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ORIGINAL ARTICLE

A national survey of workplace-related musculoskeletal disorder and ergonomic practices amongst Irish otolaryngologists

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Abstract

Background Work-related musculoskeletal disorder (WRMD) is a rising concern for surgeons, particularly those involved in minimally invasive surgery (MIS). Severe WRMD can adversely affect surgeon's health and foreshorten their careers if not appropriately managed.

Aims The aim of this study was to assess the prevalence of WRMD among Irish otolaryngologists and determine their knowledge of the best ergonomic principles.

Methods A national survey was distributed electronically to all otolaryngology consultants and non-consultant hospital doctors (NCHDs) in Ireland. The survey assessed respondents' age, grade, history of WRMD, and treatments sought for WRMD and knowledge of best ergonomic practice.

Results Forty-nine of one hundred and two respondents completed the survey. The lifetime prevalence of WRMD among this cohort was 75.5%. Pain was the most commonly experienced symptom at 71.4%. The neck was the most frequently affected location (59.2%). Treatment for WRMD was sought by 36.7% of participants. The majority of respondents (73.5%) were unaware of recommendations made in the field of surgical ergonomics, while 85.7% were interested in learning ergonomic principles.

Conclusion This study demonstrates a high prevalence of WRMD amongst otolaryngologists working in Ireland and demonstrates a need for ergonomic training for surgeons.

Keywords Ergonomics · Otolaryngologists · Work-related musculoskeletal disorder

Background

Work-related musculoskeletal disorder (WRMD) is defined as a musculoskeletal disorder to which one's work environment and the performance of work contribute to injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs [1, 2]. WRMD constitutes a variety of symptoms, including pain, fatigue, paraesthesia, stiffness, and weakness (Fig. 1) [3]. The aetiology of WRMD is multifactorial, with poor workplace ergonomics, lack of training in ergonomic principles, and a high workload environment all contributing its development [4]. Ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimise human well-being and overall system performance [5].

WRMD amongst surgeons is an increasingly reported health concern with 60–90% of surgeons reporting musculoskeletal pain whilst operating [6, 7]. In a previous study of 425 surgeons in Germany, 84% reported posture-related problems, and 97% felt that there was a need to improve operating room ergonomics [8]. In desk workers, meanwhile, there is a 14% prevalence rate of WRMD [9]. A positive correlation between head flexion of over 20° and the presence of neck and back pain is reported [9].

Practice in otolaryngology is associated with prolonged static positioning in both the outpatient and operating theatre environments. Otolaryngologists perform procedures under both microscopic and endoscopic visions, putting them at increased the risk of developing WRMD [10, 11]. Previous

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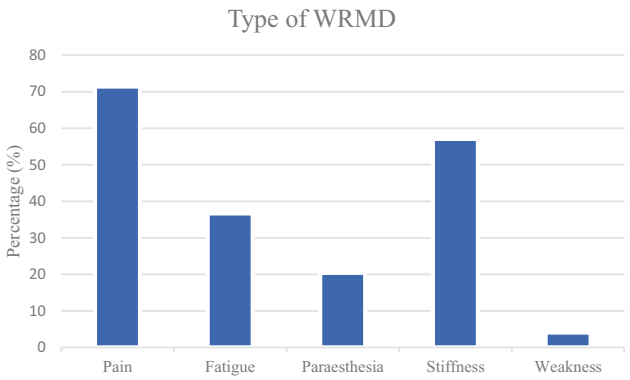

Fig. 1 Types of WRMD

international studies highlight a high rate (62–87%) of WRMD amongst otolaryngologists, leading to a significant impact on surgeon's health, professional and personal lives [4, 11–13]. There is no data available regarding WRMD rates amongst surgeons in Ireland. In this paper, we investigate rates of WRMD amongst Irish otolaryngologists and attitudes to ergonomic training with the aim of better understanding this issue and promoting a basis for further investigation.

Methods

Institutional approval was sought to electronically survey all otolaryngology consultants and non-consultant hospital doctors (NCHDs) in Ireland registered with the Royal College of Surgeons in Ireland (RCSI). Ethical approval was granted by the Tallaght Hospital Research and Ethics Board. Prior to distribution, the survey was pretested by a group of otolaryngology specialist registrars, medical students, occupational therapists, and ergonomists to ensure it was user-friendly and that responses provided meaningful data. The survey was then distributed via email to the entire membership of Irish Institute of Otolaryngology/Head and Neck Surgery (IIOHNS) with Google forms used to collect the data.

