



MINI REVIEW

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## The Necessity of Mandatory Surgical Ergonomics Training in Otolaryngology: A Novel Mini-Review

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### ABSTRACT

**Background:** In January 2022, we have published an article that compares cervical neck strain in common otolaryngology surgeries. To our knowledge, it was the first study that quantified ergonomic risk in a variety of otolaryngology surgeries. Due to the continued interest in studying the ergonomic risks in the field of otolaryngology, we decided to perform a mini-review to 1) look into factors that play a role in increasing ergonomic risks for otolaryngologists, 2) summarize any improvements that have been done, and 3) investigate what needs to be done in the near future.

**Methods:** Three major databases were used: Pubmed, EMBASE, and Cochrane Library. Search terms: "Otolaryngology", "Neck Strain", "Surgeon" and "Ergonomic risks" were used interchangeably to maximize the search results. A total of 119 articles were found, and 6 articles were included based on the inclusion criteria: published from 2010-2022, examined partial or all of the six factors, operating room procedures/surgeries only.

**Discussion:** In the 6 included articles, a total of 1080 responses were collected the percentage that reported work-related physical discomfort ranges from 47.4% to 80.0%. Four out of six articles reported that age had been a non-significant factor to increase pain from OR procedures. A total of 3 articles examined sex as a potential factor; only 1 article reported it as a significant factor, and the rest two reported sex as a non-significant factor. Five out of 6 articles stated years of practice as a non-significant factor in causing procedure-related physical discomfort. Three out of 6 articles reported the percentage of surgeons without previous ergonomics knowledge, ranging from 63% to 100%. For the percentage of physicians who received treatment, 3 out of 6 articles were investigated and it ranged from 23% to 85%.

**Conclusion:** To our knowledge, this is the first mini-review aiming at compiling and analyzing six potential factors that play roles in surgical ergonomics within the field of otolaryngology. Age, sex, and years in practice do not play significant roles in OR ergonomics. However, physical discomfort and the percentage of otolaryngologists who received treatment after surgeries remain high with minor improvement over the last decades. Implementing mandatory ergonomic training is necessary to protect and maintain the physical health of our fellow otolaryngologists.

### ARTICLE HISTORY

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### KEYWORDS

Otolaryngology; Surgical ergonomics; Operation room; Risk factors

## Introduction

Operation Room (OR) ergonomics used to be a new scientific discipline decades ago. With increasing publications on this topic, the importance and risk of OR Ergonomics have raised surgeons' attention across surgical specialties. However, OR ergonomics in the field of otolaryngology has only recently been given devoted interest [1]. Early in the year 2022, Dr. Joehassin Cordero and his team published a novel article that compared the cervical neck strain in several types of common otolaryngology surgeries [2].

It was the first study that quantified ergonomic risk in a variety of otolaryngology surgeries. Due to the continued interest in studying the ergonomic risks in otolaryngology, an updated mini-review is needed to evaluate the current ergonomics situation.

The goal of this review is to examine recent literature on OR ergonomics in otolaryngology to 1) analyze potential factors that play a role in increasing ergonomic risks for otolaryngologists, 2) summarize any improvements that have been done, and 3) investigate what needs to be done in the near future.

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## Literature Review

To ensure a thorough literature search, three major search engines were used: Pubmed, Cochrane, and Embase. Search terms: "Otolaryngology", "Neck Strain", "Surgeon" and "Ergonomic risks" were used interchangeably to maximize the search results. A total of 119 articles published from 2010-2022 were found, but only 6 articles met the inclusion criteria covering part or all six factors: 1) percentage (%) reported work-related physical discomfort, 2) age, 3) sex, 4) years in practice, 5) no previous ergonomics knowledge, and 6) percentage (%) received treatment in the cross-sectional survey and intraoperative observational studies, and operation room only procedures.

In the 6 included articles, a total of 1080 responses were collected (Table 1). Six common factors were analysed including: 1) percentage (%) reported work-re-

lated physical discomfort, 2) age, 3) sex, 4) years in practice, 5) no previous ergonomics knowledge, and 6) percentage (%) received treatment. The percentage that reported work-related physical discomfort ranges from 47.4% to 80.0%. Four out of six articles reported that age had been a non-significant factor to increase pain from OR procedures. A total of three articles examined sex as a potential factor; only 1 article reported it as a significant factor, and the rest two reported sex as a non-significant factor. Five out of 6 articles stated years of practice as a non-significant factor in causing procedure-related physical discomfort. Three out of 6 articles reported the percentage of surgeons without previous ergonomics knowledge, ranging from 63% to 100%. For the percentage of physicians who received treatment, 3 out of 6 articles were investigated and it ranged from 23% to 85%.

