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History of Medicine in the Clerkships: A Novel Model for Integrating Medicine and History

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ABSTRACT

The history of medicine has only unevenly been integrated into medical education. Previous attempts to incorporate the subject have focused either on the first year, with its already over-subscribed curriculum, or the fourth year in the form of electives that reach a small minority of students. Duke University provides an alternative model for other universities to consider. At our institution we have overcome many of the curricular limitations by including history during the mandatory third year clerkships. Reaching 100% of the medical school class, these sessions align with clinical disciplines, providing students a longitudinal perspective on what they are seeing and doing on the hospital wards. They are taught in conjunction with a medical history librarian and rely heavily on the utilization and interpretation of physical artifacts and archival manuscripts. The surgery, obstetrics/gynecology, and pediatrics rotations now feature successful and popular history of medicine sessions. Describing our lesson plans and featuring a list of both physical and online resources, we provide a model others can implement to increase the use, the framing, and the accessibility of history in their medical schools.

KEYWORDS: medical education, history teaching, clinical services, medical libraries

We have long known that the history of medicine has power to enlighten and inform health care providers, yet this critical subject has been disappearing from medical school curricula.[1] There have been multiple attempts to re-introduce history, most concentrating on the classroom-based pre-clerkship years or fourth-year electives. These endeavors have met a series of logistical challenges compounded by the difficulty of applying interventions effectively across institutions, each with its own parochial politics and organizational nuances. In this article, we turn to the example of our own institution, Duke University, to provide an

1 David S. Jones, Jeremy A Greene, Jacalyn Duffin, and John Harley Warner, "Making the Case for History in Medical Education," *Journal of the History of Medicine and Allied Sciences* 70:4 (2015), 623-52.

alternate model: instructing students in medical history during their mandatory, structurally conserved third-year clinical rotations.

In the United States, medical school is four years in length. Traditionally, students spend the first year learning about the normal body (anatomy, physiology, histology, etc); the second year studying the diseased body (pathology); the third year is devoted to clerkships when students learn how to care for patients in hospitals and clinics; and the fourth year is when students choose electives to prepare for their future careers.[2] Recent efforts have attempted to shorten and revise this structure by incorporating clinical material earlier, but over the last century the clerkship experience has remained remarkably constant. During that year, students move through four-to-eight-week rotations in medicine, surgery, psychiatry, neurology, pediatrics, obstetrics & gynecology (OB/GYN), family medicine, and often several electives such as radiology or emergency medicine. The format of these varies by institution and specialty but generally focuses on student-patient contact; nearly all incorporate didactic sessions.

At Duke University in 2009, we secured an hour of classroom time in the surgery, OB/GYN, and pediatric clerkships to integrate the history of medicine as related to that specialty. Making this curricular change was easier than anticipated, and we relied on personal relations among faculty, asking for a relatively minor time commitment. Our pilot efforts in 2009 were met with a favorable response from students, which has helped to continue this program even today. For each unit, we coordinated with staff of the History of Medicine Collections at Duke University Libraries to create a lesson plan that integrated archival documents and artifacts from historical eras to illustrate key points and capture student attention. We are fortunate that while students rotate at multiple clinical sites, they all return to the main campus for their didactic education. There are usually around 15-20 students per session, currently all studying for the MD degree, although we imagine a similar setup is possible for Physician Assistant (PA) and nursing students. Given the universality of the clerkship experiences, this model is transportable to medical schools around the country. To facilitate applying this system to other institutions, in this essay we articulate examples of lesson plans for each of the three specialties below. They represent only suggestions; clinicians/historians should adopt them to their local needs. Indeed, we selected these three specialties due to the clinical and historical expertise of the authors, professional relationships with departmental leadership, and relevant historical materials to support lessons; others clerkships would have been equally acceptable. Addended is a list of online resources available to instructors as virtual artifacts to buttress their teaching that are particularly valuable for institutions lacking large historical collections or with insurmountable logistical hurdles in making them available.

START WITH LOCAL RESOURCES: A LIBRARIAN'S PERSPECTIVE

The staff of the History of Medicine Collections at Duke University is committed to supporting instruction and especially encouraging programs that capitalize on its holdings. Previous studies have clearly demonstrated that teaching with primary sources and engaging in active learning increases value by exposing students to historical artifacts and providing opportunities to make connections.[3] Many of the materials utilized in our program originate from the Josiah Charles Trent Collection, whose namesake worked as a thoracic surgeon and instructor at Duke University from 1939-1948. Upon his death, Trent's family donated his personal collection

2 AAMC, "Instructional Formats Used in the Curriculum," https://www.aamc.org/data-reports/curriculum-reports/interactive-data/instructional-formats-used-curriculum. This model is currently in flux, with a move away from lectures and generally more time spent on the wards. See for example, Richard M. Schwartzstein and David H. Roberts, "Saying Goodbye to Lectures in Medical School – Paradigm Shift or Passing Fad?" *New England Journal of Medicine* 377:7 (2017), 605-607.

