

First Draft (1500 words):

Ignaz Philipp Semmelweis a prominent Hungarian physician and scientist known as the “savior of mothers” was an early pioneer of antiseptic procedures. After receiving his doctorate in 1844 Semmelweis decided to specialize in obstetrics, marking the beginning of his story. There he started working in the world's largest maternity clinic as an appointed assistant to professor Johann Klein. The hospital was not only special because of its enormous size but also because it was the First Obstetrical Clinic of the Vienna General Hospital. This meant that the hospital was set up as gratis institutions that offered care for infants which made this a more desirable place for underprivileged women, that included prostitutes. His duties consisted of examining patients each morning, supervising difficult deliveries, teaching students of obstetrics and being a ‘clerk’ of records. In return for their free services as a gratis institution, the women would be subjects or training doctors and midwives. The hospital was divided into two sections, ward one being known for the high mortality rate due to childbed fever, while ward two had a much lower mortality rate of 3% vs the 29% of ward one. This fact was known outside the hospital, making women beg to be admitted to the Second Clinic, some even going as far to have street births, pretending to have birth at the moment meaning that they would have child care benefits without having to be admitted to the clinic. He would go on to say “to me, it appeared logical that patients who experience street births would become ill at least as frequently as those who delivered in the clinic. What protected those who delivered outside the clinic from these destructive unknown endemic influences?” This was a mystery that would continue to puzzle Semmelweis, understanding what caused the higher mortality rate due to puerperal fever in one ward vs the other. Then began his meticulous process to further his research trying to eliminate all the possible differences between the wards, even including religious practices. The physical layout in Ward 1 made it so that priests who were summoned to give last rites to women who were currently dying of childbed fever were required to pass by many other beds, somehow increasing their chances of contracting childbed fever. He then changed the route that the priest took and attempted to lay women on their sides while giving birth but that seemed to not make a difference in the mortality rate. The only major difference were the individuals working there, the first clinic was the teaching service for medical students, while the second had been for the instruction of midwives only. He had made the connection between the death of his good friend Jakob Kollatschka, who had been poked with a student's scalpel while performing a postmortem examination. Semmelweis's friend showed a pathology similar to that of the women dying from childbed fever, when he immediately offered a relation between cadaveric contamination and childbed fever. He then concluded that he and the medical students carried “caveous particles” from the autopsy room where they performed autopsies with unwashed hands and instruments. This showed why there was such a difference between both wards, it was not the conditions or circumstances that each room held but rather the way in which the people working there had prepared for caring for patients. Hence,

Semmelweis concluded that the cause of childbed fever was the “cadaverous material” and to counteract that he instituted a policy of using a solution of chlorinated lime for washing hands between handling patients and autopsy work. This proved to be the issue as the result was that the mortality rate in the first clinic dropped to 90 percent.

During this time of the scientific revolution where it was difficult to share all the scientific discoveries and agree upon them to be used in spaces like hospitals more difficult for people to get the care needed. The discovery of anesthesia, the germ theory of disease, and antiseptic surgery was still in the process of being fully understood, making it an increasingly harder task to understand what was causing so many of the cases of childbed fever. Germ theory, an idea that people are now more exposed to, explained that certain diseases were caused by the invasion of microorganisms that were too small to be seen except through a microscope. This theory came about from the French chemist and microbiologist, Louis Pasteur, as well as English surgeon, Joseph Lister, and German physician Robert Koch who were given credit for the development and acceptance of the theory. Although germ theory has continued to be proven true, germ theory was not fully implemented into practice until much later when bloodstained frock coats and not wearing gloves or masks were unsuitable in the operating room. Before this theory was proven and popularized between 1850's and 1920's it would be common knowledge that diseases were caused by the imbalances of the four humors. The theory of four humors originated from Aristotle's work, then fully developed by Hippocrates then continued to be a mainstay medical belief until theories like that of Louis Pasteur explaining how diseases might be developed in more detail. The four humors were four liquids in the body including blood, phlegm, yellow bile, and black bile that were connected to the four seasons of and the elements in nature like wind, earth, water and fire. It was said that some of these humors were more likely to increase during certain seasons like phlegm increasing during winter, the season of chilliness and wetness. At the time the job of a physician was to diagnose which of the four humors were out of balance then treat them by focusing on restoring equilibrium through diet. Another really big discovery they were lacking at the time was antiseptic. Without germ theory antiseptics would not be such a common resource now, but because we have learned the importance of keeping areas sanitized to stop the growth of microbes that cause and spread disease. Antiseptics now are useful to prevent diseases like that of the childbearing fever, being used in hospitals and other health care settings for a variety of surfaces.

