Ignaz Semmelweis: tragic pioneer in the prevention of puerperal sepsis

This year marks the 190th anniversary of the birth of Ignaz Semmelweis, born in Budapest, then part of the Austro-Hungarian empire, in 1818. From earliest times, infection of the genital tract, often resulting in peritonitis, septicaemia, pyaemia and death – 'child-bed fever' or 'puerperal fever' – was a feared complication of delivery or abortion. With the establishment of lying-in hospitals, the disease often assumed epidemic proportions; it was safer to be delivered at home than in hospital.

Early important observations by obstetricians on the contagiousness of this disease included those of Alexander Gordon (1752–99) of Aberdeen. In a book he published in 1795 he suggested that puerperal fever was caused by putrid matter from the uterus being carried from one patient to another by the attending doctor or midwife and advised cleanliness on the part of the attendants.

Cleanliness was also stressed by Charles White (1728–1812), a Manchester obstetrician. Oliver Wendell Holmes (1809–94), of Boston, in a paper published in 1843, argued that a woman in labour should not be attended by a doctor who had recently performed an autopsy or attended a patient with puerperal fever.

Semmelweis was appointed first assistant to the Professor of Obstetrics at the great Allgemeines Krankenhaus in Vienna in 1846. The maternity unit was separated into two divisions. The first division was devoted to the teaching of postgraduate and undergraduate medical students and Semmelweiss soon found that here there was an appalling maternal mortality, which could be as high as 18%. In contrast, the second division, staffed entirely by midwives, had a maternal death rate of around 2%. Furthermore he noted that, while child-bed fever might be raging in the hospital wards, no such epidemic existed in women being delivered in their homes or even those unfortunates who self-delivered on the streets of Vienna.

The following year, his colleague, the pathologist Jacob Kolletschka, died after performing an autopsy during which he had pricked his finger. Semmelweis noted that the post-mortem features seen in his colleague bore a marked similarity to those of his patients dying of puerperal sepsis.

The cause of the difference in mortality between the two hospital divisions now became obvious to him. The doctors and medical students on the first division would perform post-mortems and also practice obstetrical procedures in the autopsy room. From there, they would hurry to the labour ward, bearing with them the invisible 'cadaver particles', recognized only by their characteristic unpleasant smell, which they would transmit on their unwashed hands from the cadaver to the birth canal of the woman in labour. In contrast, the midwives, who had nothing at all to do with the autopsy room, were protected from this contagion.

Semmelweis immediately initiated a ritual of hand-washing, which comprised a scrub with soap and water, followed by washing with chlorinated water until the smell of the post-mortem room had been completely eliminated from the operator's hands. At the same time, he ordered that instruments, basins, linen and dressings should be cleaned. The results were soon apparent, with the mortality rate of the first division falling to the region of 1%, well below that of the midwives in the second division.

Semmelweis's post in Vienna came to the end; he returned to Budapest in 1850, eventually being appointed professor in the University of Pest. There, in the old hospital of St. Roque, he achieved a maternal mortality of 0.85%, having antagonized the administrator by dumping a pile of stinking infected bed linen into his office.

Sadly, Semmelweis was the worst of communicators. In spite of a mass of clinical observations, backed up by animal experiments, he did not publish his work until 1861. His book *Aetiology, Concept and Prevention of Puerperal Fever* runs to 543 pages – rambling in style, filled with pages of statistics, argumentative and difficult to follow, it received little recognition. It was not translated into English until 1941. In his book he states:

> **'The carrier of the decomposed animal-organic material is the examining finger, the operating hand, instruments, bed linen, atmospheric air, sponges, the hands of the midwives and ward attendants that come into contact with the discharges of other ill parturients ... in a word, the carrier is anything that is contaminated with decomposed animal organic material that comes into contact with the vaginal tract.'**

By 1862, Semmelweis was showing undoubted features of severe mental deterioration. He looked prematurely aged and was losing his memory. His behaviour became more and more erratic – he would walk through the streets of Budapest warning its citizens of the perils of child-bed fever unless the doctor washed his hands with soap and water and then chlorinated water.

In 1865 his friends persuaded him to be admitted to a private mental asylum in Vienna. He had pricked himself a few days before his admission while performing an autopsy. Semmelweis died 2 weeks after admission; the post-mortem showed septicaemia and severe organic disease of the brain. He was 47 years of age.

In the very same year of the death of Semmelweis, 1865, a young Professor of Surgery at the Royal Infirmary, Glasgow – Joseph Lister – carried out the first operations under antiseptic technique. What a sad coincidence! BJHM

Professor Harold Ellis *is Emeritus Professor of Surgery, Guy's, King's and St Thomas' School of Biomedical Sciences, London SE1 1UL*

Conflict of interest: none.