A Mother Is Dying

Ignaz Semmelweis and Maternal Mortality Prevention

The petitioner has found the cause of childbed fever and has shown how to prevent it.

—Ignaz Semmelweis, *The Etiology, Concept, and Prophylaxis of Childbed Fever*

For Whom the Bell Rings

A bell rang in the corridor. The hospital ward fell silent. The patients froze. A priest entered, followed by attendants carrying a body. Dr. Ignaz Semmelweis recalled the terror of this all too routine ritual.

One can imagine the impression that was created on the other patients when the priest came several times a day, each time accompanied by the clearly audible bell. Even to me it was very demoralizing to hear the bell hurry past my door. I groaned within for the victim who had fallen to an unknown cause. The bell was a painful admonition to seek this unknown cause with all my powers.[1]

The victim was a woman with childbed fever, a disease whose cause was still unknown. But the bell also tolled for Dr. Semmelweis. He resolved to do something about this disease.

Semmelweis was a complex figure. Much has been written about him, both praiseworthy and critical, yet his legacy and work endure.[2] He was an obstetrician who worked from 1844 to 1850 in a hotbed (literally) of childbed fever at the Vienna General Hospital (VGH), the world's largest maternity hospital at that time.[3]

Childbed fever, also known as puerperal fever, usually struck women within a day or two after delivery and was usually fatal. One description from 1848 noted:

[Childbed fever] . . . is ushered in, from the second to the fourth day of confinement, by shivering, accompanied by acute pain radiating from the region of the uterus, increased on pressure, and gradually extending all over the abdomen, with suppression of [vaginal discharge following childbirth] and milk, much accelerated pulse, furred tongue, great heat of skin, and a peculiar pain in the [forehead]. [Patients usually have] short breathing, their knees drawn up, and great anxiety of countenance.[4]

This disease killed a great number of mothers across Europe and America. In some maternity clinics, the mortality rate exceeded 20 percent for decades. At its worst, childbed fever in some hospitals killed 70 percent or more of laboring mothers during outbreaks. In nineteenth-century Europe alone, more than a million women died from the illness.[4]

There was no cure for childbed fever. Therapy existed but it was useless and usually involved bloodletting. Leeches were used to draw blood locally, and often veins or arteries were opened. One physician described the practice in the 1820s.

They employed in most cases, immediately on the commencement of the disease, repeated venesection [opening of the veins], the application of leeches, emollient cataplasms [medicated substances spread over the skin], emollient clysters [enemas]; at a later period, blisters, with the corresponding internal remedies. .. [5]

Today we describe childbed fever as a postpartum infection, which is any bacterial infection of the female reproductive tract following childbirth. Signs and symptoms usually include a fever greater than 100.4°F, chills, lower abdominal pain, and possibly foul-smelling vaginal discharge. It usually occurs between the first twenty-four hours and ten days following delivery. Most infections involve several types of bacteria. With antibiotics, most patients recover in two to three days. However, in Semmelweis's day, there was no germ theory of disease, no antibiotics, and no routine hand washing or glove use before vaginal examinations.

The Prevailing Winds

What was thought to cause childbed fever in the 1800s? The most basic explanation was epidemic influences. Since Homer used the word "epidemios" (on people) in The Odyssey, the definition of epidemic had evolved.[6] Hippocrates defined it as "that which circulates and appears in a country, spreading on the people" or a collection of syndromes, such as a diarrhea epidemic. By the thirteenth century, it came to mean a large number of cases of a single, well-defined disease, such as a cholera epidemic, though the older meaning still persisted.[6]

Semmelweis summarized this view of childbed fever and epidemics.

