. The hope of this is to reduce false positives.

Question 3

Prevention may be defined as the action aimed at eradicating, minimizing or eliminating the impact of disease and disability; there are 4 levels of prevention which are:

1. **Primordial prevention-** it is the prevention of the emergence or development of risk factors in countries or population groups in which they have not yet appeared. A comprehensive programme aimed at preventing stroke on this level would encourage children to avoid eating a lot of sugar and bad fats as these are the factors that may lead to a stroke.
2. **Primary prevention-** the action taken before the onset of disease which removes the possibility that the disease may occur, it may be accomplished by measures of health promotion or specific protection.in a stroke prevention program this would be achieved by a population mass strategy which is a strategy directed to the entire population, for example try and reduce the serum cholesterol of a population by mass producing omega 3 rich foods only , hence majority of people would have low cholesterol level which might lower the chances of getting a stroke. A high risk strategy may be employed here as well whereby individuals at special risk are then individualized and assisted with methods like medications to prevent them from getting a stroke.
3. **Secondary prevention-** it involves identifying the people who have the disease but show no clinical signs , and stopping the disease before complications arise.in a stroke prevention programme at this level medical care is given to the patient with stroke , physiotherapy is enhanced to reduce the effects of stroke and blood pressure management is crucial at this stage. Antithrombotic management is also key here.
4. **Tertiary prevention-** is used when the disease process has advanced beyond its early stages. It may be defined as all the measures available to reduce or limit impairments and disabilities and to promote the patients' adjustments to irremediable conditions. A stroke program at this level tries to lessen disability limitation and rehabilitations; physiotherapy is the very important at this stage. They could also help stroke patients by providing social support by taking care of them, and helping them manage day to day.

Question 4

Evidence based guidelines in epidemiology and medicine take a systemic approach to clinical treatment by combining the highest quality evidence with expert medical consensus in order to form guidelines for patient care. These guidelines improve clinical outcomes and patient care. The guidelines manage to improve clinical outcomes through the methodology with which they are formulated and this methodology follows a very organized step process, which involves

1. Formulating a good clinical question-a question is formulated based on a diagnosis, test or procedure; better questions tend to lead to best search results.

2. Search for evidence-an extensive literature review is performed to find strategies, the best strategies are chosen based on the clinical questions formulated.
3. Critically appraise the evidence-not all research is created equal, there is a hierarchy of evidence, so one needs to use qualitative and quantitative findings and appraise the results for validity, reliability applicability, bias, strength and magnitude.
4. Implement the evidence- an assessment of the healthcare professionals' level of experience and expertise is done. A plan to educate the staff involved in the practice change is developed, and then a criteria to measure clinical outcome is then developed.
5. An evaluation of the practice changes and patient outcome is then performed by measuring the outcome data and analyzing it. Questions such as "did the practice change improve patient outcomes?" are asked.
6. Improve global health through evidence dissemination- evidence based guidelines are then published through peer-reviewed guidelines

This thorough process of establishing these guidelines make it a highly conducive methodology that often tends to indicate that randomized trials focusing on evidence obtained often improve clinical outcomes. When more physicians implement these established guidelines, more evidence of clinical outcome being positive is established.

Question 5

To investigate potential associations between occupational exposures and increased risk of lung cancer as a public health official would design a study.

1. At first, I would need to generate a solid hypothesis to guide the investigation. To formulate a hypothesis I would need to get some background information on the people who work at the industry and have lung cancer, however there are some people who have never worked at the industry that would also have lung cancer, so I would decide to make my study a retrospective cohort study. My hypothesis based on the facts presented would be best fitted as "those who are exposed to certain products directly at the industry have a higher rate of developing lung cancer than those who do not".
2. Next, I would require records of each worker's employment position, which would indicate the level of exposure at the industry. Then I would categorize the exposed group based on the level and duration of exposure. I would then further subcategorize them into exposed and unexposed groups. Unexposed being workers that would have worked for less than a year at the industries and those workers that do not work directly with hard labor related work at the industry. The exposed category would be the workers with low, medium, or high exposure based on the amount of time they would have spent at the firm.
3. I would then define the eligibility criteria for my study participants as those who have worked at the industry for at least 2 years by which upon starting employment did not have lung cancer; the medical records kept by the HR. would verify this.
4. This step would be the most crucial as it would involve data collection; the best source for gathering information on the exposure variable would be to

collect monthly updated files in the HR (human resources) department beginning with the start of the study through the end of the study. The outcome variable would be then provided by the medical doctor, which would be based on blood tests and other forms of lung cancer screening tests. I would also link a database containing cohort members from industries with the discharge database from the local hospital.