Through Semmelweis scientific attitude he was able to create a safer environment for his patients. He looked at this problem with an open mind not assuming what he knew was causing so many of the deaths but rather examined the similarities and differences between the two wards. Using his power of observation he came up with multiple hypotheses then experimenting with them until he fully understood what was going on. He accepted the wrong hypothesis and continued moving forward with his tests, leaving himself open for new information until he found the answer he was looking for. This newly found information would be industry changing and continuing to impact the way we look at healthcare. By controlling his circumstances and changing his ideas based on actual real life experience he adapted creating new solutions and theories. As mentioned in the book, the traits that are desired for a good scientific attitude are humbleness, earnestness, open-minded, intellectually honest, curious, and self-critical. Unlike the other doctors that did not want to clean up their hands because of the lack of open

mindedness to new ideas that are proven useful. He also took advantage of his position as an observer and note taker to take a deeper dive into an area too busy to be looked at by others. The hospital where he was working at being one of the largest public hospitals in Vienna gave him more access to this real world experience and experiment with these women and even possibly endangering their lives to make those of future women better. In a way making the scientific attitude a little more controversial because to what extent are you willing to hurt others to understand something better for a future with less careless deaths.

Dr. Ignaz P. Semmelweis was able to practice the scientific attitude through his work and understanding of the medical field at the time. Although they were wrong about the four humors it was understood that each patient had to be treated individually because of how different everyone was. They could not be seen as a collection but rather an individual that has to be cared for with their specific needs in mind. To some extent he went against what they knew at the time to try and understand what was causing the mortality rate to be higher. Their lack of antiseptic, germ theory, and four humors caused him to be resourceful and question the environment around him. His groundbreaking findings in the study of antiseptic procedures went against all established medical findings making it that much more impressive and as a result making his ideas rejected by the medical community. The suggestion of washing their hands to other doctors felt that their status as gentlemen was inconsistent with the idea that their hands could be unclean. Despite all the backlash his washing protocol lowered mortality rates documenting his success in virtually eliminating childbed fever.

## **Final Draft (1000 Words):**

Ignaz Philipp Semmelweis a prominent Hungarian physician and scientist known as the “savior of mothers” was an early pioneer of antiseptic procedures. After receiving his doctorate in 1844 Semmelweis decided to specialize in obstetrics, marking the beginning of his story. There he started working in the world's largest maternity clinic as an appointed assistant to professor Johann Klein. The hospital was not only special because of its enormous size but also because it was the First Obstetrical Clinic of the Vienna General Hospital. This meant that the hospital was set up as a gratis institution that offered care for infants which made this a more desirable place for underprivileged women, that included prostitutes. His duties consisted of examining patients each morning, supervising difficult deliveries, teaching students about obstetrics, and being a ‘clerk’ of records. In return for their free services as a gratis institution, the women would be subjects or trained doctors and midwives.

His research to try and eliminate all the possible differences between the wards, even including religious practices began his journey into the antiseptic field. The physical layout in Ward 1 made it so that priests who were summoned to give last rites to women who were currently dying of childbed fever were required to pass by many other beds, somehow increasing their chances of contracting childbed fever. He then changed the route that the priest took and attempted to lay women on their sides while giving birth but that seemed to not make a difference in the mortality rate. He had made the connection between the death of his good friend Jakob Kellertshka, who had been poked with a student’s scalpel while performing a postmortem examination. Semmelweis’s friend showed a pathology similar to that of the women dying from childbed fever when he immediately offered a relation between cadaveric contamination and childbed fever. He then concluded that he and the medical students carried “cadaverous particles” from the autopsy room where they performed autopsies with unwashed hands and instruments. This showed why there was such a difference between both wards, it was not the conditions or circumstances that each room held but rather how the people working there had prepared for caring for patients. Hence, Semmelweis concluded that the cause of childbed fever was the “cadaverous material” and to counteract that he instituted a policy of using a solution of chlorinated lime for washing hands between handling patients and autopsy work. This proved to be the issue as the result was that the mortality rate in the first clinic dropped to 90 percent.

