

# TB or Not TB: The great debate over registration of tuberculosis patients and implications for contemporary medicine and public health

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"[...] the treating of persons so unfortunate as to have pulmonary tuberculosis as criminals guilty of consumption [...] is something so frightful that I implore the College to interpose its remonstrance against such an outrage on common sense and common humanity [1]."

With such a forceful proclamation from Dr. Owen Wister, a medical doctor and member of the Philadelphia College of Physicians, one could easily believe that the College was in the process of imprisoning and torturing tuberculosis (TB) patients in the town square. However, the actual subject under debate at the 1894 meeting of the College was a proposal to enforce registration of all TB patients and to implement a myriad of associated public health measures. Though the sentiments of Dr. Wister and like-minded colleagues ultimately prevailed and the College voted to reject the resolution to mandate registration of TB patients, the writings and speeches of these physicians indicate that the meeting was emblematic of the confused state of public health policy in the wake of the newly-discovered germ theory, which had been articulated for the first time just a decade earlier. In the end, these Philadelphia physicians concluded that it was not worth imposing such aggressive registration tactics on patients without determining if the cost in time, money, and resources would actually lead to a successful outcome. This was particularly the case since the proposal involved infringing on the liberties of patients, usurping the authority of physicians, and wasting public health capital on an issue that most doctors believed they could handle on their own. While the discourse provides an interesting and enlightening window into the challenging issues facing physicians at the turn of the twentieth century, it also relates to subjects still debated by doctors today and it provides a stark contrast to the climate of modern medicine, in which scientific breakthroughs have become increasingly frequent and more readily received. Most importantly, the themes raised in this debate are among the most pressing and most contentious concerns still being discussed within the realm of behavioral health care and hold tremendous implications for future directions in this field.

Before delving into the specific issue of TB registration discussed at this conference, it is necessary to understand the scientific revolution that was taking place in the late nineteenth century and the context that this created for questioning the methods by which public health measures could prevent the spread of disease. While bacteria had been examined under the microscope and described by Anton van Leeuwenhoek as early as 1683 [2] the notion that these microorganisms (i.e., bioplasts, gemmules, globules, morbidic ferments, etc.) could contribute to and cause disease was virtually nonexistent at the time. As late as the 1850s, the predominant theories of disease remained *miasmatic*—that is, related to noxious exhalations—in nature, very much along the lines

of Edwin Chadwick's work linking unsanitary environments to the proliferation of illness and to poverty, moral degradation, and social upheaval [3]. Finally, in 1857, the French alchemist Louis Pasteur published several papers that linked microorganisms to fermentation and disproved the theory of spontaneous generation, which stated that animate organisms such as fleas and maggots can arise from inanimate objects such as dust and necrotic flesh. Moreover, Pasteur demonstrated that the isolated microorganism *cholera des poules* could be used to create an attenuated vaccine that was nearly 100% protective in cows and sheep injected with a culture of live anthrax bacilli [4].

The true quantum leap in germ theory, however, came in 1882, when the German bacteriologist Robert Koch applied the study of microorganisms to human disease and identified the tubercle bacillus using his own set of exceptionally precise postulates and procedures. Koch believed that bedside and clinical observation could only go so far in explaining disease pathogenesis; he argued that physicians needed to integrate pathological anatomy into their research in order to identify the source of illness in their patients. Koch's first step was to identify pathogenic organisms by staining samples from infected patients, examining these samples under the microscope, and recording all observations and descriptions. He would next isolate the pathogen in pure culture, often with a cooked potato as the solid medium, and then reintroduce the pathogen into a healthy animal host (one which, under normal circumstances, could naturally contract the disease in question), being sure to use antiseptic technique to prevent contamination. Koch would then observe the newly infected animal to look for signs and symptoms of the disease. Lastly, to confirm that the etiology of disease was the specific microorganism in question, a tissue sample would be taken from the now-diseased animal and the microorganism isolated from this sample had to be revealed as identical to the original causative agent. Using these strict protocols for investigation, Koch compared the tubercle bacilli to the anthrax bacilli, as well as other contagious pathogens, and concluded that TB must indeed be an infectious disease caused by the specific microorganism he had discovered [5].

