History of medicine and ethics

Historical Perspectives on Scrofula: Competing Medical Discourses and Public Health Implications at the Turn of the 20th Century

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Kewords

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Summary

This article examines how scrofula was classified as a distinct disease in Danish medical history around the turn of the 20th century. Dr. Niemeyer, a naturopathic advocate, attributed scrofula to an unhealthy composition of bodily fluids, whereas Dr. Geill viewed it as a tuberculous condition and a precursor to pulmonary tuberculosis. While they differed on causation – particularly regarding heredity – they agreed on prevention strategies, emphasizing fresh air, skin care, nutrition, and physical activity to reduce contagion and improve children's resilience. Physicians advocated guiding children in dietary and hygienic practices to fortify their resistance against the tubercle bacillus.

The article highlights how naturopathic discourses were challenged by emerging claims that scrofula was an infectious disease. Expanding clinical assessments to include home hygiene and working conditions reflected broader shifts in societal health rationales. Public health measures required coordinated efforts between physicians and municipal authorities rather than being solely an individual responsibility.

Finally, this historical perspective is framed within a modern public health context, emphasizing the bio-psycho-social model of health and disease. It underscores the lasting relevance of interconnected health approaches, drawing parallels between past strategies against scrofula and contemporary public health efforts to address infectious and non-communicable diseases. Integrating historical insights into modern policy and practice can enhance health equity and prevention strategies.

Introduction

Tuberculosis serves as an excellent prism for understanding and discussing recent medical history, as its complex social, political, and medical dimensions reflect evolving perspectives and approaches within modern healthcare and public health policy [1-5]. In line with this, the study of scrofula has seen a resurgence in medical history research, with articles exploring its history in France [6], Italy [7-9], the UK [10], and Spain [11, 12]. The Spanish articles posit that scrofula has traversed three distinct stages in medical history: (a) the 'humoral' phase, originating in antiquity, wherein scrofula was perceived as a condition caused by an imbalance of the four bodily humors (blood, phlegm, yellow bile, and black bile); (b) the 'royal' phase, marked by the medieval belief, particularly in France and England, in the curative power of the royal touch [13-19]; and (c) the 'modern' phase, wherein scrofula was redefined as a distinct disease following the advent of bacteriology.

This article aims to explore how scrofula emerged as a defined medical entity in Denmark around the turn of the 20th century. Specifically, how was scrofula understood and classified as a disease in a Danish medical historical context? How was it delineated in such a way that contemporary physicians could recognize and diagnose it?

The analysis is based on two contemporary works that attributed specific manifestations to scrofula. Both books, authored by medical professionals, were published within a few years of each other, lending credibility to the source material. They are structured similarly, addressing the nature, causes, prevention, and treatment of the disease, allowing for a comparative analysis of commonalities and differences.

On one hand, German physician Paul Niemeyer (1832-1890) argued in his 1888 work *On Glandular Disease (Scrofula), Its Causes, Prevention, and Treatment* that the disease could be prevented and cured through a healthy lifestyle: "We can assume that Glandular Disease is fundamentally caused by child care practices that conflict with the principles of maintaining a healthy balance of bodily fluids, and generally against all healthy living habits" [20, p. 28]. Niemeyer's book was the fifth volume in a series for the *Medical Home Library* and aimed at a general audience. The same year, German naturopath Friedrich Eduard Bilz (1842-1922) published *Das neue Heilverfahren; Lehrbuch der naturgemäßen Heilweise und Gesundheitspflege*, which became a bestseller and

was translated into 12 languages, including a Danish edition titled *The New Naturopathic Method*. Both books emphasize achieving health through a healthy lifestyle, indicating a close connection between them. Conversely, Peter Christian Frederik Geill (1860–1938) posited in his 1890 work *Chest Diseases: The Origin, Prevention, and Cure of Pulmonary Tuberculosis with Special Regard to Domestic Conditions* that scrofula should be regarded as a precursor to pulmonary tuberculosis: "Signs of Scrofula [are] evidence that they already carry the seeds of [Tuberculosis] within them" [21, p. 49]. This statement directly links to the 1882 discovery by German physician Robert Koch of rod-shaped bacteria in the sputum of tuberculosis patients [22, p. 96].

