



# Women treating lung cancer: a narrative review

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**Abstract:** A lack of women in leadership positions is a common problem across medical specialties that treat lung cancer. Academic medicine appears to be falling behind science, technology, engineering, and mathematics in eliminating gender differences in promotion. Barriers to advancement in thoracic surgery, an essential specialty in the multidisciplinary team required to care for patients with lung cancer, include length of training, discrimination and harassment during training, difficulty balancing personal life and career, and a lack of role models. Fewer than 30% of section and division chiefs and <20% of department chairs are women. Very few women have achieved the position of full professor in a surgery department or department chairman. Addressing barriers to the academic advancement of female oncologists and thoracic surgeons may facilitate equity and improve collaborative research efforts, given the value that diversity brings to team endeavors. The quality of care and the clinical outcomes provided by women physicians are at least equivalent to those of men. There is a strong support from major international societies to increase the role of women in many specialties important to lung cancer treatment by promoting mentorship and equal career opportunities. Additionally, organizations, such as Women in Thoracic Surgery (WTS) and Women in Medicine and Science (WLMS) chapters, specifically focus their efforts on empowering women physicians and surgeons.

**Keywords:** Physicians; women; thoracic surgery; sexism; work-life balance

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## Introduction

Lung cancer in women has enough particularities that *Precision Cancer Medicine* dedicated this special series to gather data from around the world to address the epidemiology, diagnosis, and treatment of women with lung cancer and highlight the challenges faced by women who treat lung cancer patients. Although many studies have been done on the effects of patient sex on lung cancer pathology and how gender plays a role when we screen, diagnose, and treat patients, the sex of the doctor treating the patients has rarely been a major focus. There is scarce data on the career

pathways of women who treat lung cancer patients and whether the care they provide impacts the patient's clinical and surgical outcomes. Additionally, data that has been collected has been almost exclusively from North America. In this series of articles, multiple authors will discuss "Lung Cancer in Women: From Epidemiology to Therapy", and in this article, we will focus on the female thoracic surgeons who drive the care of lung cancer patients with a special attention to women working in South America. We present the following article in accordance with the Narrative Review Reporting Checklist (available at <https://dx.doi.org/10.21037/pcm-21-3>)

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## Methods

To identify studies assessing outcomes when patients are treated by female physicians, we searched MEDLINE. We limited our search to studies published between 2005 and 2020. Search criteria included the following MeSH (Medical Subject Headings) terms: Physicians, Women; Treatment Outcome; Practice Patterns, and Surgical Procedures. We examined the reference lists from the retrieved articles to identify other relevant publications. Additionally, we used Google's search engine to find blog posts and other commentaries on published studies, occasionally identifying a study through these pieces.

The personal experiences of the authors were discussed, and common hurdles to advancement encountered by female surgeons who treat lung cancer were identified for inclusion in this narrative overview. MEDLINE was searched for studies assessing these factors and their impact. The websites of the Women in Thoracic Surgery (WTS) organization, the Brazilian Society of Thoracic Surgeons (BSTS), and Women in Medicine and Science (WIMS) organizations at several medical schools in the United States were reviewed. Because the Association of American Medical Colleges (AAMC) has systematically studied gender disparities in academia and published 3 reports over the last 10 years with carefully compiled data, we relied heavily on their 2020 publication detailing the state of women in academic medicine in 2018–2019 (1).

## Narrative outcomes when a patient is treated by a female physician

The role of the patient's gender on the outcomes of lung cancer patients has long been studied (2). In contrast, the role that the physician's gender plays when treating cancer patients has been barely addressed. Unconscious and conscious bias exists when choosing a medical oncologist, radiotherapist, and especially a treating surgeon, but in most cases, it is difficult to know when this happens. We should try to eliminate this bias especially if it affects patient outcomes. There is some evidence that patient outcomes when treated by a female physician are not inferior to outcomes of patients treated by male physicians and are sometimes better.