Basic demographic data including respondent age, height, grade, and years in otolaryngology practice were sought. Further questions regarding the occurrence of WRMD, the anatomical location affected, the effect on the surgeon's work and lifestyle, and treatment sought for WRMD were included. In addition, respondents were surveyed regarding their awareness of ergonomic principles and interest in attending an educational workshop (see Appendix 1.1 for questionnaire).

All data was collected and tabulated using Excel. The data was analysed using IBM Statistical Package Social Sciences (SPSS) Ver 26 2019. Chi-square tests and Fisher's exact tests were used for categorical data.

The primary outcome was to determine the prevalence of WRMD. Secondary outcomes included factors associated with WRMD and interest in ergonomic training for otolaryngologists.

Results

Demographics

A total of 49/102 otolaryngologists working in Ireland responded to the questionnaire, a response rate of 48%. The majority of respondents were male (73.5%) (Table 1). In terms of grade, 26 (53.1%) of the respondents were NCHDs, while 23 (46.9%) were consultants. Respondents' ages ranged from under 30 to 70 years with the greatest response rate among the 31–40 age range at 14 respondents. Mean height was 174 cm. The majority, in total 44 (89.8%), were right hand dominant.

Prevalence

The prevalence of WRMD was 75.5%. Pain was the most common WRMD symptom, reported by 71.4% of respondents. The neck was the most frequent anatomical location affected by pain at 59.2%, followed by upper back (34.7%) and lower back (32.6%) (Fig. 2). WRMD occurred on a daily (16.3%), weekly (26.5%), and monthly (28.6%) basis for respondents. Sustained or prolonged WRMD was reported by 55.1% of respondents. Rates of WRMD were similar amongst NCHDs (76.9%) and consultants (73.9%) with no statistically significant difference noted ($p = 0.81$). There was no statistical difference in WRMD rate based on gender ($p = 0.77$), height ($p = 0.08$), or fellowship-trained consultant ($p = 0.99$). WRMD was the highest amongst NCHDs not enrolled in the RCSI otolaryngology training programme (88.9%); this was not significantly more than in consultants ($p = 0.41$). Of otolaryngology trainees in years 1–4 of training, 5 of 9 trainees experienced symptoms of WRMD. This increased to 5 of 6 trainees in years 5–8.

Table 1 Demographics

Demographic	Value
Age (years)	31–40*
Gender (female/male)	10/36**
Height (cm) mean (SD)	174 (8.4)
Grade (consultants/NCHDs)	26/23
Dominant hand (right/left/ambidextrous)	44/1/4

*(Majority of respondents $n = 14$); **3 'Prefer not to say'

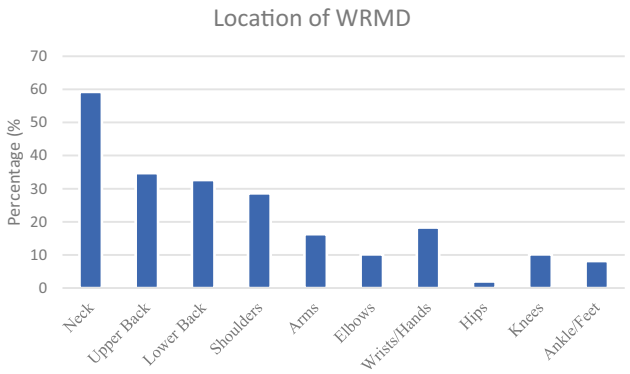

Fig. 2 Location of WRMD

Impact of WRMD

WRMD impacted on practice, with 28.6% of those surveyed forced to stop their work during a procedure due to WRMD symptoms on at least one occasion. 10.2% were required to reduce their case load or take time off work due to WRMD. Two consultant surgeons (8.7% of consultant cohort) reported planning early retirement due to the impact of WRMD.

Respondents identified a number of precipitating factors for WRMD in the operating theatre, including the use of a headlight, supervising a trainee across an operating table, or prolonged fixed posture. Eight consultants reported rhinology cases (septoplasty, rhinoplasty, and endoscopic sinus surgery) as particularly ergonomically challenging. WRMD was more commonly triggered by basic procedures such as aural microsuction and nasendoscopy amongst NCHDs in early years of training.