This suggests that the naturopathic paradigm was challenged during this period by emerging views on scrofula as an infectious disease linked to tuberculosis. Physician Rolf Hertz (1868-1937) emphasized that "Tuberculosis is the dominant etiological factor in the development of Scrofula's varied symptoms" [23, p. 2]. The following sections will closely examine the source material to understand how Niemeyer and Geill perceived and presented scrofula in a Danish medical historical context.

The Manifestations of Scrofula

Niemeyer interpreted scrofula as the "result of an unhealthy composition of bodily fluids" [20, p. 7], and to assess the quality of these fluids, one had to consider their "total amount and nature." Physicians were "quite practiced in daily life at assessing" [20, p. 6] whether there was either too much fluid, leading to a bloated face, or too little, resulting in a thin and dry appearance. It was a common disease that physicians were accustomed to diagnosing. The face played a central role in Niemeyer's clinical assessment of whether a person was ill. If glands became inflamed in "glandularly weak, scrofulous children," swollen lymph vessels and nodes were often found on the "neck and nape," first appearing as "thick cords" and then as "large, tender knots," requiring surgical "incision to drain them" [20, p. 13].

Niemeyer described how scrofula could be pathologically characterized by lymph nodes forming "pea-sized, painless lumps that are movable under the skin and appear individually; later, they grow and can become as large as apples." These primarily appeared on the neck and under the jaw, but could also occur in other specific areas with clusters of lymph nodes, such as the armpit and groin [20, p. 38]. A distinctive symptom of scrofula was a thick-necked appearance, and the pig-like face (scrofa, Latin: sow) thus became the anchor of the clinical description. Over time, the affected lymph nodes formed "cheesy, matter-filled masses, which must be removed if accessible," potentially leaving a "cavernous sore, from which flows a sparse amount of matter mixed with cheesy clumps." These surgical wounds healed slowly and produced characteristic "white, deep, radiating scars, which we have so often seen in daily life" [20, p. 39]. It is noteworthy that Niemeyer observed how the gland disease (scrofula) and its surgical treatment could mark scrofulous patients with distinctive scars that were common in the late 19th century. Initially, a pig-like face, followed by stigmatizing radiating scars.

Geill, in parallel with Niemeyer, maintained that scrofula was not a disease "specific to the lungs but found in the intestines, joints, and most commonly in the glands" [21, p. 7]. Geill vividly described the journey of the tubercle bacillus: "The tubercle bacillus is absorbed by the lymph flow and transported to the glands, where it settles [...] if a child with particularly susceptible glands is affected, the glands will become tuberculous, and the child will become 'glandularly weak' (scrofulous)" [21, p. 8].

According to physician Carl Marinus Reisz (1829-1902), the tuberculous attack on tissue generally progressed "from gland to gland, until it forms a continuous lump [...] sometimes a gland is so rapidly and completely altered throughout its mass that it becomes impermeable" [24, p. 54]. Not unlike a sailor's tattoo, where the nearest "axillary gland fills with pigment, completely blocking further circulation in the gland, which becomes a barrier to the further progression of the pigment" [24, p. 55]. This could explain why tuberculosis remained localized in the nearest gland instead of spreading into the tissue, except in the neck, where the tubercular infection often migrated. When the glands in the neck were affected, the child developed "a familiar appearance with large, palpable knots on the neck, but if the glands of the chest or abdomen become tuberculous, the disease is not readily recognized by everyone" [21, preface].

