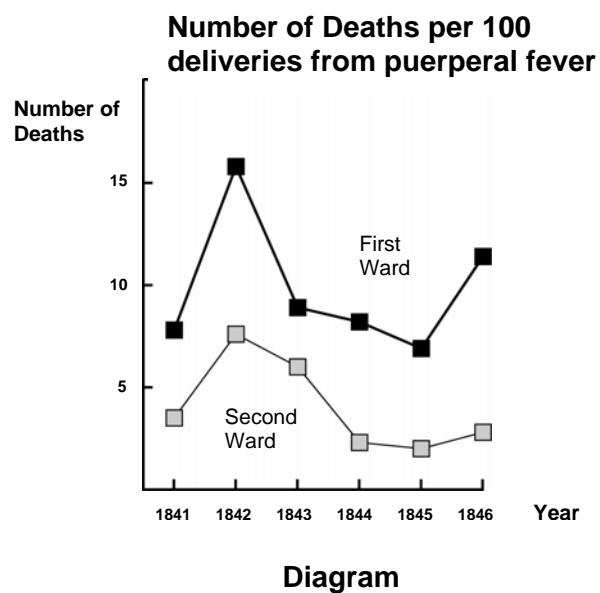


SEMMELWEIS' DIARY TEXT 1

'July 1846. Next week I will take up a position as "Herr Doktor" at the First Ward of the maternity clinic of the Vienna General Hospital. I was frightened when I heard about the percentage of patients who die in this clinic. This month not less than 36 of the 208 mothers died there, all from puerperal fever. Giving birth to a child is as dangerous as first-degree pneumonia.'

These lines from the diary of Ignaz Semmelweis (1818-1865) illustrate the devastating effects of puerperal fever, a contagious disease that killed many women after childbirth. Semmelweis collected data about the number of deaths from puerperal fever in both the First and the Second Wards (see diagram).



Physicians, among them Semmelweis, were completely in the dark about the cause of puerperal fever. Semmelweis' diary again:

'December 1846. Why do so many women die from this fever after giving birth without any problems? For centuries science has told us that it is an invisible epidemic that kills mothers. Causes may be changes in the air or some extraterrestrial influence or a movement of the earth itself, an earthquake.'

Nowadays not many people would consider extraterrestrial influence or an earthquake as possible causes of fever. But in the time Semmelweis lived, many people, even scientists, did! We now know it has to do with hygienic conditions. Semmelweis knew that it was unlikely that fever could be caused by extraterrestrial influence or an earthquake. He pointed at the data he collected (see diagram) and used this to try to persuade his colleagues.

Question 1: SEMMELWEIS' DIARY

S195Q02- 01 02 03 04 11 12 13 21 99

Suppose you were Semmelweis. Give a reason (based on the data Semmelweis collected) why puerperal fever is unlikely to be caused by earthquakes.

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SEMMELWEIS' DIARY SCORING S195Q02

QUESTION INTENT: Process: Drawing/evaluating conclusions
Theme: Human biology
Area: Science in life and health

Full credit

Code 21: Refers to the difference between the number of deaths (per 100 deliveries) in both wards

- Due to the fact that the first ward had a high rate of women dying compared to women in the second ward, obviously shows that it had nothing to do with earthquakes
- Not as many people died in ward 2 so an earthquake couldn't have occurred without causing the same number of deaths in each ward
- Because the second ward isn't as high, maybe it had something to do with ward 1
- It is unlikely that earthquakes cause the fever since death rates are so different for the two wards

Partial credit

Code 11: Refers to the fact that earthquakes don't occur frequently

- It would be unlikely to be caused by earthquakes because earthquakes wouldn't happen all the time

Code 12: Refers to the fact that earthquakes also influence people outside the wards

- If there were an earthquake, women from outside the hospital would have got puerperal fever as well
- If an earthquake were the reason, the whole world would get puerperal fever each time an earthquake occurs (not only the wards 1 and 2)

Code 13: Refers to the thought that when earthquakes occur, men don't get puerperal fever

- If a man were in the hospital and an earthquake came, he didn't get puerperal fever, so earthquakes cannot be the cause
- Because girls get it and not men

No credit

Code 01: States (only) that earthquakes cannot cause the fever

- An earthquake cannot influence a person or make him sick
- A little shaking cannot be dangerous

Code 02: States (only) that the fever must have another cause (right or wrong)

- Earthquakes do not let out poison gases. They are caused by the plates of the Earth folding and faulting into each other
- Because they have nothing to do with each other and it is just superstition
- An earthquake doesn't have any influence on the pregnancy. The reason was that the doctors were not specialised enough

Code 03: Answers that are combinations of Codes 01 and 02.