Twelve years after Koch's seminal work on germ theory, TB remained a highly prevalent and morbid disease across Europe and the United States and, in Philadelphia, the College of Physicians convened

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a summit on the subject of registration of TB patients (a transcript of the debate was published in the College's journal of transactions). The specific resolution called for recording the residences of all pulmonary TB patients and requiring that they seek permission from the Board of Health before moving to any other house or apartment. Opponents to this resolution recalled the "hysterics" of health officials during the cholera scare of 1892 in New York, where the reaction was greatly exaggerated as compared to the actual incidence of disease, and there was fear that the medical community may be overreacting and that mandating registration of TB patients would turn these individuals into social outcasts and lead to public frenzy. Topics such as the boundaries of public health interventions and the potential stigmatization of TB victims were on the minds of many of these physicians, and indeed this balancing act is as tricky and tenuous a situation in 2015 as it was in 1894. What so worried many physicians in the late nineteenth century on the subject of TB registration and disinfection of TB homes was the idea of handing over to the state the authority to regulate personal behavior of patients and relinquishing accountability for patient care that had traditionally been afforded to doctors. As the meeting's transcript reveals, many physicians doubted that the Board of Health would provide superior protection against the spread of TB as compared to the treatment and counseling provided by doctors, and they also feared that the social implications of mandating the registration of TB patients would be extreme and perhaps unwarranted, particularly if the disease was truly hereditary rather than infectious. In the 21<sup>st</sup> century, many physicians remain divided on categorical public health measures in situations where the likely health benefits are known, such as the banning of trans fats or of large volume sugary beverages, as well as in situations in which the health risks and outcomes are unknown, including regulation of electronic cigarettes.

The concept of TB as an infectious disease was also a hotly contested topic with tremendous implications for the practice of medicine as understood by these physicians in the late 1800s. Some argued that TB is contagious and is spread via dirty homes and, thus, these houses should be registered and disinfected. Dr. L.F. Flick, for instance, is able to state with confidence that TB is indeed infectious by referring to the experiments of Dr. George Cornet, who showed that dust from the rooms of TB patients who spat indiscriminately could produce infection and that infections with TB are consistently found within the same houses even when entirely different families have moved in after a victim of consumption has died. In response to these arguments, others claimed that such studies are flawed because many or all of the TB victims could have had family histories of consumption and certain houses may be connected by networks of poor sanitation, which naturally give rise to more disease. One of the most fascinating aspects of this discourse is the readiness with which so many learned, renowned physicians were willing to rely on substantially weaker arguments and anecdotes to reject scientific studies. Dr. Flick presents reports in which the histories of many thousands of homes and individuals are analyzed over the course of 25 years, producing very convincing data in favor of the argument that TB is contagious. Yet even in the face of such overwhelming evidence, many physicians reject these studies by arguing that they have heard of individual cases in which TB was not passed on from one homeowner to the next and, thus, these anecdotes should be weighed equally against larger observational studies. Similarly, there are a number of College members who prefer to have it both ways: they argue that TB is a hereditary disease (in that its victims are predisposed to illness), but that transmission itself is through contagious mechanisms.

Although Koch's procedures and postulates may seem simple and intuitive by modern standards, it is imperative to understand that, in 1894, Koch's scientific articles were exceedingly difficult for many physicians to comprehend, not only due to the esoteric terminology employed, but also because of the novelty of his conclusions. For instance, the idea presented in germ theory that bacteria strike with equal ferocity regardless of class, gender, or ethnicity contradicted the importance ascribed to individual constitution (i.e., the concept taught since Hippocratic times that a person's nature, temperament, and other traits play a large role in determining their health and susceptibility to disease). Additionally, the notion of *disease carriers*—asymptomatic, healthy-appearing individuals who actually serve as reservoirs and potential transmitters of pathogens—seemed improbable and perplexing to many physicians at the time. Such a concept seemed to threaten the role of doctors as disease storytellers who wove the symptoms and signs of their patients into a cohesive disease narrative; if diagnosis was simply a matter of isolating pathogens and identifying hosts and carriers of disease, where would this leave the practice of the *art of medicine*?

The arguments put forth and the discourse that took place at this meeting of the Philadelphia College of Physicians provides incredible insight into the major issues facing doctors at the turn of the twentieth century, including several subjects that are still quite relevant today. Faced with an emerging science of germ theory and infectious disease—much of which threatened or directly contradicted centuries-old dogma and medical doctrine—physicians were forced to reconsider their entire intellectual framework for understanding disease pathogenesis. Many vehemently defended the theories upon which modern medicine to that point had been constructed, while others argued that the work of Koch and others represented an evolution in scientific thought that should be incorporated into policy and procedure. What made this discussion so profoundly contentious and important was that it was not purely academic in nature; rather, exploring and nominally accepting germ theory held tremendous implications for how patients ought to be treated by the medical community and society at large and for how physicians viewed their own professional activities and potential for success. With the identification of microorganisms causative of disease but without the tools or knowledge to eradicate patients of these bacteria, it is not unreasonable to suspect that many providers may have been grappling with what germ theory, if true, would mean for their perceived and real ability to cure patients of illness. As with any paradigm shift, there was likely also the fear that Koch's claims may have been overwrought and that time would ultimately prove such theories incorrect, thereby putting proponents of germ theory on the wrong side of history. In the modern era of genome-wide sequencing and the potential for personalized medicine, physicians may not necessarily question the science behind these advances, but many doctors are certainly left wondering how to incorporate such developments into clinical practice and how to use an incomplete understanding of genotype and phenotype relationships to counsel their patients.