During this time of the scientific revolution where it was difficult to share all the scientific discoveries and agree upon them to be used in spaces like hospitals more difficult for people to get the care needed. The discovery of anesthesia, the germ theory of disease, and antiseptic surgery were still in the process of being fully understood, making it an increasingly harder task to understand what was causing so many cases of childbed fever. Germ theory, an idea that people are now more exposed to, explained that certain diseases were caused by the invasion of microorganisms that were too small to be seen except through a microscope. This theory came about from the French chemist and microbiologist, Louis Pasteur, as well as English surgeon, Joseph Lister, and German physician Robert Koch who were given credit for the development and acceptance of the theory. Although germ theory has continued to be proven true, germ theory was not fully implemented into practice until much later when bloodstained frock coats and not wearing gloves or masks were unsuitable in the operating room. Before this

theory was proven and popularized between the 1850s and 1920's it would be common knowledge that diseases were caused by the imbalances of the four humors. The theory of four humors originated from Aristotle's work, then fully developed by Hippocrates then continued to be a mainstay medical belief until theories like that of Louis Pasteur explained how diseases might be developed in more detail. The four humors were four liquids in the body including blood, phlegm, yellow bile, and black bile that were connected to the four seasons and the elements in nature like wind, earth, water, and fire. It was said that some of these humors were more likely to increase during certain seasons like phlegm increasing during winter, the season of chilliness and wetness. At the time the job of a physician was to diagnose which of the four humors were out of balance and then treat them by focusing on restoring the equilibrium through diet. Another really big discovery they were lacking at the time was antiseptic. Without germ theory antiseptics would not be such a common resource now, but because we have learned the importance of keeping areas sanitized to stop the growth of microbes that cause and spread disease. Antiseptics now are useful to prevent diseases like that of childbed fever, being used in hospitals and other health care settings for a variety of surfaces.

Dr. Ignaz P. Semmelweis was able to practice the scientific attitude through his work and understanding of the medical field at the time. Although they were wrong about the four humors it was understood that each patient had to be treated individually because of how different everyone was. They could not be seen as a collection but rather as an individual that has to be cared for with their specific needs in mind. To some extent, he went against what they knew at the time to try and understand what was causing the mortality rate to be higher. Their lack of antiseptic, germ theory and four humors caused him to be resourceful and question the environment around him. His groundbreaking findings in the study of antiseptic procedures went against all established medical findings making it that much more impressive and as a result, making his ideas rejected by the medical community. The suggestion of washing their hands to other doctors felt that their status as gentlemen was inconsistent with the idea that their hands could be unclean. Despite all the backlash, his washing protocol lowered mortality rates documenting his success in virtually eliminating childbed fever.

Through Semmelweis's scientific attitude he was able to create a safer environment for his patients. He looked at this problem with an open mind not assuming what he knew was causing so many of the deaths but rather examining the similarities and differences between the two wards. Using his power of observation he came up with multiple hypotheses and then experimented with them until he fully understood what was going on. He accepted the wrong hypothesis and continued moving forward with his tests, leaving himself open to new information until he found the answer he was looking for. This newly found information would be industry-changing and continue to impact the way we look at healthcare. As mentioned in the book, the traits that are desired for a good scientific attitude are humbleness, earnestness, open-mindedness, intellectually honest, curiosity, and self-critical. Unlike the other doctors that did not want to clean up their hands because of the lack of open-mindedness to new ideas that are proven useful. He also took advantage of his position as an observer and note taker to take a deeper dive into an area too busy to be looked at by others. The hospital where he was working being one of the largest public hospitals in Vienna gave him more access to this real-world experience and experiment with these women and even possibly endangering their lives to make those of future women better. In a way making the scientific attitude a little more

controversial because to what extent are you willing to hurt others to understand something better for a future with fewer careless deaths.

Notes/ Reading + Sources:

<https://coggle.it/diagram/YySIR-fA2wMrAHfa/t/scientific-attitude-dr-semmelweis>

include:

- ^ The historical context of the discovery or false discovery
- ^ How the Scientific Attitude was applied or not applied correctly
- ^ Specific scientific details explaining the findings for the reader

The story of Dr. Ignaz Semmelweis, the doctor working in the maternity wards of a Vienna hospital, who discovered a way to decrease maternal deaths after giving birth.

Outline:

1st Paragraph:

- Explaining Ignaz Semmelweis
  - Different steps to understanding what was causing more deaths in ward 1 vs ward 2
  - Taking action once he found what was the issue
  - Germs and knowledge of medicine - the four humors

- No anesthesia
- No germ theory
- Scientific attitude
  - Willing to change
  - Empirical data

Details:

- Ward 1,2 ; priests; pos of birth

2nd Paragraph:

- How was the scientific attitude applied?
  - Critical mindedness
  - Open mindedness
  - Determination
    - Continued to look for answers when it continued to be challenging
- “Semmelweis did not assume that he already knew the “answer to the question of what caused childbed fever; he examined the similarities and differences between the two wards, then learned what he could through observation and controlled experiment. He came up with various hypotheses, then began to test them one by one. When a hypothesis flamed out, he moved on to the next one, leaving himself open to learning new information along the way. Finally, when he found the answer—and later broadened it—he changed his ideas based on the new data”
- 

