In the 1800s, childbirth was often fraught with fear and death rather than joy. But growing knowledge about the cause of puerperal fever—also known as childbed fever—eventually brought the epidemic of maternal and infant mortality under control. How that knowledge was gained can be tracked in 19th-century documents.

By Emily Baumrin, William Corbett, Amita Kulkarni, and Lee A. Witters, M.D.

On November 30, 1843, tragedy struck at the brick home of Harvey Benton, a carriage painter of "unusual skill." Benton and his 31-year-old wife, Orilla Greely Benton, lived at 6 South College Street in Hanover, N.H., the current site of Dartmouth’s Hood Museum gift shop. Orilla Benton had given birth a few days earlier to their first child but died of postpartum complications on the 30th. Their infant daughter, named Orilla G., died on December 5.

These facts were duly recorded in a list of deaths "in the vicinity of Dartmouth College from 1777-1861" kept by William Worthington Dewey, a tavern keeper and chronicler of Hanover history. Dewey recorded the cause of death as "childbed erysipelas," but then crossed out the latter term and replaced it with "puerperal fever"—a disease called by Dr. Charles Meigs, a leading 19th-century obstetrician, "the most unspeakable terror." As it happens, three days earlier—on November 27—Dewey had also recorded, and then amended, the deaths of Mary Baker and her infant as due to "childbed erysipelas puerperal fever." A later entry by Dewey noted that out of 23 deaths in Hanover during 1843, "Mrs. Baker and Benton both died of puerperal fever."

Dewey appears to have been struck by this coincidence; indeed, they were the only deaths due to the condition that he recorded over the course of 84 years. Could the deaths have been related, and if so how? And what was the relationship seemingly identified by Dewey between puerperal (pronounced PWER-per-ul) fever and erysipelas (air-suh-SPAH-liss), a skin disease? Had he learned something by living across North Main Street from the institution now known as Dartmouth Medical School but then called New Hampshire Medical College? What was being taught about the two diseases to 19th-century medical students?

Answers to many of these questions can be found in medical reports and textbooks of that day; classroom notes and theses by Dartmouth medical students; local and national census data; and information gleaned from visits to local cemeteries, museums, and town clerks’ offices. 

The DMS student theses are especially revealing for several with further background on this subject, see dartmed.dartmouth.edu/W09/W01.
about the emerging understanding of a tragedy that touched many families of the period. Between 1815 and 1881, it was a graduation requirement that every DMS student write a scholarly thesis, which had to be defended to the faculty and, in some instances, to the president of Dartmouth College. (For a database listing all 1,202 of these theses, see dartmed.dartmouth.edu/w09/we01/.)

Few of the theses represent the kinds of original research done by today’s graduate students. Indeed, as John Wingate Bucknam wrote in his 1857 thesis on erysipelas: “We search our minds for some idea that are both acquired and unlearned, and which, upon all subjects, we know nothing about medicine practically; it is all theory. Therefore we are not enabled to prove any system of practice by our own observations but are obliged almost wholly to refer to the lectures and to the numerous medical works that have been hand-down to us by year after year by the learned of the profession.”

Yet despite Bucknam’s disclaimer, the theses illustrate the growing understanding—by both the students and the faculty of DMS—about the tragedy that struck South Street College in 1843.

The illnesses that the mid-19th-century medical student learned about were quite different from those of the present, as indicated by both census records and documents in the Dartmouth archives. Nationally as well as in New Hampshire, the 1850 census (which was the first one to include health data) recorded the leading causes of death as tuberculosis, dysentery/diarrhea/enteritis, typhoid fever, pneumonia, and “old age” (which was defined then as being over 50). Heart disease and cancer, now the leading causes of death in the U.S., accounted for only about 2% of deaths.

