Literature-Centered Medicine: The Story of Ignac Semmelweis

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Abstract:

Literature-centered medicine is a nontraditional learning method developed to supplement medical didactic curricula. With this method, a work of medically related fiction was used as a starting point in the exploration of various historical and contemporary topics. The project initially involved reading Morton Thompson's *The Cry and the Covenant*, a fictionalized biography of the Hungarian obstetrician Ignac Semmelweis, known for promoting antisepsis in nineteenth-century Europe. Subsequently, a branching analysis of five major topics generated from this work was conducted. Multiple parallels were identified between nineteenth-century and twenty-first century medical communities. The group concluded that approaching medicine from this nontraditional angle was an intellectually stimulating way to learn and an excellent supplement to didactic education. Literature-centered medicine led to an exploration of issues that would have otherwise been overlooked in a standard learning environment, while also providing an opportunity to apply history to the understanding of modern medical practice.

Key words: hospital-acquired infections, nosocomial infections, hand washing, noncompliance, puerperal fever, history of medicine, medical education, nineteenth-century, medical economics

Resumo:

Medicina centrada em literatura: a história de Ignac Semmelweis

Medicina centrada em literatura é um método de aprendizagem não-tradicional desenvolvido para suplementar currículos didáticos médicos. Com este método, um trabalho relacionado a ficção médica foi usado como ponto de partida na exploração de vários tópicos históricos e contemporâneos. O projeto envolveu inicialmente a leitura do livro "The Cry and the Covenant" de Morton Thompson, uma biografia de ficção do ginecologista húngaro Ignac Semmelweis, conhecido por promover anti-sepsia na Europa no século XIX. Subsequentemente, uma análise de ramificação foi conduzida a partir de cinco principais tópicos gerados deste trabalho. Múltiplos paralelos foram identificados entre as comunidades médicas do século XIX e do século XXI. O grupo concluiu que abordando a medicina de um ângulo não-tradicional era uma maneira intelectual de estimular o aprendizado e também um excelente suplemento de educação didática. A medicina centrada em literatura levou a exploração de questões que, de outra maneira, seriam negligenciadas em um ambiente de aprendizagem padrão, enquanto que também podem fornecer a oportunidade de aplicar a história á compreensão da prática médica moderna

Palavras-chave: infecção hospitalar, infecção nosocomial, lavagem das mãos, inaderência, febre puerperal, Historia da medicina, Educação Médica, século dezenove, economia médica

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Introduction

In traditional medical school curricula, didactic coursework is the primary means of student education during the first two years. At the Mayo Clinic College of Medicine in Rochester, MN, medical students have six-week didactic blocks followed by two weeks of dedicated selective time, in which students can choose to shadow physicians, engage in community service, continue research, or pursue other interests deemed to enrich their learning.

We sought in our selective time to study contemporary medical topics through the lens of fictional medical literature. We began this literature-centered study of medicine by choosing a work of medical fiction as the central focus of our study. In reading we identified major topics of interest sparked by the literary work and then expanded those topics using a variety of nonfiction resources.

We chose for our work Morton B. Thompson's *The Cry and the Covenant* (1949), a fictionalized biography of the Hungarian obstetrician Ignac Semmelweis, known best for promoting hand washing in the Austrian medical community during the mid-nineteenth century. Thompson describes the poor sanitation in the Vienna General Hospital, where Semmelweis made the connection between puerperal fever and poor hand hygiene.

We generated a list of possible topics and chose five based on personal interest and relevance to modern medical practice (Table 1). Below is a condensed version of our findings.

