

Female representation in orthopedic surgery: where do we stand in Belgium ?

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Female underrepresentation in Orthopedic Surgery and Traumatology is a well-known issue worldwide, including in Belgium. Most of the literature comes from northern America. This two-part study aims to quantify the female workforce in orthopedic surgery in Belgium and assess the presence of unconscious biases among active orthopedic surgeons.

Epidemiological data from national registries, orthopedic societies and universities in Belgium were analyzed. This included data on medical students, residents, active orthopedic surgeons and awards given by a Belgian orthopedic society. Additionally, a questionnaire was administered to Belgian orthopedic surgeons, assessing their perceptions of gender stereotypes and potential unconscious biases. 90 participants responded with 70% of men and mean age was 36 years old.

The data revealed that 12% of active orthopedic surgeons in Belgium were women in 2020. However, the representation of women was higher among residents, with a thirty percent distribution. In one university, women had a slightly higher chance of getting accepted in the orthopedic training than men.

The questionnaire results indicated the presence of unconscious bias regarding subspecialties, which aligned with the actual distribution. Women tend to specialize more in upper limb surgery and pediatrics while men focus more frequently on lower limb surgery.

The findings highlight the need for addressing the underrepresentation of women in orthopedic surgery and traumatology in Belgium. If the current rate of progress continues, it is projected that 30% of active orthopedic surgeons will be female by the year 2074. Identifying and addressing factors contributing to the underrepresentation, such as lack of mentorship, unconscious biases, visibility issues, and discrimination, is crucial for empowering future female orthopedic surgeons and fostering diversity in the field. Collaboration among European universities and orthopedic societies can play a vital role in reducing barriers and promoting gender equality in orthopedic surgery and traumatology.

Keywords: female orthopedic surgeon, diversity, women doctors.

INTRODUCTION

Throughout history, the role of women in society and, by extension, in medicine has evolved. In the 15th century BC, women in Egypt studied, taught, and practiced medicine, as depicted in the drawings on the burial walls near the tomb of Tutankhamun¹. They held a nearly equal position to men and could take up the profession of a surgeon when their husbands passed away, for example.

During the Middle Ages, with the rise of the clergy and male dominance, the Church gradually discouraged women from practicing medicine².

In the 19th and 20th centuries, the field of medicine gradually became feminized, especially after World War I and World War II. As men went off to war, women took care of the wounded, and it was in this context that orthopedic surgery emerged – on the battlefields

and during wars. This partly explains the military culture and the hierarchical structure still present in the specialty.

In the 21st century, diversity and equality have become prominent issues in our society. Western society has become more individual-centered, tending to shed long-standing traditions, and public discourse is constantly evolving with regularly challenged norms. We are currently witnessing multiple generational conflicts. Generation Y (born between 1960 and 2000) embraces change with the implementation of new projects and freely expressing their opinions without fear of reprisal. This generational clash is also evident among faculty members and in the organization of assistantship programs³.

Numerous studies have shown that diversity in medicine is essential for equitable quality of care, with some even demonstrating a decrease in immediate

postoperative complications when the surgeon is a woman^{4,5}.

Women are often underrepresented in academia and decision-making positions. A British study from 2007⁶ already showed that female researchers were fewer in number than their male counterparts, partly because women spent more time teaching or progressed through their careers more slowly than male colleagues.

In the past, women were even denied positions solely because of their gender. For example, Dr. Ruth Jackson was initially denied membership to the American Association for Orthopaedic Surgery when it was founded in 1933 but eventually became its first female member twenty years later. The influence of diversity within a university team on specialty choice is of great importance and has been demonstrated by several national studies in the United States⁷.

Women are less frequently authors, although this trend has started to change more rapidly in recent years. Examples include male lab directors who impose their name as the first author or women who do uncredited work in the background. The h-index is lower for female physicians, although it is multifactorial. An article by Nguyen et al.⁸ shows that this index, which is correlated with future publications, is often associated with the hierarchy within a department.

Women speak less at conferences, with 43% of conferences lacking any female speakers. Fortunately, this is changing rapidly and most conferences organized today pay special attention to the diversity of their speaker panels. Some organizations even reject certain speakers to maintain their diversity quotas, although this approach can be debatable.

The feminization of medicine has made positive strides at nearly all levels and in all specialties, but some specialties still lag behind.

Diversity in the workplace and in society at large is a subject discussed daily in the media. Racism, discrimination, and harassment have transitioned from “shocking headlines” to the “news brief” section. For over a decade, an increasing number of articles and studies have been published regarding the representation of women in medicine and surgery. Even before the #MeToo era, the limited number of female orthopedic surgeons was already a topic of discussion in international journals. The emergence of sexual harassment in the film industry prompted every company to assess the state of #MeToo within their own walls. During the early years of their careers, 50% of female surgeons experienced sexual harassment, and 38.5% found that their gender acted as a barrier to career progression⁹.