- Puerperal fever is unlikely to be caused by earthquakes as many women die after giving birth without any problems. Science has told us that it is an invisible epidemic that kills mothers
- The death is caused by bacteria and the earthquakes cannot influence them

Code 04: Other incorrect answers

- I think it was a big earthquake that shook a lot
- In 1843 the deaths decreased at ward 1 and less so at ward 2
- Because there aren't any earthquakes by the wards and they still got it
[Note: The assumption that there were no earthquakes at that time, isn't correct.]

Code 99: Missing

SEMMELWEIS' DIARY TEXT 2

Part of the research in the hospital was dissection. The body of a deceased person was cut open to find a cause of death. Semmelweis recorded that the students working on the First ward usually took part in dissections on women who died the previous day, before they examined women who had just given birth. They did not pay much attention to cleaning themselves after the dissections. Some were even proud of the fact that you could tell by their smell that they had been working in the mortuary, as this showed how industrious they were!

One of Semmelweis' friends died after having cut himself during such a dissection. Dissection of his body showed he had the same symptoms as mothers who died from puerperal fever. This gave Semmelweis a new idea.

Question 2: SEMMELWEIS' DIARY

S195Q04

Semmelweis' new idea had to do with the high percentage of women dying in the maternity wards and the students' behaviour.

What was this idea?

- A Having students clean themselves after dissections should lead to a decrease of puerperal fever.
- B Students should not take part in dissections because they may cut themselves.
- C Students smell because they do not clean themselves after a dissection.
- D Students want to show that they are industrious, which makes them careless when they examine the women.

SEMMELWEIS' DIARY SCORING S195Q04

QUESTION INTENT: Process: Recognising questions
Theme: Human biology
Area: Science in life and health

Full credit

Code 1: Having students clean themselves after dissections should lead to a decrease of puerperal fever.

No credit

Code 0: Other

Code 9: Missing

Question 3: SEMMELWEIS' DIARY

S195Q05- 01 02 11 12 13 14 15 99

Semmelweis succeeded in his attempts to reduce the number of deaths due to puerperal fever. But puerperal fever even today remains a disease that is difficult to eliminate.

Fevers that are difficult to cure are still a problem in hospitals. Many routine measures serve to control this problem. Among those measures are washing sheets at high temperatures.

Explain why high temperature (while washing sheets) helps to reduce the risk that patients will contract a fever.

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SEMMELEWEIS' DIARY SCORING S195Q05

QUESTION INTENT: Process: Demonstrating knowledge and understanding
Theme: Human biology
Area: Science in life and health

Full credit

Code 11: Refers to *killing of bacteria*

- Because with the heat many bacteria will die
- Bacteria will not stand the high temperature
- Bacteria will be burnt by the high temperature
- Bacteria will be cooked [Note: Although "burnt" and "cooked" are not scientifically correct, each of the last two answers as a whole can be regarded as correct.]

Code 12: Refers to *killing of microorganisms, germs or viruses*

- Because high heat kills small organisms which cause disease
- It's too hot for germs to live

Code 13: Refers to the *removal* (not killing) of bacteria

- The bacteria will be gone
- The number of bacteria will decrease
- You wash the bacteria away at high temperatures

Code 14: Refers to the *removal* (not killing) of microorganisms, germs or viruses

- Because you won't have the germ on your body

Code 15: Refers to sterilisation of the sheets

- The sheets will be sterilised

No credit

Code 01: Refers to killing of disease

- Because the hot water temperature kills any disease on the sheets
- The high temperature kills most of the fever on the sheets, leaving less chance of contamination

Code 02: Other incorrect answers

- So they don't get sick from the cold
- Well when you wash something it washes away the germs

Code 99: Missing

Question 4: SEMMELEWEIS' DIARY

S195Q06

Many diseases may be cured by using antibiotics. However, the success of some antibiotics against puerperal fever has diminished in recent years.

What is the reason for this?

- A Once produced, antibiotics gradually lose their activity.
- B Bacteria become resistant to antibiotics.

- C These antibiotics only help against puerperal fever, but not against other diseases.
- D The need for these antibiotics has been reduced because public health conditions have improved considerably in recent years.

SEMMELEIS' DIARY SCORING *S195Q06*

QUESTION INTENT: Process: Demonstrating knowledge and understanding
Theme: Biodiversity
Area: Science in life and health

Full credit

Code 1: Bacteria become resistant to antibiotics.

No credit

Code 0: Other

Code 9: Missing