

## A Chemical Perspective to Nineteenth-Century Female Medical Pioneers: Utilizing Mass Spectrometry in the Museum Space

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**Abstract :** Throughout history and into modern times, the continuation of male influence over female healthcare has created inadequacies in availability and access to treatments, often further limited in rural communities. The historical plight of women in healthcare can be understood by studying the advancements made by women in the field, both through their career arcs and by delving into the treatments they offer. An early example is the case of Martha Ballard (1735-1812), a midwife in New York who practiced when female practitioners were dismissed in favor of less educated male physicians, which was a well-accepted practice into the twentieth century. In order to overcome these setbacks, a strategy used by some female practitioners was to develop and market their own remedies in an attempt to better serve female patients. By highlighting the compromises and social manipulation of female entrepreneurs, in comparison with the medicines they developed and used, we can map their ability to carve a specific niche for themselves and their targeted customers. The application of modern chemical approaches in a historical context serves to enhance a variety of perspectives within the museum sphere necessary for the comprehension and understanding of the female plight in both medical care and service. In order to further examine the overall bias and scrutiny for women in the medical field, specifically those undertaking entrepreneurial roles, examples of alternative remedies from female founders will be analyzed utilizing these approaches. Modern analytical chemistry techniques, specifically mass spectrometry (MS), have been successful in offering compositional analyses for both labeled and unlabeled ingredients in old medicines. Previously, we have analyzed two forms of alternative treatment options created by male medical professionals to address lingering historical questions of purity and validity. Although primarily sugar based, both Humphreys' Specifics and Boericke & Tafel remedies also contained unique ingredients, albeit in small quantities, with medicinal properties. Here, we applied the same methodology to study another highly politicized 19th-century debate surrounding the contribution and role of women in the medical profession through analyzing three remedies, each from a different female-led manufacturing company; Mrs. Joe Persons, Lydia Pinkham, and Winslow's Syrups. Following MS analyses for both labeled and unlabeled ingredients, both Winslow's and Pinkham's remedies were similar to their male counterparts in advertisement strategy, targeted customer base, and overall composition of remedy (primarily sugar-based with small amounts of unique ingredients). In effect, these unbiased chemical assessments are used to dissect the rationality of both market and physician criticism for each individual manufacturer through assessment of authenticity, benefaction, and comparison among female entrepreneurs and their aims to enter the medical community (i.e., geographic location, market size). Our work aims to increase collaboration between STEM (Science, Technology, Engineering, Mathematics)-based fields and historical museum studies on a larger scale while also answering questions of potential bias towards females in the medical community as means of comparison to their male counterparts and in-depth historical analyses to unravel individual strategies to overcome the setback.

**Keywords :** nineteenth-century medicine, alternative remedies, female healthcare, chemical analyses, mass spectrometry

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