

A CORNERSTONE OF SEPSIS PREVENTION

Semmelweis's Enduring Legacy in the Era of Antimicrobial Resistance



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The image in Fig. 1 is a striking rendition of Ignaz P. Semmelweis's pioneering work in sepsis prevention, as imagined by American artist Robert Thom. Thom transports the viewer to a 19th-century hospital ward where physicians and trainees gather near a patient's bed, observed closely by the patient and a ward attendant.

The composition draws the eye to Semmelweis, the only figure facing forward. He is depicted explaining the handwashing technique he conceived during a profound "eureka moment," while the staff focuses intently on his instruction. Nearby, others gather around a pair of basins for practical application.

Thom's photorealistic painting immortalizes Semmelweis's revolutionary insight into infection prevention, capturing his introduction of handwashing at Vienna General Hospital in 1847 – a practice that remains fundamental today.¹

Robert Alan Thom was born on March 4, 1915, in Grand Rapids, Michigan, to Max and Laurine Thom. Though he spent most of his youth in Michigan, he studied under Ukrainian-American artist Robert Brackman at the Columbus School of Fine Arts in Ohio. After graduation, he worked in commercial illustration for Detroit-based companies before establishing his own studio.²

In 1948, Thom joined the collaborative project *A History of Pharmacy in Pictures*, commissioned by the pharmaceutical company Parke-Davis. While Thom created the images of pivotal medical moments, the accompanying narratives were written by George A. Bender, a pharmacist and historian at the company. Thom followed this in 1964 with *A History of Medicine in Pictures*. This volume, also commissioned by Parke-Davis, featured 45 oil paintings, including the depic-

tion of Semmelweis's handwashing breakthrough.^{3,4} Through a series of subsequent mergers, the Parke-Davis archives eventually became the property of the Pfizer corporation.⁵

Introduced before the advent of germ theory, Semmelweis's groundbreaking intervention aimed to prevent childbed (puerperal) fever.^{1,6} He had observed a stark disparity in mortality rates: wards where physicians and students performed deliveries saw significantly higher death tolls than those staffed by midwives.⁷ Semmelweis hypothesized that the staff were unknowingly transmitting "cadaverous particles" from the autopsy room to the maternity ward on their hands.¹

To test his theory, Semmelweis introduced a chlorinated lime antiseptic for handwashing.¹ This intervention reduced the absolute mortality rate from roughly 18% to 2% – a relative decrease of nearly 90%.^{1,7} Despite such compelling data, he encountered skepticism because germ theory was as yet unknown.^{7,8} Full acceptance and vindication arrived a quarter-century later with the advancements of Louis Pasteur and Joseph Lister.⁹

Modern medicine classifies puerperal fever as maternal sepsis, defined as life-threatening organ dysfunction resulting from a dysregulated host response to infection.¹⁰ Whether acquired in a community or health care setting, sepsis represents a critical global health challenge, linked to nearly 11 million deaths annually.^{11,12} In the United States, it remains a leading cause of mortality, associated with one-third of all hospital deaths.¹³

Significant strides have been made in preventing maternal and neonatal sepsis, but the condition remains a leading cause of pregnancy-related deaths worldwide, especially in areas with limited resources.¹⁴

The World Health Organization promotes crucial interventions, including hand hygiene and the proper use of antibiotic prophylaxis, for specific procedures such as C-sections.¹⁵

In the United States, the Patient Safety Bundle for Sepsis in Obstetric Care, supported by the American College of Obstetricians and Gynecologists, focuses on readiness, early recognition, and rapid response protocols within hospitals to prevent and manage infections.¹⁶ The Centers for Disease Control and Prevention has also championed enhanced surveillance and prevention programs for specific pathogens such as *Streptococcus agalactiae*, which has led to a significant reduction in neonatal sepsis cases.¹⁷

Inappropriate antimicrobial use is a primary driver of antimicrobial resistance, which is a growing threat to public health that can lead to treatment failure and increased mortality. The proliferation of drug-resistant pathogens significantly increases the risk of developing

sepsis and septic shock.¹⁴ For example, bloodstream infections caused by drug-resistant non-typhoidal *Salmonella* species are a serious therapeutic challenge, as are carbapenem-resistant bacteria such as *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Acinetobacter* acquired in health care settings.^{14,18} To address this multifaceted challenge, a global “One Health” approach involves not only the promotion of appropriate prescribing but also the judicious use of anti-infectives in agricultural settings.¹⁹

Thom's realistic painting serves as an enduring reminder of the introduction of modern infection prevention, a foundational element of patient safety.² The World Health Organization's “My 5 Moments for Hand Hygiene”^{20,21} – a practical and systematic approach to reducing maternal and child mortality – confirms that Semmelweis's insight remains profoundly relevant, underscoring the enduring importance of simple, effective measures in public health.^{6,7}



Fig. 1. Semmelweis – Defender of Motherhood, from *The History of Medicine*, circa 1952 by Robert Thom. From the collection of Michigan Medicine, University of Michigan, Gift of Pfizer, Inc., UMHS.26. Used with permission.

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