Reading:

“Ignaz Semmelweis was a lowly assistant physician in the world’s largest maternity clinic, which was divided into two wards. In Ward 1, childbed fever (also known as puerperal fever) was rampant and the mortality rate was as high as 29 percent; in the adjacent Ward 2, the rate was only 3 percent. Another piece of relevant information was that women who delivered their babies at home or even on the way to the hospital in a “street birth” had a much lower incidence of childbed fever. What was so different about Ward 1? Various hypotheses were offered. One was that Ward 1 was overcrowded. When Semmelweis counted up the patients, however, he noted that the overcrowding was in fact much worse in Ward 2 (perhaps because of all those women avoiding the notorious Ward 1). It was then noted that, because of the physical layout in Ward 1, the priest who was summoned to give last rites to women who were dying of childbed fever was required to pass by many other beds—all while ringing a bell—which might put great fear into the other women and perhaps increase their chances of contracting childbed fever. Semmelweis decided to try an experiment in which he asked the priest to take a different, silent, route to the sickroom in Ward 1, but the mortality rate from childbed fever stayed the same.

“Other tests involving whether the women lay on their sides or their backs while giving birth were similarly fruitless. Finally it was noted that one of the main differences was that in Ward 1 the deliveries were handled by medical students, whereas in Ward 2 they were performed by midwives. Were the medical students giving rougher examinations? After the medical students and the midwives changed places, the mortality rates followed the medical students, but still no one knew why. After instructing the medical students to use gentler techniques, the mortality rate still did not improve.”

“Eventually, enlightenment came in 1847 when one of Semmelweis’s colleagues received a puncture wound during an autopsy on a woman with childbed fever, and died of an illness that appeared to have the same symptoms.<sup>17</sup> Could childbed fever be contracted by someone other than pregnant women? Semmelweis realized that there was a difference in where the medical students were before they came to the maternity ward; they came directly from performing autopsies, with unwashed hands and instruments (remember that this was before antisepsis and the germ theory of disease), straight to the maternity ward, leading to the hypothesis that childbed fever may have to do with the transfer of “cadaveric matter” to the pregnant women.” “As a test, Semmelweis ordered the medical students to wash their hands in chlorinated water before performing their deliveries. The mortality rate plummeted. He now had an explanation not only for why the incidence of childbed fever was so much greater in Ward 1, but also for why “street births” saw such a low incidence of childbed fever. Eventually, Semmelweis was forced to broaden his hypothesis to include the idea that childbed fever could also be transferred from putrified living tissue, after he and his colleagues examined a woman with cervical cancer, and then a dozen other women in succession, eleven of whom died of childbed fever.

“Use of the scientific attitude in this example is obvious. Semmelweis did not assume that he already knew the “answer to the question of what caused childbed fever; he examined the similarities and differences between the two wards, then learned what he could through observation and controlled experiment. He came up with various hypotheses, then began to test them one by one. When a hypothesis flamed out, he moved on to the next one, leaving himself open to learning new information along the way. Finally, when he found the answer—and later broadened it—he changed his ideas based on the new data.”

Pg 87-89

1 - history - religious

- Scientific attitude
  - Willing to make small changes
- Details
  -

Ignaz Philipp Semmelweis a prominent Hungarian physician and scientist known as the “savior of mothers” was an early pioneer of antiseptic procedures. His story began in the world's largest



maternity clinic, which was divided in two sections. Ward one being known for the high mortality rate due to childbed fever, while ward two had a much lower mortality rate of 3% vs the 29% of ward one. They also noticed that women who had births at home or on the way to the hospital had a lower incidence of contracting childbed fever. Semmelweis then noted when counting the patients that there was overcrowding in Ward 2, perhaps because of the infamous mortality rate of ward 1.

Sources:

<https://www.britannica.com/science/germ-theory>

<https://schoolshistory.org.uk/topics/medicine-through-time/medicine-in-ancient-greece/theory-of-the-four-humours/>

<https://journalofethics.ama-assn.org/article/legacy-humoral-medicine/2002-07>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC88911/>

<https://www.npr.org/sections/health-shots/2015/01/12/375663920/the-doctor-who-championed-h-and-washing-and-saved-women-s-lives#:~:text=Semmelweis%20was%20no%20exception.,commonly%20known%20as%20childbed%20fever.>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3881728/>