Niemeyer argued that scrofula was a serious disease, demonstrating that "the disease can manifest anywhere, in organs and tissues, from the skin and mucous membranes to the deepest bones" [20, p. 48]. He approached this systematically and soberly:

The Skin

The skin was where "Glandular Disease most loves to appear," and it was "the part of the human body that is first affected [...] particularly on the hairy part of the head, the face, and behind the ears." Niemeyer believed that the hairy parts of the head and face were first affected because the body hair was "suitable for holding scabs and dirt." Scrofula presented as a "rash covered with thick, oozing yellow scabs" [20, p. 40]. The fluid irritated the skin and was contagious, necessitating care to prevent its spread to other parts of the body. It was essential "to observe the necessary cleanliness in time" and prevent scrofula from spreading "to larger and larger areas" [20, p. 40]. Again, attention was drawn to the face, as scrofula's pig-like face could develop from the hairy parts of the head and face into a "yellow-brown, oozing, and stinking mask" [20, p. 40]. Other manifestations of gland disease were also noted,

as scrofulous conditions could affect tissues beneath the skin. These presented as abscesses throughout the body, "sometimes located just beneath the skin and sometimes deep between the muscles." They ranged from pea to hazelnut-sized lumps that, "when they become 'mature,' have a dark bluish-red color." If the physician opened the abscess, "thin bloody matter flowed out," and the wound healed slowly [20, p. 41].

The Mucous Membranes

In addition to abscesses that appeared as swollen lumps under the skin, scrofulous mucosal disorders also occurred in the form of "chronic catarrhs with an exceptionally strong secretion of mucus with great persistence." The mucous membranes connected to the external skin "in the eye, at the corners of the mouth, the nose, and the ear" were at risk, and especially the nose could swell, giving patients a quite characteristic appearance; however, the stomach, intestines, and bronchial tubes could also be affected by catarrhs [20, p. 42].

Bones and Joints

On the arms and legs, scrofula manifested as swollen joints, "double joints," where the bones of the arms and legs could bend like wax under pressure. This was particularly evident on the shins, "so the sharp ridge of the shinbone protrudes like the edge of a saber" [20, p. 46]. Scrofula was not just about enlargements, but also inflammation — characteristic lumps — in the bones and joints themselves [20, p. 48]. Scrofula reached deeper, causing inflammation in bones and joints. It formed "lumps in the bone itself, filled with matter, gradually working their way to the bone's surface," from where they could open into surrounding muscle tissue and further out to the skin [20, p. 47]. If an inflammatory lump opened spontaneously, it did so very slowly, while it could also cause "sores that could persist for years with continuous discharge of thin, foul-smelling fluid." Even if the sore closed, there was no guarantee that "it would not reopen under certain circumstances," leaving scars that could impede natural movement in "the affected part of the body" [20, p. 48]. This scrofula was a chronic, fateful disease.

Aetiologies of Scrofula

Niemeyer emphasized the importance of scrofula as a distinct disease among other contemporary illnesses, such as rickets, as he considered scrofula to be "more intrusive in the human organism" [20, p. 48]. As mentioned, Niemeyer attributed the cause of the disease to the pathological composition of bodily fluids, specifically lymph — "the colorless fluid prepared in the intestinal canal from ingested nutrients" [20, p. 12]— as the localized origin of scrofula. In other words, the imbalance of lymph due to dietary intake was the direct cause of scrofula. Niemeyer termed an unhealthy composition of bodily fluids as scrofulous [20, p. 28], holding that scrofula was "in some cases [...] inherited," but in most instances, it was "surely acquired" through a child's "inappropriate treatment" or living conditions that either developed "possible predispositions for the disease or outright triggered it" [20, p. 28]. It was only when a patient became scrofulous, with lymph nodes swelling and becoming tender due to inflammation, that scrofula could be visually diagnosed. Glandular pain was not a good indicator of scrofula, but it was unnecessary, as visible glands were a reliable sign of the disease. Niemeyer distinguished between rapidly emerging glands in acute conditions, which were "generally very tender," and chronic conditions with a prolonged course, where "the glands could be completely painless" [20, p. 13].