The influence of both surgeon and patient gender on risk assessment in patients considered for lung cancer resection

has been studied by Ferguson and colleagues (3-6). When only gender-neutral clinical vignettes were presented to thoracic surgeons and cardiothoracic surgical trainees of any gender, there were no differences in their estimation of the complications associated with lung cancer surgery (3). In contrast, when videos of standardized patients were shown to thoracic surgeons and surgical trainees, risks assessment scores differed by gender of the physician (5). Female surgeons rated the patient's age and weight loss as very important characteristics determining surgical risk after watching a video of a standardized patient more frequently than male surgeons. Additionally, in a study of perception of surgical risk by 338 male and 386 female laypeople, most of whom had a college education, women were more likely to notice weight loss in videos of frail standardized patients (6). When asked to assess risk after reading a vignette and again after viewing a video of a standardized patient matching the vigor or frailty described in the vignette, female surgeons were more likely than their male counterparts to change their estimation of surgical risk after viewing the video (4). Thus, the surgeon's perceptions of the patient can vary by surgeon gender and may influence their recommendations for treatment.

Screening for frailty has been suggested to identify patients for individualized care management, a form of precision medicine (7). In a study of 230 patients age 60 or older who underwent a major elective general or vascular operation, preoperative frailty and weight loss were correlated to non-discharge home after surgery (8). These patients would likely benefit from increased discharge planning to precisely tailor their care. Therefore, the surgeon's perception of risk, particularly risk due to frailty as indicated by weight loss, could influence personalization of postoperative care.

In surgical clinical research, outcome parameters, including length of stay, complication rate, mortality, and readmission, are used as quality measures. A matched cohort study by Wallis and colleagues examined these outcomes after 25 different procedures, including lung resection, in 104,630 patients. Female surgeons had significantly better outcomes during the first 30 days postoperatively than male surgeons, although the differences were small (9). This may be related to empathy and better emotional support for the patient and their family; however, we cannot identify the underlying cause with data currently available. In a published series examining physician gender and quality of care in patients with type 2 diabetes, female physicians achieved better prognostic risk management

with their patients than male physicians (10). Key factors may have included better engagement with the patient, more empathy, positive talk, and longer medical visits, which are documented differences between male and female physicians when interacting with chronically ill patients (11). A comparison of male and female caregivers was also performed in Medicare patients treated as inpatients, a cohort representative of the elderly population. Patients treated by female internists had lower mortality and readmissions as compared with those cared for by male internists (12). This might be related to increased guideline adherence and evidence-based practice by female internists however due to the lack of studies on why gender can affect outcomes we can only speculate as to underlying differences.

## **Closer look at the careers of female thoracic surgeons**

### *Thoracic surgery journey*

The journey from medical school to clinical practice is definitely not a fairy tale for women in surgical specialties. Although the proportion of female medical students has increased over the years and in some countries, such as the USA, has surpassed men, surgical specialties are still not attractive to women for several reasons (13). First, compared with clinical subspecialties, the path is longer. Second, it is difficult to find balance between personal life and career. The absence of women at higher ranks, especially in department chair positions, has negative effects, and the lack of role models may perpetuate the cycle. Lastly, fear of discrimination and harassment during training is a reality. Nearly 1 in 3 women physicians and clinician-researchers indicate that they have experienced sexual harassment in the workplace, and this harassment appears to be more common in academic medical centers than in community or outpatient medical settings (14-16). Most women physicians have children, and most physicians who are mothers report discrimination because they were pregnant, took maternity leave, or were breast-feeding (14,17). The 2019 survey conducted by the AAMC 17% of women faculty members reported an incident of disrespect based on their gender within the past year, while only 1% of men had the same experience. When examined by specialty, 25% of women in surgery departments reported an incident of disrespect that they felt was based on their gender (1).

### *Surgical training*

Residency years are tough, and surgical residents have one of the highest working-hour expectations among specialties. To become a board-certified thoracic surgeon takes 4 to 7 years after medical school, depending on the country of practice. However, the lack of equal opportunities and the potential for harassment are prevalent and unpleasant. Almost half of women physicians report that they experienced some harassment, either verbal or physical, from male faculty during training. Additionally, Meyerson reported a sad difference in the amount of autonomy given to female trainees as compared with male trainees, which was dependent on the gender of the faculty member overseeing training. When the faculty was a woman, residents of either gender received equal autonomy; however, male faculty members gave male residents more autonomy (18).