Table 1

Topics of Interest Following Literature-Centered Study of Medicine

Hospital-acquired infections and hand-washing noncompliance
The economics of hand hygiene
The modern state of puerperal fever
Resistance to change in medical practice
Non-fictionalized account of Semmelweis' life and struggles

1. Hospital-acquired infections and hand-washing noncompliance

> "On the wooden table [...] lay the body of a woman [...] The uterus had been dissected out. In the cavity thus formed in the corpse had been put the waxen body of a dead,

> new-born child [...] As the student advanced to the table the door of the autopsy room opened. Klein, who had been making last-minute arrangements to the body of the child as it lay in the dead woman, looked up indignantly [...] It was a short walk, across the hall and into the next ward. [Klein] wiped his hands on the lapels of his coat. An attendant drew back the bedcovers [...] 'Be easy, Mother. We'll take care of you.' "
>
> -*The Cry and the Covenant*

Such a description was common in Europe during the mid-1800s, when physicians and students practiced post-mortem procedures immediately followed by patient examinations (Nuland, 2008; Porter, 1996). Hospitals focused on maintaining ventilation and reducing overcrowding to minimize infection, but failed to see the connection between infected post-mortem specimens and the spread of disease. Pregnant women feared forced admission to the physician-run division of Vienna General Hospital due to high rates of puerperal fever, preferring birth on the streets where cases of the illness were surprisingly absent (Nuland, 2008; Porter, 1996).

In 1847, Ignac Semmelweis realized the need for washing hands and instruments after cadaver dissections and prior to patient contact. He attempted to implement the use of a chlorine washing solution, but was met with resistance from physicians. Midwives were more apt to use the solution in their wards and witnessed a dramatic reduction in puerperal fever rates (Nuland, 2008; Porter, 1996; Porter, 1997).

Today, hospitals still battle nosocomial infection, but a new host of organisms have taken the place of illnesses past. *Clostridium difficile* and vancomycin-resistant *Enterococci* are only some of the hospital-acquired infections making for a daunting hospital stay (*Infectious Diseases*, 2006). Unfortunately, hand washing noncompliance during patient contact is still the top reason for the spread of infectious agents (Pittet, Mourouga, & Perneger, 1999).

Various studies have monitored hand hygiene practices in hospitals to identify current risk factors and reasons for noncompliance. Risk factors include being a physician, working in the ICU, and working during the morning shift. The busier the units, the less likely that hand hygiene protocols are followed. When surveyed, health care providers mentioned laxity of practice, lack of education and role models, and high workload as major deterrents of compliance (Pittet, Mourouga, & Perneger, 1999; Suchitra & Lakshmidevi, 2006).

Interestingly enough, the reasons for noncompliance highlighted in modern studies mirror those that plagued nineteenth century Europe. Even with current hospital intervention programs and the advent of alcohol-based hand sanitizers, compliance remains low (Bischoff, Reynolds, Sessler, Edmond, & Wenzel, 2000). The efficacy of hand washing in decreasing the rates of hospital-acquired infections has been proven, but it seems some behaviors persist.

2. Economics of hand hygiene

The nosocomial infections highlighted in *The Cry and the Covenant* clearly parallel those found in modern day hospitals. An estimated 10% of hospitalized patients acquire an infection after admission, resulting in substantial economic cost based on prolongation of stay and additional interventions (Graves, 2004). Many scientists and physicians have expanded on Semmelweis' ideas in an attempt to decrease the morbidity and mortality of nosocomial infections. In 2001, Peter Provonost implemented a checklist in the Johns Hopkins Hospital ICU to prevent central line infections (Provonost et al, 2006). It involved five steps: (1) Wash hands with soap; (2) Clean the patient's skin with chlorhexidine antiseptic; (3) Put sterile drapes over the entire patient; (4) Wear a sterile mask, hat, gown, and gloves; (5) Put a sterile dressing over the catheter. In "The Checklist" (2007), Atul Gawande describes the results of Provonost's project:

> "The results were so dramatic that they weren't sure whether to believe them: the ten-day line-infection rate went from eleven per cent to zero. [...] They calculated that, in this one hospital, the checklist had prevented forty-three infections and eight deaths, and saved two million dollars in costs."

The effect of the checklist on morbidity, mortality, and the bottom line was astounding. However, infection control programs are expensive and subject to downsizing or elimination. The Centers for Medicare and Medicaid Services' October 2008 implementation of the "no-pay list" attempted to counteract the downsizing of infection control programs and improve patient safety by ending payment for ten nosocomial conditions considered "reasonably preventable" (Table 2). These ten events, numbering nearly 700,000, were associated with $22 billion dollars in hospital charges in 2007, raising the question of whether a checklist is in order for each of the items on Medicare's list (Trapp, 2008).