Epidemiologists have pointed out that the dramatic decrease in the death rate from other causes of death—from the 18th to the 20th century—is due to the numerous medical, preventive, and public-health measures that were introduced. The diseases that were predominant in the 19th century—tuberculosis, dysentery, typhoid fever—were largely ignored by the students and the faculty until the 1860s, when the insights of Louis Pasteur and Robert Koch were introduced.

In fact, the topics of the DMS student theses between 1815 and 1881 paralleled precisely the disease burden revealed by this census data, with the most common topics being pneumonia, tuberculosis, typhoid fever, scarlet fever/carlotina, diphtheria, and dysentery. (On occasion, however, DMS students did select other topics—including animal magnetism; tight lacing; suspended animation; the use of skunk secretions for “lying-in hospitals,” where physicians were placed at the bedside of women in labor; and the use of skunk secretions to treat disease; mycosis, or the fear of contamination; and even the evils of masturbation.)

Of the 1,202 DMS theses written over this 66-year period, seven were on the subject of puerperal fever and 21 were on erysipelas. Both subjects appear to have been taken by the mid-19th-century medical students. Evident in all these documents is a growing understanding of the connection noted by Dewey between the two diseases—an understanding that illustrates the ascendance of critical analysis in medical study.

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This article’s undergraduate coauthors—from the left, Emily Baumrin, William Corbett, and Amrita Kulkarni—are pictured in Dartmouth’s Rauner Library, home of the archives where they did much of their research.

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Dr. Charles White, a surgeon in Manchester, England, was one of the first physicians to take a step back from merely cataloging the disease and begin to examine its cause, however, he fell short. He noted the plethora of cases allowed him to recognize the epidemic nature of the disease. In an early call for hygienic practices, White warned against the retention of putrid lacteal milk—which was actually the white pus of infection!—as caused by the retention of putrid lacteal milk—which was actually the white pus of infection!—and vomiting. In his superb book, The Theory of Puerperal Fever, he gave an account of his theories, such as “milk-metastasis,” which held that puerperal fever was transmitted when the lacteal fluid was retained. By the time of Robert Collins, the master of Dublin’s Rotunda Hospital, reported that after the institution of hygienic practices (such as filling wards with chlorine gas and washing the woodwork with chloride of lime), that after the institution of hygienic practices (such as filling wards with chlorine gas and washing the woodwork with chloride of lime), the number of deaths from puerperal fever plummeted.

And, he wrote, “I had evident proofs of its infectious nature. . . . It is in the body of so-called “bad humors.” They included early and copious treatment, “often patient dies in 12 hours after delivery,” he boldly stated. Though just a country practitioner with no apparent knowledge of the disease, he evidenced little tolerance for the misconduct this conclusion implied on the part of health practitioners. “The time has come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune but a crime,” he stated.

Un fortunately, although Holmes’s paper was published in the New England Quarterly Journal of Medicine and Surgery in April 1849, it was not wide- ly read at the time. Holmes’s conclusions were largely ignored by his contemporaries, and the concept of a contagious disease continued to be debated and challenged. It was not until 1855 that his insights were published in a monograph titled Puerperal Fever as a Private Pestilence.

Holmes concluded that puerperal fever was a contagious disease conveyed by the unhygenic practices of a physician, midwife, or nurse. He evidenced little tolerance for the misconduct this conclusion implied on the part of health practitioners. “The time has come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune but a crime,” he stated.

Dr. Charles Knowlton, the DMS graduate who wrote provocatively about the unnatural death of Mrs. L., was also key in helping spread enlighten ment in the U.S. about puerperal fever. Though just a country practitioner with no apparent connection to the Boston academic establishment, he added to Holmes’s theory of transmissibility in 1844—just a year after Holmes first published his conclusions. Knowlton did not mention Holmes (or any other physician) in his paper and thus seems to have come independently to his idea, linking puerperal fever to erysipelas even more firmly than Holmes had. Although White, Gordon, Holmes, and Knowlton all recognized the contagious nature of puer-
pental fever, and Collins had suggested a preventive measure through hygiene, it is Dr. Ignaz Semmelweis, a Hungarian physician, who usually receives credit for the monumental discovery. This can be attributed to the experimental nature of Semmelweis’s work, for he based his findings on an epidemiologic analysis.