3 Lois Hendrickson, "Teaching with Artifacts and Special Collections," *Bulletin of the History of Medicine* 90:1 (2016), 136-40.

explicitly as an educational resource, with his widow reflecting that "he was one of the growing body of medical men who saw the history of medicine as an inextricable aspect of the life of medicine."[4]

Although our program has grown into a very successful one, we experienced several logistical hurdles. While classes are held at the Medical Center, the History of Medicine Collections are physically located on the main university campus at the David M. Rubenstein Rare Book & Manuscript Library. We had to establish protocols for removing artifacts from the Rubenstein Library and transporting them safely across campus, recognizing limitations such as size and what items could be ferried and rapidly arranged in effective displays. Planning and time management are key, as materials have to be pulled and properly packed for the ten minute walk between the two locations. Communication between instructor and librarian is essential for determining appropriate and relevant objects, as well as establishing and explaining guidelines for handling them. Early collaboration is critical in determining how to coordinate the lesson plans and artifacts utilized.

Exposing medical students to historical artifacts has numerous benefits. Students welcome the opportunity to engage with historical materials, from rare obstetrical atlases to Renaissance-era amputation saws. These interactions broaden their perspective on the challenges, successes, and failures of the medical profession's past by providing tangible memories that physically link students to history. They also deeply connect us to the emotional aspects of doctoring both today and in the past. Practical instruction in the history of medicine affords students to see the university's collections and to connect them with librarians and archivists. These sessions also allow us to foster a stronger relationship between the medical campus and the main university campus.

A CASE STUDY IN SURGERY

Surgery easily adapts to incorporating historical perspectives, as every instrument, every operation, and most diseases are named for past surgeons. Many faculty members are at least avocationally interested in the field, and it is not uncommon for some faculty to quiz students in operating rooms on historical trivia. So students on the clerkship are already attuned to the past, but we want to expand their perspective beyond a series of non-sequitur factoids removed from any context to provide a broader appreciation for history. Our most popular curricula leverage surgical manuals and artifacts from different historical periods, using each to present how surgeons worked in their era. This not only enables the discussion of change over time but also presents an opportunity to highlight how surgeons of a given time period marshalled the contemporary medical and scientific knowledge for their practice, thus allowing us to discredit notions of "butchers" and barbers that so often characterize pre-modern surgery. Instead, we can demonstrate their expertise in managing patients and disease. Commencing with replicas of Roman instruments, we discuss the range of possible procedures, accentuating the superficial nature of surgery in antiquity. Students are permitted handle these artifacts and compare them to the accoutrements available in modern ORs. We then display an incunabulum to highlight the importance of textual tradition in medieval medical practice and how the illiteracy of surgeons initially excluded them from the medical community and contributed to a professional division from physicians that lasted a millennium. A large amputation saw from the early modern period, a perennial favorite, facilitates the discussion of military surgery at a time when gunpowder first appeared on battlefields. This leads into a conversation of Ambroise Paré's classic passage on effective treatment of gunshot wounds and stimulates a debate on the transition from text-based

4 MDBT Semans, "Josiah Charles Trent as a Collector," *Library Notes: A Bulletin Issued for the Friends of Duke University Library* 32 (1956), 1-5.

information to experiential, empiric knowledge. Civil War surgical kits at a glance exhibit little difference from early modern ones, but observant students usually find in them an ether mask, prompting discourse on the introduction of anesthesia and its relatively rapid utilization in the practice of surgery. Comparing these Civil War instruments with those of the later nineteenth century permits the class to observe the changes made following the introduction of asepsis, with plain, all-metal tools to facilitate sterilization.

We make several major arguments using these diverse artefacts: (1) what is surgery and how has it evolved through the centuries; (2) how surgeons of each era practiced to contemporary limits of expertise and science; (3) developments in knowledge and technology, often advanced by surgeons, have altered practice through history and will continue to do so for the future; (4) change is not linear progress towards perfection. Students discuss ideas such as antisepsis that have since been widely adopted but faced significant coetaneous resistance while also highlighting operations such as frontal lobotomy that were once widely practiced but since have been condemned as ineffective, unethical, or both. Students tend to dismiss these examples as aberrations, and it can be challenging to prod the group beyond hero-and-villain thinking into comprehending that an idea must be understood within the context of its time.