### *Personal life*

As a female surgeon, it is challenging to balance personal life and work. Not all programs allow women to interrupt training to take maternity leave. A common example of harassment prior to the start of training is being asked during an interview if you are married, if you have kids, and if you plan on getting pregnant during training. Nobody asks male candidates if they are married or if they intend to have kids. As a consequence, some women decide to either postpone pregnancy or freeze eggs while they complete their surgical training. Neither option is easy or attractive, and consequently, the number of women in cardiothoracic surgery without kids may be disproportionately high; a similar trend does not apply to their male counterparts.

When you work in academic medicine, participating in meetings—presenting studies or lecturing during conferences—is important for advancement but also requires great effort. For some female surgeons, family commitments may be a reason for not attending conferences.

### *Mentoring & leadership*

For anyone to believe they are capable of greatness, they must first be encouraged early in life. This comes not only in the form of individual support but in the presence of leaders with whom you can identify during training. Although women are the majority of medical school

students in the United States, “scissor effects” have been widely observed (19,20). There is a decline in the proportion of women in surgery and thoracic surgery as they advance in rank and particularly in the number of women in leadership positions. Very few women have achieved the position of full professor in the surgery department or department chairman (21). Naturally, the lack of role models adversely affects the decision to choose a surgical specialty. Trainees may believe women are incapable of leading a thoracic surgical service.

Gender bias has also been identified during professional society meetings in surgical specialties. Often numerous sessions planned by the organizing committees do not have a single woman moderating or presenting. In contrast, the genders are usually equally represented in the number of oral abstracts presented by surgeons. Typically, selection of abstracts for presentation is blinded, so the authors’ names, and hence their genders, are masked. During the presentations, female surgeons may be treated with less respect and will often be referred to by their first names when they are presenting or moderating instead of by their title and complete name as should be customary for any presenter or moderator (22). Female moderators are typically similarly formal when introducing male and female speakers; however, male moderators are significantly less likely to formally introduce a female colleague as compared with a male colleague.

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### *Career advancement*

In 2019, 41% of full-time medical school faculty members, 25% of full professors and only 18% of department chairs were women physicians (1). Twenty years ago, a landmark study showed that the percentage of women physicians at U.S. medical schools who were advancing in rank to associate or full professor was lower than expected when compared with their male counterparts (23). Gender disparity with respect to promotion remained even when accounting for age, experience, specialty, and research productivity (24). When advancement of women in oncology was examined specifically, academic centers similarly struggled with gender diversity in their

workforce. Representation of women among trainees lagged behind men in both medical oncology and radiation oncology (25). In a paper published in 2020, Richter and colleagues used pooled data from 35 years of medical school classes to determine if gender differences had persisted and examined the percentage of women physicians promoted in academic rank. Gender differences in promotions and appointments had not diminished over time (26). The Association of American Medical Colleges (AAMC) found a slightly more encouraging increase in the representation of women among full-time faculty of 5% over the past 10 years (from 36% to 41%) (1).

Although the number of female department chairs has risen steadily over the past 10 years, fewer than 20% of department chairs are women, and although the number of women who are section or division chiefs has tripled, women comprise less than 30% of section and division chiefs (1). When cohorts of new assistant and associate professors appointed to their positions in 2008 or 2009 were examined by the AAMC, a larger percentage of men were promoted within 7 years than women.

### *South America: a reality check from Brazil*

As a rule, South America has a male predominance in thoracic surgery and thoracic oncology, specifically in Brazil. Women represent approximately 12% of the Brazilian Society of Thoracic Surgeons (BSTS). The number of medical residents in Brazil and their activities are a proxy for trends in the specialty in South America. Fortunately, the representation of women among thoracic surgical residents is much higher than a decade ago, now around 30% (27). This is evident looking at applicants for the Thoracic Surgery National Exam administered by the BSTS. The BSTS National Exam is similar to the American Board of Thoracic Surgery certification exam in the United States. In Brazil, however, you are not obligated to take the exam before starting your career. Since 2011, the percentage of National Exam applicants who are women has ranged from 0% to 28.6% (27). This data gives us some hope for changes in gender representation among Brazilian thoracic surgeons in the future.