Semmelweis was appointed to the staff of the lying-in unit at Vienna General Hospital in 1846. He soon began to notice a drastic difference in the rates of puerperal fever mortality between the two clinics of the unit. One clinic was restricted to midwives, while the other one was used to teach physicians-in-training. The physicians and medical students who presided over the latter clinic would perform autopsies in the hospital’s morgue and then go directly upstairs to conduct deliveries and vaginal exams. Consequently, the second clinic had a far higher death rate due to puerperal fever.

With this evidence, Semmelweis implemented a regimen in which the physicians and trainees were required to wash their hands with chloride of lime before entering the maternity unit. The data supported his hypothesis, with the rate of puerperal fever deaths in the physicians’ clinic declining by 92% after the intervention. His findings, however, were not widely circulated and were not even published until his 1860 treatise, Etiology, Concept, and Prophylaxis of Childbed Fever, so it’s unlikely that they influenced medical education and practice in the 1840s and 1850s, especially in the United States.

Lessons from the 19th century

Although there was much debate throughout the 19th century about contagion, infection, and viruses, the understanding then of those terms bore only a vague resemblance to today’s knowledge. For example, one of the prevalent theories of contagion involved so-called “miasmas.” They were thought to be poisonous vapors generated by putrid, decomposing materials that polluted the atmosphere, according to A History of Infectious Diseases and the Microbial World. But it was not until the latter part of the century that the existence of airborne microorganisms was proven.

Yet long before that time, the debate surrounding contagion influenced the medical community’s response to diseases like erysipelas and puerperal fever. It is now known that these diseases were not contagious, but the notion that erysipelas, for example, might be contagious was still entertained. The idea that certain diseases might be contagious was still entertained by physicians and medical students alike.

For example, though Samuel Brown referred to erysipelas in his 1872 thesis as “a virus,” the term then meant a poison or infectious agent, not the class of microorganisms now bearing that name.

Charles Hunt, an 1857 DMS graduate, noted in his notes he was a student the growing understanding of puerperal fever’s transmissibility.

This confusion is evident in the 21 DMS theses on erysipelas. They, and death records of the time, make it clear that the disease swept through the Upper Valley during the mid-1800s—even more so than puerperal fever. Yet the theses were filled with misconceptions about what caused the disease and even whether it was contagious.

For example, though French also acknowledged erysipelas’s contagious nature in his 1856 thesis but was unsure exactly how it spread. “Perhaps it may be that inflammation by being treated to bad air and filth . . . generates a more extensive plan than at others, not only affected by the 1850s, well in advance of wide knowledge of the work of Semmelweis. For example, Eina Paine wrote in 1851, “We ought to practice carefully to consider that there is a risk of conveying infection, if we were to attend the erysipelatous and the puerperal at the same time.” He mentioned children born with advanced erysipelas due, he suggested, to “bad management of the umbilical cord, in addition to causes in the adult.” Paine also discussed an erysipelas epidemic in northern New Hampshire in 1843; he supported his observations about the disease’s contagious nature by noting that it was more common to find erysipelas in locations where cases of the disease had previously occurred.

And Charles Hunt—an 1857 graduate of DMS—who later achieved wide recognition for his service during the Civil War (for more about his career, see Dartmouth Medicine) included in his 1852 classroom notes a three-page summary of erysipelas. This account concludes with a mention of the disease’s contagious nature by noting that it was more common to find erysipelas in locations where cases of the disease had previously occurred.

Hunt’s 1852 lecture notes describe the symptoms of a skin inflammation called erysipelas, then suggest a link between that disease and puerperal fever. Today, we know both are caused by a streptococcal bacterium.
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