In contrast, Geill vigorously advocated that scrofula was fundamentally a tuberculous infection, a view promoted and disseminated among colleagues following Robert Koch's (1843–1910) discovery of the tubercle bacillus in 1882. As early as 1865, French physician Jean-Antoine Villemin (1827–1892) described tuberculosis as a non-hereditary disease [22, p. 8], but it was only after Koch that the role of heredity in "the origin of pulmonary tuberculosis" [21, p. 9] was dismantled. According to Geill, the presence of the tubercle bacillus and a predisposition to disease in the form of a general state of weakness were necessary for scrofula to develop. Scrofula in "the mouth, nose, and facial skin" was explained by Geill as a "tuberculous affection" rooted in "tuberculosis in the tonsils" [21, p. 5]. The disease's array of symptoms in individual cases needed to be attributed to tuberculous infections, which starkly contrasted Niemeyer's explanation. Regarding the tubercle bacillus, the recognition that dried bacteria could survive "up to half a year outside the body" in a dry state meant that policymakers increasingly took an interest in the citizen's private home [21, p. 6]. Thus, bacteriological surveillance in society became a key element in the name of prevention.

Scrofula was understood by proponents of the tuberculous perspective as a chronic disease that, while originating as an infectious disease through a pathogen's influence, had been exacerbated by a "congenital or acquired state of debility" [21, p. 77]. Physicians were particularly attentive to individuals weakened by "overexertion, illnesses, childbed, etc." [21, p. 50]. Notably, "uncleanliness and poor skin care" were considered to contribute to a state of frailty, as "the skin participates in the work of expelling a large quantity of harmful metabolic products from the body" [21, p. 14]. The skin (and home) had to be kept clean and tidy, as this helped to prevent this unclean disease.

Geill believed that children's bodies should be gently hardened to raise their metabolism and provide at-risk children with the greatest possible resistance. It was crucial that the child received "plentiful, nourishing, and easily digestible food," allowed their lungs to inhale "fresh and clean air," and engaged in physical exercises to strengthen "respiratory muscles and stimulate blood

circulation," thereby promoting "nutrition" [21, p. 51]. This view aligned with Niemeyer, who asserted that a balanced relationship between "food and drink" on one hand and "physical movement" on the other [20, p. 25] was essential to ensuring a proper mixture of bodily fluids. Geill and Niemeyer concurred that healthy living required fresh air, skin care, nutrition, and physical activity.

Fresh Air

Fresh — and especially clean — air was considered "one of the greatest conditions for health," while poor, stagnant, and particularly humid air was viewed as "the absolute most harmful thing imaginable." Air was perceived as a "purifying agent for bodily fluids, as vital to the organism as the intake of nutrients" [20, p. 20]. Regarding the lungs and branches of the respiratory tract, Niemeyer asserted that catarrh occurred because the mucous membrane was "susceptible and exposed to the effects of poor air" [20, p. 44]. The relationship between fresh air and nutrition was expressed in the notion that a person could thrive "better on less good food when living in fresh air" than on excellent "nourishment while simultaneously residing in poor air" [21, p. 19]. Poor air was a primary cause of scrofula, emphasizing the importance of access to fresh air.

Skin Care

Niemeyer understood that what air was to the lungs, water was to the skin, and that glandular disease rarely developed "as long as one continues with baths." However, in practice, it often happened that parents ceased bathing the child after the first few weeks – especially if there were multiple children in the family. Niemeyer provides an example where a "doctor happens to prescribe a bath," only to observe that it was "something the child was not accustomed to at all" [20, p. 23]. This absence sometimes developed into a fear of water, despite the fact that most children were "not able to bear the consequences of this neglect without harm." In practice, the earlier parents stopped bathing their child – and deprioritized regular skin care — the earlier symptoms of scrofula appeared in the form of "eruptions on the body, face, or head" [20, p. 23].