For nearly one-third of female surgical assistants, this harassment came from their direct supervisors, significantly affecting their performance in the operating room, self-confidence, and learning abilities¹⁰.

Quality of life and achieving a work-life balance are at the center of many societal debates, and burnout has become a prevalent issue in this century. Female general surgeons (based on US data) have a 60% higher risk of experiencing burnout compared to their male counterparts. Identifying risk factors could lead to a decrease in its incidence¹¹.

Women are now pursuing education for personal fulfillment rather than solely for their roles as wives or mothers. This shift in paradigm could favor the feminization of surgery.

An interesting study in Canada comparing postoperative complications and 30-day mortality rates between male and female surgeons showed a decrease in mortality when operations were performed by women⁴. Another Canadian study analyzed the concordance or discordance of gender between surgeon and patient, revealing a higher rate of postoperative complications (readmissions and deaths) when the surgeon and patient were of different sexes.

A study from 2011 demonstrated that a patient's gender influenced the decision to perform total knee replacement¹². Men were more likely to be offered this procedure compared to women. Although data can sometimes be challenging to verify due to the small number of women in surgery, their growing numbers will allow for more substantial studies to determine if these findings hold true on larger samples.

Europe has limited data and studies on women in surgery and orthopedic surgery, with most articles and data coming from Scandinavian countries, the UK where diversity and inclusion have been discussed longer than in other regions.

Many comparisons can be drawn between the medical field and the more “traditional” business world. Hospitals, in many respects, are comparable to large corporations: board of directors, CFOs, CEOs, hierarchies, etc.

A Belgian “state of affairs” is, therefore, necessary, and this work aims to lay the groundwork for it.

METHODS

Study Design: descriptive epidemiological statistics through a questionnaire for French-speaking Belgian orthopedic surgeons (target population), determining the presence or absence of preconceived ideas or trends regarding female orthopedic surgeons.

Primary outcome: What is the percentage of women in orthopedic surgery in French-speaking Belgium?

Literature Review: the initial search was conducted in PubMed database using the terms “female” and “orthopaedic” and “women” and “orthopaedic surgery.”

Thirty (18 were selected based on their titles) and 78 articles appeared, respectively.

Only the most recent articles were initially selected.

Data Collection : Period of interest: 2000-2020.

Contact was made with the heads of medical studies and specialization masters (UCL, ULB, and ULg), with the two communities responsible for higher education in the country (Fédération Wallonie-Bruxelles and Vlaamse Overheid) and with the SORBCOT (Royal Belgian Society of Orthopaedic Surgery and Traumatology, French speaking).

Epidemiological data on practicing physicians in Belgium I.N.A.M.I. (National Institute for Health and Disability Insurance).

An online questionnaire consisting of 10 questions was created on the surveymonkey.com platform. The first part of the questionnaire gathered epidemiological data (age, gender, marital status, years of practice). The second part asked participants to choose the “masculinity” or “femininity” of the proposed terms.

This survey was inspired by the Implicit Association Test (IAT). The questionnaire was sent via a link by email to personal or professional addresses and was also sent to SORBCOT members via the newsletter in October 2022.

There were 89 respondents, and 1 respondent did not answer all of the questions.

Data were encoded and analyzed in Microsoft Excel.

RESULTS

Although Belgium is a relatively small country, in 2020 there were 59,038 registered doctors authorized to practice medicine in Belgium, which means there was 1 doctor for every 194 Belgians (513.65 per 100,000 population) across all specialties. For orthopedic surgeons specifically, there were 1,300 for a population of 11,492,641 Belgians, which corresponds to 1 orthopedic surgeon for every 8,840 Belgians (11.13 per 100,000 population).

Among these active Belgian orthopedic surgeons, 12% were women, which positions us relatively high in comparison to other countries. In Belgium, in 2000, there were 39 women out of 770 orthopedic surgeons, which accounted for 5.06% of the total. This figure increased to 7.7% in 2010 and further to 12.23% in

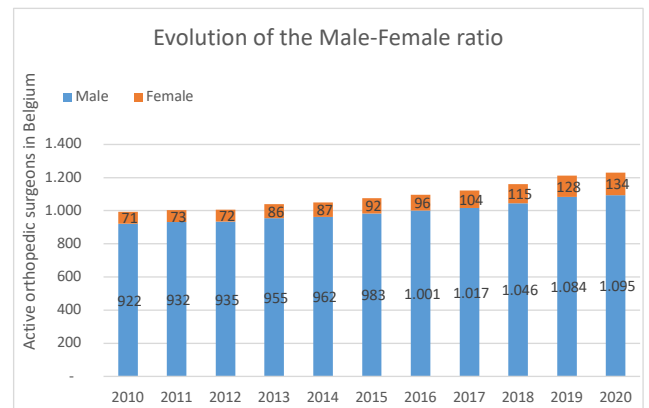


Figure 1. — Table of the number of orthopedic surgeons from 2010 to 2020.