GIVING BIRTH TO A BETTER UNDERSTANDING OF OBSTETRICS

The obstetrics session begins with a comparison to surgery. Most people, given the choice to undergo an operation in 1820 versus 2020, would readily choose the latter. In popular culture, the annals of surgery are generally told as a story of progress. However, the history of obstetrics is more contested. Many women today develop elaborate birth plans for their providers' review, longing for a "natural" birthing experience free from the modern contrivances of cesarean sections, fetal monitors, and anesthesia. This reflection sets the stage for the significance of medical history. What do we really know about the reality of childbirth in 1800? Do delivery outcomes today justify so much intervention? And how does history help us reflect on the question of just what constitutes a "good" birth?

We begin by exploring the idea and reality of childbirth in 1800, setting up a (limited) re-enactment of giving birth in that era. Students play the roles of a woman in labor, a midwife, and a physician, with a circle of accompanying ladies assisting the delivery. Here, Laura Thatcher Ulrich's analysis of the diary of midwife Martha Ballard provides background upon which we rely, supplemented by contemporary manuals available to practitioners of the time.[5] Much of the simulation focuses on the art of waiting and the role of the support women, as well as the authority of midwifery as a craft learned through experience rather than from academic writings. Then we examine late eighteenth- and nineteenth-century obstetric texts to illustrate a perceived shift in authority to one grounded in anatomical knowledge. Students grapple with the difficulty of using forceps properly and how individuals might teach or develop such a skill, an insight that leads to a dialogue of how scientific knowledge translates into practice. Regardless of his anatomical expertise or medical grounding, the ability of an obstetrician/man-midwife was ultimately determined by his ability to deliver babies safely.

A discussion of outcomes follows the simulation, starting again with Martha Ballard's diary. Most students, aware that today nearly one in three pregnancies result in caesarean section in the United States, are stunned that Ballard described only 5.6% of her deliveries as complicated, and lost only five mothers in a series of 814 consecutive deliveries (one maternal death per 198 living births). Their surprise fosters discussion, and we try to raise two kinds of observations.

5 Laurel Thatcher Ulrich, *A Midwife's Tale: The Life of Martha Ballard, Based on Her Diary, 1785-1812*, 1st edition (New York: Knopf, 1990).

On the one hand, we must be careful not to romanticize her results. Ballard's maternal mortality rate was still much higher than that of today, and it did not convey the cumulative risk of childbirth in an era when women often had five or more children. Her outcomes also pertained to a relatively well-nourished rural population and were very different than contemporary experience among the urban poor. Yet despite these caveats, most participants are still astonished at the number of deliveries that proceeded safely without technical intervention, prompting them to realize that today's high rate of caesarian section requires further explanation. Being placed in historical roles forces students to make clinical choices – and consider how those choices would change in different eras, bring the point closer to home.

Class interest then points us in different directions. One conversation might discuss the subsequent history of midwifery, its struggles to define itself professionally and develop a new identity starting in the 1970s. Alternatively, we may continue with obstetrics and ask what factors have driven the recent increase in cesarean sections in the US.[6] It can be instructive simply to project a graph depicting the rise of the procedure since the 1960s and ask students what variables they believe might have determined that climb. Their answers are intriguing. Many assume feminism helped propel the surge in the 1970s, not realizing that most feminists of that time were resolutely against medical intervention. After much speculation, we end by sharing the conclusions from Jacqueline Wolf's study, with particular attention to the importance of fetal monitoring as well as the choices of women.

In a one-hour session, we have traveled far, from simplistic caricatures of evolutionary change to the more complex and nuanced kinds of explanations employed by academics. The greater lesson may seem obvious to an historian but not to medical student: medical practice is shaped by a multitude of social, cultural, and political forces, not just science.

TO VACCINATE OR NOT TO VACCINATE: A CASE STUDY IN THE HISTORY OF PEDIATRICS

Pediatricians tell of another kind of progressive narrative centering on prevention rather than intervention. Its practitioners want students to learn not just about the diseases they will see on the ward, but also the ones they should never encounter. This perspective has taken particular importance with the recent resurgence of anti-vaccination sentiment during the ongoing Covid-19 pandemic. To be sure, the class rarely needs any encouragement to embrace their teachers' enthusiasm for immunization; if anything, they may over-estimate the role of vaccination in the decline of infant mortality. But explaining resistance to vaccines offers an opportunity to explore historical precedent, cultural difference, and social understandings of science.