Table 2

Medicare List of Preventable Nosocomial Events (Trapp, 2008)

Stage III, IV pressure ulcers
Fall or trauma resulting in serious injury
Vascular catheter-associated infection
Catheter-associated urinary tract infection

Foreign object retained after surgery
Certain surgical site infections
Air embolism
Blood incompatibility
Certain manifestations of poor blood sugar control
Certain deep vein thromboses or pulmonary embolisms

3. The modern state of puerperal fever

> "There is incredibly, a fever. There is vomiting. There is diarrhea. There is crunching pain. And now it is all over. In three days this healthy, praying woman is a burning, unrecognizable, insane corruption. And you will watch, helpless."
>
> -*The Cry and the Covenant*

The *Cry and the Covenant* graphically describes the horrors of puerperal fever. This led us to consider modern puerperal fever and whether it is still a problem after pregnancy.

'Puerperal' refers to the 'puerperium,' or the postnatal period, during which a woman's normal barriers to infection are compromised. If the body cannot defend itself from a developing uterine infection, bacteria can spread from the uterus to the peritoneum or bloodstream.

Maternal mortality has decreased with the advent of hygiene and antibacterial therapy. The absolute number of puerperal fever cases is therefore low; however, it still accounts for 16% of the deaths of new mothers. *Streptococcus pyogenes* usually causes the infection, which occurs after hospital discharge; thus, it primarily affects developing countries where postnatal care is lacking (Maharaj, 2007).

Today, we think of childbirth as a routine process that is unlikely life threatening. Reading *The Cry and the Covenant* encouraged us to examine puerperal fever, discover how dangerous it once was, and track its progress in time.

4. Resistance to change in medical practice

Morton Thompson paints a dramatic picture of Ignac Semmelweis' demise. Although Semmelweis made the monumental connection between puerperal fever and poor hand

hygiene, he was unable to convince others of the utility of his harsh hand-washing regime and was forced to return to his native country. His tragedy was his inability to convince the world that thousands of lives could be saved by the simple expedience of hand washing.

A study published in *The Journal of Healthcare Management* outlines the main reasons for physician resistance to change: feelings of incompetence, concerns about workflow, or uncertainty of reasons for change (LeTourneau, 2004). This highlights a key concept of effecting change: communication. Healthcare teams must work together when considering change and understand why a change is being implemented. Semmelweis was unable to articulate why hand washing was, in fact, important. He simply made a unilateral decision that all physicians would use his caustic cleansing solution. The physicians working with Semmelweis did not understand why this new process was necessary or why they should bother to take the time to wash their hands. Additionally, proper education about how to perform a new task is essential. While it is not necessary to pander to physicians' egos, it is crucial to properly educate healthcare staff so that they are able to perform what is being asked of them.

5. The Non-Fictionalized Account of Semmelweis

Since *The Cry and the Covenant* is fiction, we elected to examine a nonfictional representation of the same events. We wanted to know whether the fictionalized account of the story left out anything important, or whether it added any details that colored our view of Semmelweis and his discovery.

We read Sherwin B. Nuland's *The Doctor's Plague: Germs, Childbed Fever, and the Strange Story of Ignac Semmelweis* (2003), in which he writes convincingly about certain topics not fully discussed in Thompson's book. Nuland presents Semmelweis in a way that is different from the hero worship in Thompson's novel. Nuland thought Semmelweis' difficult personality and pride kept him from saving the lives of the women he was trying to protect. It is clear, even in the novel, that Semmelweis is frustrated with the physicians and scientists who oppose his theory. However, Thompson places the burden of responsibility on those nonbelievers, rather than on Semmelweis, whose frustration drove him to delay publishing his work. Semmelweis disliked writing so much that when he did publish, it was not in a clear or persuasive form.

Nuland points to the similar work by Joseph Lister, who also faced great opposition. However, Lister's refusal to back down allowed him to convince the world to accept his theory. In Nuland's opinion, had Semmelweis' nature been different, he could have pushed his theory

of antisepsis to acceptance, prevented a multitude of deaths, and also pushed medical science to new levels.