2020. Over a span of 10 years, there has been a 5% increase in the number of female orthopedic surgeons (compared to a 2% increase between 2000 and 2010). (Figure 1)

By analyzing this data and creating a projection using linear regression analysis, it would suggest that it will take until the year 2074 to achieve a gender balance comparable to the data for surgical residents which is 30%. The number of active surgical assistants in orthopedic surgery across the country continues to increase (from 163 assistants in 2010 to 304 in 2020), with a proportional increase in the number of women, although at a slower pace. In 2010, there were a total of 21% women among all surgical assistants in orthopedic surgery. The percentage reached a peak in 2018 with over 31% women, but by 2020, it had dropped just below 30%.

Looking at the applicants for the orthopedic residency program at the ULB (*Université Libre de Bruxelles*), taking the example of the academic years 2018-2019 and 2020-2021, there was a higher percentage of women admitted to the orthopedic specialization than the percentage of women applicants for the program. In 2018-2019, 32% of applicants were women, and there were 38% of women admitted to the orthopedic specialization. When considering all cohorts from 2017 to 2022, 41% of those selected were women.

By analyzing the data of recipients of training and research grants since 2015 (SORBCOT), it has been found that there were 19.4% of women.

If we compare these data on orthopedic surgery residents to general surgeons, anesthesiologists, or emergency physicians, we can see that orthopedic surgery has a much more male-dominated landscape, even though these specialties could be considered comparable in terms of working hours or “challenging schedules” with weekend shifts, night shifts, etc.

From a general perspective at UCLouvain, there are 57% women among all surgical assistants across specialties in the 2018-2019 academic year. This distribution slightly varies depending on the specialties: surgical specialties show a higher percentage at 67% women, internal medicine at 54%, and specialties with less patient contact (radiology, clinical biology, etc.) at 48% of women.

The questionnaire had 90 respondents with an average age of the respondents of 36.78 years (36 for women and 37 for men). Among the respondents, 70% were men.

When asked to classify as feminine or masculine the different subspecialties, most sectors were classified as neutral. However, some nuances can be observed with regards to the hip/knee, where 80% of the respondents categorized it as masculine, with 41% selecting “very masculine” and 38% choosing “masculine.”

It is worth noting that there is a difference in responses between women and men in these questions. Female respondents tended to classify the different subspecialties as “neutral” more often than men. On the other hand, the upper extremity has a slight tendency to be considered more feminine, with 38% of respondents selecting “feminine” and “very feminine.”

The sectors of activity were generally distributed satisfactorily, assuming that the assistants responded regarding their area of interest, and some specialists may practice in multiple sectors and had to choose a primary one. A more specific analysis by gender reveals differences. Women tend to work more in the upper extremity (40%) and pediatrics (12%). Men, on the other hand, focus more on lower extremities such as knee/hip/foot (47%) and trauma (15%).

The majority of respondents believe that they find the most satisfaction in surgical procedures (41%), followed by patient gratitude (26%). The aspect that gives them the least satisfaction is work-life balance, with one-third of the respondents ranking it last. Economic gratitude and social prestige were also ranked as providing little satisfaction.

The last question of the questionnaire was ranking different adjectives as feminine or masculine. Men are perceived as *strong* by 79% of respondents, and 50% of women agree with this analysis. Both sexes agree that *attentive listening*, *empathy*, and *parenting* are more feminine traits. *Arrogance* (68%) and *leadership* are predominantly considered masculine traits by both sexes. Women ranked *negligence* as the most masculine trait overall, and over 60% of female respondents classified *competitiveness* as masculine.

Self-esteem is considered neutral by 50%, with the remaining leaning toward the masculine side (with more women believing that men have confidence/self-esteem). Men perceive themselves as *funny*, with 38% of male respondents stating that it is a masculine trait. However, the vast majority of women (83%) consider humor to be a neutral trait.