One strategy has been to focus explicitly on the history of anti-vaccination. We might open by giving students a chance to read from a copy of Edward Jenner's account of inoculating James Phipps with cowpox, and ask students how they think that contemporaries might have reacted. We then divide students into groups and provide each one either an anti-vaccination pamphlet related to smallpox, or a more recent analogous web site to check on their laptops. Each group is given a few minutes to analyze their passage: who wrote it and why? And what ideological and cultural assumptions did they share? That leads to discussion comparing not only "new" vs "old" vaccine skepticism, but also to illustrate that anti-vaccination and vaccine hesitancy are complex phenomena that can hardly be characterized as a monolithic movement either today or in the past. We then consider how awareness of these assumptions might lead to a different way to engage with parents declining vaccines.

6 Jacqueline H. Wolf, *Cesarean Section: An American History of Risk, Technology, and Consequence* (Baltimore: Johns Hopkins University Press, 2018).

We have also tried a more ambitious strategy, focusing on the larger question of why disease burdens rise or fall over time. We typically focus discussion on four conditions whose historical epidemiology poses challenges for interpretation — perhaps diphtheria, cholera infantum, scarlet fever, and a recent example of a disease that has become more prevalent such as autism. Students are divided into groups, provided a historical case description, and asked to share a brief report on how the given illness presented in their time period, how it was understood, and how it might be treated or prevented. Pediatric textbooks from the turn of the past century are excellent sources; pictures from *Life* magazines are often helpful for more recent diseases such as polio, prematurity, or autism. If possible, we try to incorporate relevant artifacts, such as infant feeding bottles, a vaccination lancet, or a set of O'Dwyer tubes used for diphtheria. We will then describe (using charts where possible, noting their limitations) the changing rates of the diseases under consideration over the course of time, and ask students to suggest explanations. Students often start by assuming vaccines to be the answer; our goal is to affirm the value of vaccines while drawing attention to the role of other factors such as the social environment, public health interventions, changes in the biological agent, and the important questions of how diseases are named and recognized.

Quite a few students are surprised to realize that campaigns directed at contaminated milk were much more important in the early twentieth century than vaccines in reducing infant mortality. While we rotate specific diseases, individual sessions center on contrasting examples, utilizing a disease where a vaccine had a clear impact (e.g., diphtheria or polio) and another where their value has a more complicated relationship with controlling epidemics (e.g., whooping cough or measles). We also often discuss at least briefly examples of diseases that were not eradicated by medical breakthroughs but instead transformed into chronic conditions, such as childhood diabetes, cystic fibrosis, and extreme preterm birth. Finally, reviewing contemporary "epidemics" such as autism or obesity, we try to identify some of the factors involved in their recent prominence.

Both of these pedagogical strategies have been popular. The session on vaccination has been most consistently successful, likely because of a sharper focus that resonates with students' clinical experience. Parenthetically, it is interesting to watch how students over the course of the clinical year become increasingly less empathetic toward parents who question vaccines and, indeed, their own authority. But we still find that changing our formats helps keep the entire exercise more dynamic and interesting for the instructors as well as students.

CONCLUSION

Over the last decade at Duke University, we have effectively integrated the history of medicine into the medical school curriculum by incorporating it into the surgery, OB/GYN, and pediatrics clerkships. Duke presented significant challenges to the classic pre-clerkship model since it compresses the standard content of the first two years into a single academic year, effectively eliminating any elective time that might have been devoted to history. This particular dilemma highlights how "all politics are local," and no system can be cut-and-pasted perfectly from one institution into another. However, the conserved structure of clerkships around the country, as mandated by the American Association of Medical Colleges (AAMC), makes our methodology particularly transportable.

Some limits to this model are evident. Certainly, a few discordant one hour sessions cannot replace the once-standard semester-long course in the extent of material covered, the depth of study, or its continuity. Nonetheless, it still requires substantial time commitment. Each clerkship occurs approximately six times per year, so three clerkships demand eighteen hours of time, not including preparatory work, although this can be divided among multiple instructors. For medical schools with multiple clinical sites without a common didactic experience, this time requirement could expand three- or four-fold. Since students are not tested or graded on the material, engagement varies based on individual curiosity and competing demands for their attention.