Reading this work by a historical researcher cast a different light on the novel and this project as a whole. It allowed us to consider the advantages and disadvantages of using a work of fiction to begin a literature-centered project. On one hand, *The Cry and the Covenant* was an enjoyable read and the narrative tone kept us engaged. On the other hand, the account was fictional and presented events in a biased manner. Even Nuland's factual account of events was colored by his interpretation and personal beliefs about Semmelweis. It seems that the novel was a great place to start; however, to fully delve into such a project, it was necessary to turn to the variety of resources that we used.

Conclusion

In the *New England Journal of Medicine* in 2004, Irving Loudon states, "I know of no one else in the history of medicine whose reputation rose from the extreme of oblivion to reverence as one of medicine's greatest heroes." Morton Thompson's fictionalized biography introduced us to this fascinating man, Ignac Semmelweis. *The Cry and the Covenant* also piqued our interest in issues related to nosocomial infections, modern puerperal fever, and resistance to change. The overwhelming advantage of using a work of fictional literature as a springboard for this project was that it allowed us to have humanities-based discussions too often lacking in a standard basic science curriculum. We were able to discuss Ignac Semmelweis not only as a historical personage, but also as a literary protagonist. Reading both Nuland's and Thompson's book threw an element of stimulating questioning into our investigation of topics related to *The Cry and the Covenant*: was Semmelweis really a tragic, helpless hero whose brilliant discovery was stifled by the medical elite, or did he orchestrate his own failure and destruction?

References

Bischoff W.E., Reynolds T.M., Sessler C.N., Edmond M.B., Wenzel R.P. (2000). Handwashing Compliance by Health Care Workers. *Arch Intern Med, 60*, 1017-1021.

Gawande A. (2007). The Checklist. *The New Yorker Annals of Medicine*. Retrieved December 6, 2009 from http://www.newyorker.com/reporting/2007/12/10/071210fa_fact_gawande.

Graves N. (2004). Economics and Preventing Hospital-acquired Infection. *Emerg Infect Diseases, 10*(4), 561-6.

Infectious Diseases in Healthcare Settings. Retrieved December 6, 2009 from the Centers for Disease Control and Prevention: http://www.cdc.gov/ncidod/dhqp/id.

LeTourneau, B. (2004). Managing Physician Resistance to Change. *J Healthc Manag, 49* (5), 286-8.

Loudon I. (2004). The Doctors' Plague: Germs, Childbed Fever, and the Strange Story of Ignác Semmelweis. *NEJM*, *350*, 1368-1370.

Maharaj D. (2007). Puerperal Pyrexia: A Review. Part 1. *Obstet Gynecol Surv, 62* (6), 393-9.

Nuland S.B. (2003). *The Doctors' Plague: Germs, Childbed Fever, and the Strange Story of Ignác Semmelweis*. New York: W.W. Norton.

Nuland S.B. (2008). *Doctors: The Illustrated History of Medical Pioneers*. New York: Black Dog & Leventhal Publishers, Inc.

Pittet D., Mourouga P., Perneger T.V. (1999). Compliance with Handwashing in a Teaching Hospital. *Ann Intern Med, 130* (2), 126-134.

Porter R. (1996). *The Cambridge Illustrated History of Medicine*. New York: Cambridge University Press.

Porter R. (1997). *The Greatest Benefit of Mankind: A Medical History of Humanity*. New York: W.W. Norton & Company, Inc.

Provonost P., Needham D., Berenholtz S., Sinopoli D., Chu H., Cosgrove S. (2006). An intervention to Decrease Catheter-Related Bloodstream Infections in the ICU. *NEJM, 355*(26), 2725-2733.

Suchitra J.B., Lakshmidevi N. (2006). Hand washing Compliance- Is it a Reality? *JHAS*, *5*(4),1-5.

Thompson M.B. (1949). *The Cry and the Covenant*. New York: Doubleday & Company, Inc.

Trapp D. (2008). *Final Medicare no-pay rule targets 10 hospital-acquired conditions*. Retrieved December 6, 2009 from American Medical News: http://www.ama-assn.org/amednews/2008/08/25/gvl10825.htm#s1.

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