DISCUSSION

When it comes to descriptive epidemiological data, the interpretation was done by refining the samples as we progressed. Starting with the number of medical students, moving on to the number of active physicians, and then narrowing down the sample to orthopedic surgeons, some interpretations can be made. For the academic year 2020-2021, for example, in Flanders, there were 261,777 students enrolled in higher education (across all fields of study) with 55.69% of them being women¹³. Regarding medical students, there were 7,224 enrolled (in the 3 universities UGent, KUL, and UAntwerpen), with 61.73% being women. If we look at these data over the past 10 years, we see a relatively stable percentage of 55.23% of women enrolled in medicine.

This means that women are starting their studies in proportion to men and outnumbering men during medical school.

The comparison of percentages of active female orthopedic surgeons with female trainees highlights the importance of a comprehensive analysis. The differing percentages (12% among female surgeons versus 30% among trainees) demonstrate that feminization is slowly making its way into a specialty that has traditionally had fewer women.

In predicting the future presence of women in orthopedics, an exponential growth rate may be closer to reality, as it is reasonable to assume that the number of women in orthopedic surgery will increase at an accelerating rate over time. This can be attributed to various factors, such as changes in social norms and expectations, female residents in training becoming surgeons in the years that are coming, as well as increased access to training and employment opportunities for women in the field of orthopedic surgery.

The allocation of study grants or fellowships is often cited as an example in studies to illustrate the underrepresentation of women¹⁴. Indeed, certain societies, organizations or hospitals provide access to resources, offer opportunities for additional education, and provide job and networking opportunities. These

grants and fellowships play a crucial role in supporting the career development of individuals in various fields, including medicine. However, the gender disparity in the allocation of these opportunities highlights the need for greater efforts to promote gender equality and provide equal access to such resources and opportunities for women. We analyze our recipients of SORBCOT grants. We are referring here to grants for further training and financial assistance. The exact process of awarding grants involves submitting applications to the SORBCOT office, which then deliberates and allocates the grants based on available budget, number of applicants, eligibility criteria (such as order of contribution, submission requirements), and the quality of the project if there is a need to distinguish between candidates.

The data regarding the grants represent a small sample, but did not especially align with the trends found in the literature (19,4% of female recipients). With the gradual increase in the number of female orthopedic surgeons, we can expect a proportional increase in the number of awards received¹⁵. This suggests that efforts are being made in Belgium to provide support and recognition for women in the field, and as their presence continues to grow, it is important to ensure equal opportunities for advancement and recognition through various avenues, including grants and awards.

Comparing to other specialties, men are in minority in OB/GYN but why is the “problem” different ? Despite a clear feminization of gynecologists, there would be proportionally more men in higher hierarchical positions¹⁶. The gender issue is different in gynecology-obstetrics as the patient population is exclusively female, whereas in orthopedic surgery, it is mixed.

Regarding the questionnaire, the results regarding the distribution of most adjectives between genders correspond to unconscious biases mentioned as examples in the literature (such as strength and endurance for men, and nurturing and empathy for women, to name a few).

Differences between men and women in orthopedic surgery are present in the work-family relationship¹⁷. Women tend to be less satisfied with the balance they cannot achieve. In the questionnaire, we did not observe a significant difference between the two genders. The subspecialties chosen predominantly by women, namely hand surgery, pediatrics, and shoulder surgery, correspond to the general data found in other countries¹⁸.

The study has certain limitations, primarily related to the collection of overall data. Not all universities in the country provided a response, and the statistical analysis could not be conducted on a sample representing the entire population of orthopedic surgeons and/or students. Another bias is present in the analysis of data on active orthopedic surgeons, as those who are over 50 years old pursued their medical studies at a time when the proportion of women enrolled in medical school was lower. This is inherent to the difference in perception and the role of men in households between the baby boomer generation and the Generation X³. The data regarding applicants for the specialty comes from a single French-speaking university, and due to the low number of candidates, the statistical sample size is small, which makes the evidence more uncertain.

In the original IAT questionnaire, the speed of responses is taken into account, which can measure the strength of association between two concepts. The faster a respondent associates, for example, “man” and “career,” or “woman” and “family,” the stronger the association between these terms. Due to technical constraints, we were unable to include this precise time measurement in the survey designed. The notion of response time increases the power of association but does not play a role in the initial implicit or explicit association. An additional bias of the questionnaire is the binary gender representation : non-binary individuals were unable to respond as the listed choices were “male” or “female.” Given the small sample of respondents, this was a conscious decision.

In the operating room, the role of female surgeons and the experience they undergo depend not only on their direct surgical colleagues but also on the entire team they work with (anesthesiologists, logistical support staff, nurses). The perception of female surgeons is therefore also linked to how they are perceived among these collaborators.