It has not been questioned and has been expressed thousands of times that the horrible ravages of childbed fever are caused by epidemic influences. By epidemic influences, one understands atmospheric-cosmic-terrestrial changes, as yet not precisely defined, that often extend over whole countrysides, and by which childbed fever is generated in person predisposed by the puerperal state.[1]

Semmelweis was referring to Hippocrates's ideas about air, water, and places. Hippocrates taught that climate had a significant impact on disease causation. He had written about the air, its heat, the different types of climate, and the diseases that were observed under each type.[6]

In 1848, an American physician, J. P. Leonard, published a paper on epidemic influence in the Boston Medical and Surgical Journal. He stated, "By telluric and cosmic influences we however intend more than climate, more than even airs, waters, and places. We intend . . . the entire physical environment of the people and in addition their cultural, industrial, and economic status."[7] Thus, epidemics were heavily influenced by a variety of factors, including climate, location, season, and people's habits and manners.

Many factors pushed Semmelweis to investigate childbed fever. He faced this horrible disease daily, but there was more. He worked at a maternity hospital that collected and tabulated data, particularly death rates, and there was a well-known inconsistency or difference between two clinics, or divisions, in that institution that had no easy explanation. Semmelweis saw an opportunity to learn and asked many questions to find answers.

The Road to the Dilemma

How did Semmelweis arrive at this place and time? Born in 1818 to a prosperous family in Budapest (Pest-Buda at that time), Hungary, he was well educated—first at the Catholic Gymnasium of Buda, then at the University of Pest.[8] In 1837, he traveled to Vienna intending to study but soon switched to medicine, enrolling in the Vienna Medical School.[9]

After completing his first year in Vienna, Semmelweis returned home and continued his studies at the local university from 1839 to 1840. However, he returned to Vienna in 1840 to continue his studies at

the medical school, which became one of the leading world medical centers for almost a century with its combination of laboratory and bedside medicine. While there, Semmelweis's path crossed with several of the school's most well-known professors: Karl von Rokitansky (pathologist), Josef Škoda (dermatologist), Ferdinand Ritter von Hebra (dermatologist), Jakob Kolletschka (forensic medicine), and Johann Klein (obstetrician).[9]

After graduating in 1844, Semmelweis stayed in Vienna, received a master's degree in midwifery after completing a two-month course, and chose obstetrics as his specialty. Semmelweis continued his career at VGH. It had about eight hundred beds and two clinics or divisions. Each clinic had one professor and one first assistant, who was appointed for two years. Semmelweis became Professor Johann Klein's obstetrical assistant in the first clinic. His duties included examining patients, assisting with procedures, overseeing difficult deliveries, teaching students on rounds, and performing demonstrative autopsies in the morgue. In a twenty-four-hour period, Semmelweis might oversee twenty to thirty births.[4]

Since 1784, when VGH first opened, it had been compiling detailed statistics on the number of mothers who had delivered and then died of childbed fever in the two divisions.[4] The hospital was established to provide a safe and caring place for needy women to give birth, yet paradoxically, women there were far more likely to die than those delivering elsewhere. The clinics soon earned a bad reputation.

VGH's two maternity clinics were run differently in that one was assigned male medical students and the other female midwife students. This fact, along with the additional information that the rates of maternal mortality were substantially different between the clinics, provided Semmelweis with a "natural experiment" for figuring out how to stop this dreaded disease.[1]

In the first clinic where Semmelweis worked, the maternal mortality rate varied around 9 percent per year, three times higher than in the second clinic. Despite several committee investigations, no one could discover why.[1]

Women tried to avoid being assigned to the first clinic because it was widely known that it had a much higher mortality rate than the second. Semmelweis stated that he was frequently obliged to "witness moving scenes in which patients, kneeling and wringing their hands, beg to be released to seek admission to the second clinic."[1] He also noted that "the disrespect displayed by the [hospital] employees toward the personnel of the first section [clinic] made me so miserable that life seemed worthless." Despite his efforts, the occurrence of childbed fever in the first clinic increased after he started as an assistant.

Excerpted from ***The Preventioneers: Diseases, Disasters, and the Discoveries That Changed Our World***

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Johns Hopkins University Press, May 2026

ISBN 978-1-4214-5433-7 (paperback) | 978-1-4214-5434-4 (ebook)