5. I would then apply for the ethical committee board ensuring the study will adhere to ethical principles.
6. Funding and budgeting would have to be planned next.
7. I would design a consent form for all participants clearly highlighting my goals, explaining the risks, benefits and expenses that the participants will or might incur by choosing to participate in the study.
8. I would design a questionnaire to collect data from the participants, and then hire data extractors and statisticians.
9. I would then design a data management plan on how I would enter the data into my database then how I would analyze the data and how I would publicize it.

During data analysis, I will get the total number of exposed individuals and the total number of unexposed individuals and the number of unexposed yet diseases. After this, I would have to calculate the cumulative incidence for both exposed and unexposed groups and come up with an interpretation. This would finally indicate how the dose of exposure is related to the development of lung cancer. Upon presenting back to the medical practitioner, my data would either suggest that there is an association between occupational exposures to industrial substances and the development of lung cancer or not.

This is how I would design my cohort study as a public health official.

Question 6

Edward Jenner was very interested in a worldwide scourge which was small pox at his time. At the time it was observed that through variolation people could gain immunity against smallpox.

Ethical Issues That Arise in Jenner's Vaccination Against Smallpox

In Edward Jenner's Vaccination against Smallpox, the way Jenner experiments on the people in his village questions whether or not his actions were ethical. Jenner's work on the people in his community addresses many health risks due to the smallpox disease, his work may have had both purpose and justification, but the way Jenner carried out his experiments were very dangerous and harmful to his community, of course at the time there were not many ethical committees to regulate standard test procedures, Jenner put many people's lives in jeopardy including men, women and even young innocent children.

Jenner used these healthy humans in order to observe how the cow pox disease symptoms would affect their body, then observing how there body reacted to the smallpox inoculation. What if these people would have died after Jenner injected them with the cowpox? Today one may say that Jenner's inquiry shows that he did not care about getting consent; as ethical issues clearly indicate that each and every subject should have an informed consent, even then if that was the case, he would

have to explain the entire study to the subject which they would probably no understand considering that it was an eight year old boy, a full informed consent would not be possible. It is unethical to place a deadly disease and very infectious matter into people without getting their consent in today's ethical contexts but Jenner back then just inoculated the first patient without their consent.

Is it just or acceptable that children are used as test subjects in order to analyze Jenner's study of cowpox and smallpox? Analyzing how Jenner tested his theory, Jenner primary used children in his experiment to prove that cowpox was a vaccine for smallpox.

"Jenner paid no attention to these children age he had no sympathy towards these innocent children" is a way one might actually view it on an ethical standpoint. Injecting young innocent children with a deadly disease is unethical because children lack capacity and intellectual understanding to clearly fathom what is being administered to them. The cowpox he inoculated the boy was derived from the maid who had chicken pox, this is a clear violation of human's right in nowadays, as that could be the perfect method to transmit a lot of viruses. Jenner operated on observational data only; he didn't have the understanding of pathology or virology. In an appropriate ethical scientific study data from medical records should be made available to investigators without information linking them directly to the individual, and yet in this case Jenner knew all his subjects that he inoculated.

In summary Jenner violated all codes of ethics if we were to evaluate his study based on the 21st century ethical laws,, however, it is noteworthy to see that he did not have an ethical board he had to answer to, or the wide variety knowledge of how disease function. He did however start the vaccination protocol that would eventually eradicate small pox today, so although grey the matter might be Edward did a good thing by initiating his studies.

RESULTS

Total = 89 / 110 (81%)