Nutrition and Physical Activity

Just as the vital role of fresh air was crucial, poor diet was similarly perceived as one of the most decisive causes of scrofula, "when the body's nutritional fluids are already of poor quality" [20, p. 34]. Inadequate nutrition manifested even more quickly if the child was also "confined in rooms with poor air, where they also cannot get sufficient exercise" [20, p. 36]. Niemeyer wrote that "the affliction is essentially doubled" if glandular swellings occurred in the intestines, as this could lead to nutritional disturbances and digestive issues in the child [20, p. 7]. Thus, there was continuity between the naturopathic method, as represented by Niemeyer, and the pulmonary tuberculosis model presented by Geill, where scrofula was considered an infectious disease. This was evident in that both approaches placed particular emphasis on the social aspects of the disease, despite conflicting views on the etiology of scrofula. A key issue influencing treatment was whether scrofula could be inherited or acquired, and the general impact of (workplace) environment.

Treatments of Scrofula

Until 1865, scrofula was viewed solely as a hereditary disease, which meant that therapy was limited to symptomatic relief, such as stays in Madeira and Corsica to provide patients with sun and warmth, and notably the "extensive use of cod liver oil and Swedish Bitters" [24, p. 8]. Niemeyer argued that scrofula was best treated "by adhering to the general dietary guidelines" [20, p. 49]. This explains why only three of the book's 52 pages explicitly dealt with the treatment of scrofula, merging the content with previously mentioned points about fresh air, exercise, skin care, and nutrition. Niemeyer viewed scrofula as a "comprehensive constitutional disorder" that "is easier to prevent than to cure" [20, p. 52], resulting in a strong focus on preventive measures and practical guidance.

Niemeyer categorized scrofulous patients into two groups. The first was the obese patient, who had "a very peculiar appearance. The body is plump; the skin is puffy, lacking elasticity, and of a peculiar grayish-pale color; the lips are thick, protruding, and have a pale blue color." These obese patients were often from the wealthier classes, "whose children are allowed to fill themselves with all kinds of foods, without regard to their type or quantity" [20, p. 35]. The second group was the thin patient with a "slender build with transparent, white, thin, fine skin with little fat underneath; the cheeks have a peculiar fine red color; the muscles are weakly developed." The thin patients generally came from the "poorer population, who must live on potatoes, pork, and similar cheap dishes that can only be called nourishing to a certain extent" [20, p. 36]. There is an interesting contrast between the disease profile then and now, where the situation today is diametrically opposite.

At the 1890 International Medical Congress in Berlin, German bacteriologist and physician Robert Koch attempted to move beyond his discovery of the tubercle bacillus by introducing a new miracle remedy. Unfortunately, tuberculin proved to have no curative effect on tuberculosis in practice. Geill hoped that it would "be possible for us to find a remedy that can directly affect and kill the bacilli after they have entered the lungs and attacked them" [21, p. 71]. He also acknowledged that no miracle cure existed in 1890, despite high demand, as the "absolute cure" took not days and weeks, but months and years [21, p. 77].

According to Reisz, tuberculosis treatment in 1899 was characterized by its "complex nature." The Germans pursued results using tuberculin, but these immunity experiments were "rather naïve and thus only briefly

reported" [24, pp. 26-31]. Edoardo Maragliano's (1849–1940) and other Italians resorted to serum treatment, which gained attention between 1895 and 1898. Reisz admitted: "I cannot deny that this serum strikes me as highly suspect, and as I have already mentioned, the available reports make one inclined to consider it a thin and weak form of tuberculin." [24, p. 34]. Auriol and Sollaud, a French naval physician based in Cherbourg, treated patients using inhalation of sulfurous acid, reporting notably positive clinical outcomes [24, pp. 45-49]. Reisz concluded: "It is therefore not always easy to determine which element or elements in the chain of treatment is the primary remedy, or indeed how much each of the methods used contributes to the outcome of the treatment." [24, p. 78].