Hierarchical relationships within the operating room have been analyzed in numerous studies, and they are influenced by socio-cultural norms, including gender¹⁹. Attitudes and reactions can vary greatly depending on the gender of the surgeon. Qualitative studies based on interviews have shown that nurses may find it easier to address certain issues or questions with female surgeons, while being more hesitant to do so with male surgeons.

Suboptimal group cohesion directly affects the quality of care. For example, the fact that nurses have a more direct relationship with surgeons has a positive effect, but the fact that female anesthesiologists are sometimes not listened to as much as their male

counterparts has a direct negative impact on patient care. The organization of specific staff meetings on diversity and discrimination, including role-playing scenarios in the operating room, could already raise awareness of the differentiations present in daily practice.

Women and men are different, and not everything can be compared and equalized. Pregnancy is the most striking example of this. In a study conducted by the NHS in 2009²⁰, one of the reasons cited for the difference in career progression between men and women (in terms of time to reach a position or for the position or hierarchical level itself) was the lack of opportunity due to working part-time rather than direct gender discrimination. Indeed, if women have a desire for pregnancy, their period of residency will be extended, resulting in a delay compared to their male counterparts. Pregnant residents in the field of orthopedics face multiple specific challenges²¹. The measures that institutions can take to support these women during their pregnancy and orthopedic training are not yet widely known and implemented. Work schedule arrangements are often decided on a case-by-case basis, and women may hesitate to put themselves in a position of vulnerability by making such requests.

CONCLUSION

Medicine is not completely gender-neutral, and the field is traditionally dominated by men, which has implications for how it is taught and practiced. However, the representation of women in orthopedic surgery is increasing in Belgium, with a slightly higher percentage of female graduates and trainees compared to the United States, where efforts to increase the number of women have been implemented for several years.

Based on literature and Belgian data, four main barriers exist for women in orthopedic surgery. Gender stereotypes consider orthopedic surgery as a “masculine” profession, discouraging women from considering this specialty. Gender biases and unconscious biases can lead to differences in treatment and opportunities for residents and promotions at work. Asking about the desire for children during interviews with women, while not specifically asking the same question to men, is considered inappropriate but still commonly practiced.

Work-life balance poses challenges in orthopedic surgery, as the demands of the profession can be difficult to reconcile with family responsibilities, dissuading women from pursuing this specialty. The lack of female role models makes it difficult for women

to find success stories to follow. Mentors are crucial for trainee surgeons, as mentorship has been shown to have a positive impact on skill development, professional growth, and well-being.

Harassment and discrimination are additional problems that women may face in the workplace, affecting their careers and specialty choices. Belgian epidemiological data indicate that while there is room for improvement in orthopedic surgery compared to other specialties, women are not completely invisible or absent in the field.

Diversity in surgery is a topic gaining attention, and although some institutions and services are increasingly recognizing its importance, more efforts are needed. The medical field must evolve towards a new era beyond patriarchy and embrace inclusion. It is worth noting that women are not the only underrepresented group, and investigating the discrimination experienced by other minorities, such as ethnic and philosophical backgrounds, could provide insights into equality in the country.

While their presence is not yet central, it cannot be denied that women are present at almost all levels in orthopedic surgery in Belgium.

The choice of specialty is influenced by both positive and negative factors, which may not be easily changeable. However, it is possible to act on elements that can be changed, such as negative stereotypes, biases regarding parenthood, and learning methods. The priorities chosen by women and men may differ, but achieving complete equality may not be necessary to create a diverse team and practice.

Limiting working hours for assistants has shown renewed interest in the specialty among women in the United States. The royal decree of 19.07.2021 may have a similar effect.

The question is also raised of whether men pursuing gynecology face the same gender stereotypes as women pursuing orthopedic surgery. Gender stereotypes can affect men as well, particularly in fields traditionally considered feminine, such as gynecology and pediatrics. However, the consequences of these stereotypes differ for men and women. It is important to recognize these differences and work towards creating inclusive and equitable environments for all healthcare professionals.

Effective mentors play a crucial role in supporting women and underrepresented minorities in orthopedics. Mentorship programs and initiatives should be developed to overcome barriers and provide specific support to individuals facing the impostor syndrome. Strategies to reduce the impact of impostor syndrome

in surgical training include mentorship programs and mental resilience training and should be considered.

Diversity is a strength that should be celebrated and encouraged in healthcare institutions. Initiatives supporting diversity in various groups, such as culture, gender, ethnic minorities, people with disabilities, LGBTQ+, and aging surgeons, are essential for promoting inclusion and tolerance in society. Medical organizations should continue to support initiatives that promote diversity in all fields, including orthopedics.

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