Like North America, there is gender bias at national meetings in Brazil. Only a handful of females are invited for lectures, but oral abstracts, which are blindly selected, are more equally presented by surgeons of both genders. Even though all countries in South America are developing countries with limited financial resources, robotic surgery is

now performed in most of them. As a rule, hospitals usually require that surgeons obtain training and certification to perform robotic surgery, an advanced minimally invasive approach. To our knowledge, fewer than 5% of female thoracic surgeons in Brazil are certified in robotic surgery (27). We recently completed a survey of all female thoracic surgeons in Brazil, and the women's commission within the BSTS has been created to promote equity. The survey identified that female thoracic surgeons in Brazil are a very young group with the majority under 40 years of age. During training, 40% reported prejudice by their mentors, 39% reported any type of harassment, and 23% would choose a new specialty.

### ***Groups advocating***

Female physicians are more likely to be undercompensated, are less likely to progress in academic rank, and have higher attrition rates than their male counterparts (28-30). Gender equality is one of the most important measures of health and health inequalities of our time. Gender equality in science, medicine, and global health also has the potential to promote substantial health, social, and economic gains. There is evidence, primarily from the business world, that gender-diverse workplaces have improved productivity, innovation, decision-making, and employee retention and satisfaction. Gender-diverse institutions are more likely to outperform those that are not gender diverse. Any organization that is not gender diverse is, thus, failing to access and leverage talent. Many academic medical centers have a Women in Medicine and Science (WIMS) organization to promote equity for women in all medical and scientific fields. Additionally, several organizations advocate specifically for a gender-diverse workplace for thoracic surgeons.

Women in Thoracic Surgery (WTS) is a North American organization that helps promote the careers of young female thoracic surgeons: the medical students and surgical residents and fellows (31). They have put forth several initiatives to increase recruitment and retention of female thoracic surgeons, specifically funding exposure to the thoracic surgical specialty, funding opportunities for specialized training, and providing mentors to early-career female thoracic surgeons (32). Since 2005, WTS has awarded over 100 scholarships that focused on the development of female thoracic surgeons through a mentoring program. The scholarships cover registration, lodging and some travel expenses for trainees still choosing

their career path attend either the Society of Thoracic Surgeons (STS) annual meeting, the Southern Thoracic Surgical Association (STSA) annual meeting, or the Western Thoracic Surgical Association (WTSA) annual meeting, and the WTS arranges designated time with mentors at the meetings. There is growing recognition that mentorship is key for women professionals to advance. A recent study of the careers of the recipients of these scholarships found that the recipients of a WTS scholarship attained career milestones at significantly higher rates than their peers, suggesting that the scholarships are a successful program to promote the advancement of women in thoracic surgery (33).

Additionally, the WTS, in cooperation with the Thoracic Surgery Foundation (TSF) (Carolyn E. Reed Traveling fellowship award) and Intuitive Surgical, Inc., (WTS-Intuitive Robotic Fellowship) offers fellowships for early-career thoracic surgeons to travel to another institution for the purpose of learning a new technology or to obtain advanced robotic training from a female thoracic surgeon. A similar WTS traveling mentorship award, co-sponsored by Scanlan International, Inc., (WTS Brigid Scanlan Traveling Mentorship Award) provides funds for female medical students or general surgery residents to do a travel elective to work with a female cardiothoracic surgeon mentor. The BSTS also supports the advancement of female thoracic surgeons and created the women's commission to address specific needs and promote enhanced education for their female members.

### **Perspectives**

The long-term results of actions taken recently to improve the mentoring and education of female surgeons may decrease the current gender disparity among thoracic surgeons. The presence of female role models encourages students to choose the thoracic path, but it will take several years to reach a balance between males and females in the field. Empowering female surgeons is the main goal, not imposing quotas for attendees, speakers etc. Allowing women to compete with equal tools with respect to mentoring might be the right solution to the current gender disparities.

### **Conclusions**

Physicians and surgeons encounter different challenges across specialties when treating lung cancer. Nonetheless,

the lack of women in leading positions is a common problem. Addressing barriers to the academic advancement of female oncologists and thoracic surgeons may facilitate equity and improve collaborative research efforts, given the value that diversity brings to team endeavors. Additionally, the quality of care and the clinical outcomes when women care for lung cancer patients are at least similar to those of men. Differences have been identified in the ways that male and female physicians care for their patients. A better understanding of the differences may enhance personalized care and precision cancer medicine. There is strong support from major international societies to increase the role of women in many specialties important to lung cancer treatment by promoting mentorship and equal career opportunities. We hope in a few years, this will not be an issue anymore.

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