As mentioned, the medical miracle cure remained elusive, and treatment continued to focus on "raising the organism's strength and resistance by placing [the scrofulous child] under good hygienic and dietary conditions" [21, p. 75] to bring "the organism up from the predisposed state in which it has sunk" [21, p. 50]. This held no novelty, in line with Niemeyer's highlighted measures.

Geill's rationale was that a better composition of the blood and the vitality of individual cells enabled the lungs to establish an "impenetrable barrier against the tubercle bacilli's attack." This was achieved through "a cartilaginous capsule that excludes the tubercle bacilli from the surrounding healthy lung tissue," thereby depriving them of access to nutrients, which would ultimately extinguish the disease [21, p. 75]. This approach remained the only defense against the external aggressor until the development of the well-known Calmette vaccine (BCG), which remains the only partially protective vaccine against tuberculosis today. Geill highlighted, from an occupational health perspective, how the general spread of tuberculosis correlated with "the population's occupations and sources of employment, its poverty, and its vices" [21, p. 77]. Geill categorized "urban industry and factory work and alcoholism," which reduced the population's resistance, as modernity's iron cage, while "rural life, with its abundant outdoor movement, relatively easier access to appropriate food [*e.g.*, milk], and its lower propensity for drinking," was elevated as the optimal living conditions.

It is, however, noteworthy that heliotherapy and the therapeutic use of sunlight [27] – also widely promoted in southern European countries at the time, as noted above – are almost entirely absent from Dr. Niemeyer's and Dr. Geill's works. This limited attention suggests that sun-based treatments were not a central component of Danish scrofula management, in contrast to Mediterranean practices where heliotherapy featured prominently in both medical and public discourses. The omission in Danish sources may reflect climatic constraints or a cultural-medical preference for emphasizing air, hygiene, and nutrition over direct solar exposure.

Overall, the focus shifted from individual internal imbalance to the impact of the working family's environment, living, and working conditions. As is known, from 1875, medical reports were altered from pre-printed forms to include comment fields for describing the patient's hygienic conditions at home [25, p. 283]. This development occurred in parallel with the evolving understanding of the causes of scrofula, reflecting a broader public health movement in the latter half of the 19th century [26].

Bridging Historical Perspectives with Recent Advances in Contemporary Public Health

The historical discourse on scrofula highlights pivotal transitions in public health paradigms that resonate with contemporary understandings of disease and health. At the turn of the 20th century, scrofula's prevention and treatment relied heavily on the interplay between environmental, social, and individual factors. Fresh air, nutrition, and hygiene were emphasized not only as therapeutic measures but as essential public health strategies. This reflects an early acknowledgment of what we now recognize as the bio-psycho-social model, where health is viewed as an outcome of biological, psychological, and social determinants [28-31].

Scrofula, classified as a precursor to tuberculosis, also underscores the fusion of infectious and chronic disease paradigms; a theme that persists today [32-37]. Diseases like HIV/AIDS, initially acute and infectious, have transitioned into chronic, manageable conditions. Similarly, the intertwined narratives of infectious and non-communicable diseases (NCDs) illustrate the complexity of contemporary public health challenges, where socioeconomic factors and chronic comorbidities influence disease progression and outcomes. In this context, historical strategies for scrofula's prevention, such as improving living conditions and fostering intersectoral collaboration, resonate with modern efforts to address health inequities and social determinants. The early 20th century municipal hygiene reforms in Denmark foreshadowed today's holistic approaches to health promotion, bridging the gaps between medical interventions and societal well-being. These historical lessons remain relevant in addressing contemporary global health issues, reinforcing the importance of an integrated and adaptive public health strategy.

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Conflict of interest statement

The authors declare no competing interests.

Authors' contributions

UBK conceived the initial idea, conducted the historical analyses, drafted the first version of the manuscript, and contributed to subsequent revisions. CW and PK provided contemporary public health perspectives, contributed to the development of the initial concept, and critically reviewed manuscript drafts. All authors have read and approved the final version of the manuscript for publication.

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