**Table 1.** Summary of included studies in the review relating to the six potential factors.

| Title  | Author            | year | Type of study                                | Responses | Work related to physical discomfort | Age | Sex | Years in practice | No previous ergonomics knowledge | % Received treatment |
|--|-------------------|------|--|-----------|-------------------------------------|-----|-----|-------------------|----------------------------------|----------------------|
| Occupational musculo-skeletal pain amongst ENT surgeons  | A Vijden, et al   | 2016 | Cross sectional survey                       | 323       | 47.40%                              |     |     | NS                |                                  | 85.00%               |
| Are we looking at the tip of an iceberg?   |                   |      |  |           |                                     |     |     |                   |                                  |                      |
| Occupational hazards of endoscopic surgery   | Little RM, et al  | 2012 | Cross sectional survey                       | 62        | 77.00%                              | NS  | NS  | NS                | 63.00%                           | 23.00%               |
| Quantitative Assessment of Surgical Ergonomics in Otolaryngology   | Rodman C, et al   | 2020 | Cross sectional survey                       | 275       | 80.00%                              | NS  | NS  | NS                | 100.00%                          |                      |
| Endoscopic sinus surgery and musculoskeletal symptoms  | Rimmer J, et al   | 2016 | Cross sectional survey                       | 250       | 80.00%                              | NS  |     |                   |                                  |                      |
| Work environment discomfort and injury: An ergonomic survey study of the American Society of Paediatric Otolaryngology Members | Cavanagh J, et al | 2012 | Cross sectional survey                       | 100       | 62.00%                              | NS  | S   | NS                |                                  | 56.50%               |
| Ergonomic hazards in Otolaryngology  | Vaisbuch Y, et al | 2019 | Intraoperative observations and survey study | 70        | 72.90%                              |     |     | NS                | 76.00%                           |                      |

**Note:** NS: Non-significant; S: Significant

## Discussion

To our knowledge, this is the first review article that complies and investigates major factors that could play in OR ergonomics in the field of otolaryngology. The six main potential factors including 1) percentage (%) reported work-related physical discomfort, 2) age, 3) sex, 4) years in practice, 5) no previous ergonomics knowledge, and 6) percentage (%) received treatment were thoroughly discussed and selected by otolaryngologists at Texas Tech University Health Science Center ENT department. Before conducting the mini-review, residents and attendings at the ENT department hypothesized that these six factors could play significant roles in affecting the ergonomic experience in the OR setting for otolaryngologists. However, surprising results were found after analyzing articles published in the past decade with a total of 1080 responses (Table 1). ENT surgeons' age and length of practice did not play significant roles in their work-related discomfort from operational room procedures, even though the common expectation is that older age and longer years in practice could lead to more discomfort. Regarding the sex factor, Cavanagh J, et al stated that female surgeons experienced more pain and discomfort than male surgeons [3]. However, it's difficult to precisely determine the importance of sex differences due to unequally distributed response rates (70%-80% male responders) in the field of otolaryngology [4,5].

According to the review article done by Ramakrishnan, et al. [1], a landmark article published a decade ago revealed an astoundingly high percentage of physicians physically suffering from minimally invasive surgeries, and attention to physician physical well-being in the OR has been increasing [2,6]. With the expectation that ergonomics awareness would reach a higher point from the past 10 years, yet our review shows that lack of ergonomics knowledge is still prevalent among otolaryngologists, with 63% to 100% of otolaryngologists having no previous ergonomics knowledge. In addition, the portion of physicians who reported surgery/procedure related physical discomfort remains notably high accompanying the non-negligible rate of surgeons seeking treatment. In the quantitative study published by Rodman C, et al., it stated that among a total of 275 surgeries categorized in the three most common otolaryngology surgery types: tonsillectomy, adenoidectomy, and tympanostomy tube insertions, none of the observed procedures bared negligible ergonomic risks [4]. Based on the result from our review, the current OR ergonomic risks in otolaryngology continued with minimal improvement, and it's clear that our ENT surgeons are vulnerable from surgical ergonomic risks. There are serious needs of action to protect and maintain the

physical health of our otolaryngology subspecialists. To reduce the physical discomfort and ergonomic risks in surgical procedures, a good option is to increase collaborations between surgeons and technology companies to make ergonomic and customized equipment as it mentioned previously in the published articles [7]. However, A new first step, by implementing mandatory ergonomic training is strongly recommended for all the otolaryngology programs across the nation to increase ergonomic awareness among practicing otolaryngologists. We hope our review could serve a "wake up call" for practicing otolaryngologist, especially young residents, due to the reason that younger age and fewer years in practice do not reduce the surgical ergonomic risks. In the future, in order to provide more solid data on the importance of ergonomic training, more experimental comparative studies are suggested to be conducted [8-10].

## Conclusion

Out of the six major factors that could potentially affect physical discomfort during surgeries, age, sex, and years of practice do not play important roles in surgical ergonomics within the otolaryngology subspecialty. Even with growing attention and increasing publications on ergonomic risks in the field of otolaryngology over the past ten years, surgical ergonomic risks have not improved much as expected. This astounding founding brings an alerting message to our fellow otolaryngologists. In order to mitigate the situation, immediate actions are required, with the first step being increasing ergonomic awareness through mandatory ergonomic training.

## Limitation

A few limitations relating to this review could be the small sample size due to the reason that only articles analysing the six potential major surgical ergonomics in the field of otolaryngology were included. Also, there is a possibility at a low chance that some articles were missed during the literature search.

## Conflict of Interest

No conflict of interest to disclose.

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