The benefits of this model far exceed its disadvantages. First, it reaches 100% of the student body, unlike fourth year electives that cater to a select few, already-interested students. Second, clerkships represent a relatively easier time to integrate history than the overcrowded initial two years. With more than six clerkships from which to choose, identifying a few receptive ones is comparatively easy. Third, students inundated with science and clinical material have generally welcomed a diversion into history, responding enthusiastically. Linking lessons directly to activities on the wards is straightforward and emphasizes the relevance and value of historical inquiry. This program has met great success at Duke with students frequently evaluating these sessions as the most popular of the rotation. We hope others can benefit from our experience and adopt this model to expand the instruction of the history of medicine at their respective institutions.

A NOTE ON SOURCES

Below, find a list of the specific artifacts used for each session as an example; these are interchangeable with materials available at each institution. We also include a list of online sources that are free of charge.

History of Surgery

- Replicas of Roman surgical instruments
- Guy de Chauliac, *Cyrurgia Guidonis de Cauliaco et cyrugia Bruni, Theodorici, Rogerij, Rolandi, Bertapalie, Lanfranci.*Venetiis: Impressarum mandato Octaviani Scoti... cura... Boneta Locatelli, 1498.
- Scultetus bow saw, late 16th or 17th century
- Anesthesia Mask
- Civil War era amputation set, early to mid-19th century
- Field surgeon's amputation kit, circa 1890

History of Obstetrics

- Eucharius Rösslin, *Eucharius Rösslin's "Rosengarten": gedruckt im Jahre 1513*. München: C. Kuhn, 1910. (20th-century work including images and text from the original 16th-century work by Rösslin)
- Angelique Marguerite Le Boursier du Coudray, *Abrégé de l'art des accouchements, dans lequel on donne les preceptes necessaires pour le mettre heureusement en pratique*. Paris: Debure, 1777.
- William Smellie, *An abridgement of the practice of midwifery: and a set of anatomical tables with explanations*. Boston: Printed and sold by J. Norman at his office near the Boston-Stone, [1786].
- Anesthesia mask
- Smellie-style obstetrical forceps with wooden handles, circa 1850s
- Smellie obstetric perforator, 19th century
- Obstetrical forceps and model infant heads

History of Pediatrics

- *A Collection of the yearly bills of mortality, from 1657 to 1758 inclusive: together with several other bills of an earlier date...* London: A. Millar, 1759.
- Edward Jenner, *An inquiry into the causes and effects of the variolae vaccinae, a disease discovered in some of the western counties of England, particularly Gloucestershire, and known by the name of the cow pox*...London, Printed, for the author, by Sampson Low, and sold by Law [etc.] 1798.
- John Snow, *On the mode of communication of cholera*. London: John Churchill, 1849.
- O'Dwyer's apparatus for intubation, circa 1880
- Glass baby bottles
- Infant/invalid feeders, 19th century

General Online Resources for Historical Materials

The following online resource list is by no means exhaustive. Numerous sites exist for finding relevant materials, including subscription databases of primary sources depending on one's institutional affiliation. What follows below are sites with freely available content. Many include digital representations of the above items (e.g., Smellie's work). Items are listed in no particular order.

Medical Heritage Library

MHL is a collaborative digitization effort to provide and promote open access to historical resources in medicine. Available freely via the Internet Archive are MHL's growing collection of digitized rare books, pamphlets, and journals. A wide range of languages, time periods, and topics are represented. The MHL site also includes Primary Resource Sets related to Vaccines.

National Library of Medicine Digital Collections

An online repository of freely available digitized content including books, manuscripts, maps, and more.

Historical Anatomies on the Web

This site from the National Library of Medicine includes images from important historical anatomical atlases. Note that this site does not include the entire text of anatomical atlases, only selected images.

National Library of Medicine's Images from the History of Medicine

Online access to portraits, photographs, caricatures, genre scenes, posters, and graphic art illustrating the social and historical aspects of medicine dating from the 15th to 21st century.

Digital Public Library of America

DPLA provides digital content from numerous archives, libraries, and museums across the country, and includes online exhibitions as well as curated primary source sets on topics in medicine and science.

Duke University Libraries Digital Collections – History of Medicine Artifacts

Online resource includes images of numerous artifacts such as replicas of Roman surgical tools, infant feeders, and obstetrical tools. Images are in the public domain.

Medicine and Madison Avenue

Duke University Libraries' digital collection of 600 advertisements ranging in date from 1850 to 1920. The site includes advertisements related to children, vaccines, motherhood, and more.

Wellcome Library Digital Collections

Provides numerous digitized items from the Wellcome Library in London including books, posters, pamphlets and more; all freely available.