There has, of course, been a tremendous shift in the way scientific breakthroughs are regarded in the present day as compared to a century ago. With the widespread availability of cutting-edge technology and the electronic means to share information instantaneously, it is no wonder why many a medical student or resident is told that what they are learning today will be obsolete in less than a decade. This climate of rapid change has helped prepare modern physicians to expect adjustments in conventional wisdom and be more willing

to consider and accept paradigm shifts than in past eras. In contrast, physicians in the 1890s cannot be faulted for having been more reticent to contemplate changing the way medicine was conceptualized or practiced; after all, they were used to scientific progress moving at a more glacial pace and it just so happened that these physicians were caught on the cusp of a major revolution in their field.

Though understanding the pathophysiology of TB would take some time after the conclusion of this great debate, we now have the benefit of hindsight to recognize this disease as an infectious process and we are left to wonder: what role does behavioral health care play in the primary and secondary prevention of infectious diseases in the modern day? Additionally, does the role of behavioral health care change depending on the severity or mode of transmission of the particular infectious disease?

TB treatment is now a highly organized, largely affordable, and fairly easily accessible medication regimen with a good evidence base with regards to efficacy; the main problem, however, is convincing patients of the importance of strictly adhering to their treatment course. Given the necessity of ensuring patients do not miss doses of their medications, the Centers for Disease Control and Prevention have published guidelines on the appropriate use of a technique called Directly Observed Therapy (DOT), in which a trained health care worker watches the patient (in the patient's home or in another location) take every dose of every medication, each and every day. While highly time and resource intensive, the practice seems intuitively effective and, thus, has gained endorsement from many global health care associations, including the World Health Organization. However, as demonstrated in a Cochrane Database Review from 2015 looking at 11 trials and over 5600 participants, DOT did not provide a clear resolution to the quandary of poor adherence to TB treatment. In fact, the review specifically notes that further work is needed to evaluate strategies that "motivate patients and staff" to promote and maintain adherence, and this is where behavioral health care strategies can and should play a tremendous role [6]. Unless systems are developed to provide widespread evaluation of patients' willingness to participate in TB treatment programs, and unless motivational interviewing and behavioral counseling are used in a consistent, rational manner, the problems associated with failed TB treatment will continue to recur and expand, creating major challenges for developing and developed nations alike.

While TB is transmitted via inhalation of airborne particles and can infect any person, risk factors for development of the disease remain among those associated with the impoverished conditions that the physicians of 1894 so greatly feared: homelessness, incarceration, and alcohol abuse, to name a few. Yet one of the greatest risk factors in present day society is poorly or uncontrolled HIV infection, and it is this condition—with its transmission via sexual intercourse and its profound implications for infected patients—that so drastically questions where behavioral health care alone should end and intervention on the part of health care departments and government should begin. As of 2011, 24

states had passed laws requiring individuals with HIV to disclose their status to sexual partners [7]. Moreover, all states now require laboratory reporting to local and/or state health departments of new HIV infections detected in any health care setting [8]. Such laws raise several questions, namely: 1) have these laws resulted in decreased rates of transmission of HIV and/or increased efficacy of treatment for patients with these conditions? 2) do such laws cross an ethical line with regards to singling out certain patients with particular conditions for labeling by the health care system and specific targeting for intervention? 3) does the attention paid to HIV status—both in reporting to the state and the onus on patients to report to sexual partners—encourage patients to change their sexual behaviors and remain adherent to treatment or does it cause patients to feel ostracized and embark on a path of denial or unwillingness to change behavior or seek care? It is this last question that holds tremendous implications for the balance between behavioral counseling and mandates from the state that both have been pursued for similar goals, namely to decrease the spread of infectious disease and treat disease where it does exist. A great deal more research is warranted with regards to this topic, and examination of reporting laws in relation to success of behavioral health strategies will be of the utmost importance to the field in the years to come.

Returning to the great debate, the College ultimately voted to reject the proposed resolution for registration of TB patients, noting that to have passed the resolution would have added undue hardship to the lives of these patients and would not have achieved real value in controlling this disease. Preceding the vote, Dr. Charles Dulles provides perhaps the most comprehensive description of the great TB registration debate, as well as a call to action that goes unheeded: "In passing upon the question before us I feel sure that the College will act in keeping with its traditions of a hundred years, and give a new illustration of the fact that it is a body in which prudent and conservative counsels prevail, and I have no fear it will hastily commit itself, as a sister society has done, under the ingenious arguments of those strongly infected with the idea of the infectiousness of tuberculosis [1]."

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