Treatment

Treatment was sought by 36.7% ($n = 18$) of participants for symptoms of WRMD, most often in the form of simple non-opiate-based analgesia ($n = 16$). Several other combined treatment modalities were required such as physiotherapy ($n = 10$), yoga/pilates ($n = 5$), massage ($n = 9$), focused exercise ($n = 10$), and acupuncture ($n = 3$) (see Appendix 1.2). Anecdotally several otolaryngologists working in Ireland have undergone back or neck surgery, but no respondents in this survey underwent surgery for WRMD.

Ergonomics

The majority (73.5%) of respondents were unaware of recommendations made in the field of surgical ergonomics. Some measures were taken by surgeons during surgery to improve ergonomics such as the use of arm rests (26.5%), micropauses (30.6%), and using an ergonomic chair (22.4%). Height adjustments (alteration in patient position relative to surgeon) were made in the OPD setting (53.1%) and theatre setting (89.8%).

Anti-fatigue standing mats, adjusting the operator screen to eye level and use of a mayo operating stand as an arm rest were other measures taken by respondents. A strong interest in additional education regarding ergonomic principles was reported by the majority (85.7%) of respondents. Surgeons favoured learning these principles in the form of virtual tutorials (52.2%). A large proportion of respondents (85.7%) felt their hospital department did not take sufficient steps to reduce WRMD or provide ergonomics training.

Discussion

This is the first study to report the prevalence of WRMD in a cohort of Irish surgeons. A 48% response rate to our study suggests a high level of engagement with this topic, with standard response rates to studies in this format typically 20–30% [10, 14]. We highlight high rates of WRMD of 75.5%, which is in keeping with internationally reported WRMD rates of 62–87% [11–13]. The most common WRMD symptom of neck pain noted in this cohort is reflective of the reported literature, with 72% of otolaryngologists describing neck/back pain in other studies [15]. Surgeons performing minimally invasive surgery (MIS) compared to open procedures are known to be at increased risk of experiencing neck pain (odds ratio 2.77) [16].

The impact of WRMD in the Irish surgical workforce is highlighted in this study with 10.2% suggesting that they intend to reduce their workload or needed to take sick leave due to WRMD. Weekly symptoms were experienced by 26.5% of respondents. Previous meta-analysis highlighted that 12% of physicians with WRMD require a leave of absence, practice restriction, modification, or early retirement [7]. Another study of neurosurgeons reported 14.2% considered a change of career due to WRMD [17]. In our study, 8.7% of the consultant cohort reported planning earlier retirement due to symptoms of WRMD. The significant manpower impact and potential future workforce planning threat posed by WRMD are evident.

Consultants and NCHDs were affected equally by WRMD in our study, highlighting that WRMD also has significant effects for those at early stages in their careers. Of otolaryngology trainees in years 1–4 of training, 5 of 9 trainees experienced symptoms of WRMD. Basic procedures such as aural microsuction were reported as a common source of WRMD symptoms in this group, demonstrating early exposure to poor ergonomic practices. WRMD amongst otolaryngology trainees, including neck pain, has previously been reported to be as high as 82.3% in some cohorts [10]. We highlight a potential for early ergonomic training

to limit severe symptoms which result in later work absences or requirement for additional treatment. The precipitants of WRMD symptoms we report, including the use of a headlight, supervising a trainee, and prolonged fixed posture, add to previously reported data for plastic surgeons, which highlighted factors such as the use of surgical loupes in WRMD [18]. Interventions to reduce the effects of these risk factors for WRMD are required. Incorporation of ergonomic principles into the surgical training curriculum could offer benefits.

Considerable interest was shown in our data for education in best ergonomic practices, with 85.7% in favour of further training. One trainee in our study added the response, "trainees, in particular those at early stages, should be advised, encouraged and allowed time to optimize set up in order to engender good habits from the outset of training. The perception that taking these moments slows down clinics or operating theatre should be discouraged." The Health Service Executive (HSE) published a "Fast Fact" document in October 2020 regarding ergonomic principles to provide guidance to managers and employees [19]. A guidance document for dentists in Ireland, a group similarly affected by WRMD related to fixed, standing positions, was published in 2016 [20]. Strong legislative support and employer awareness of WRMD appear necessary to promote better practice.

Ergonomic principles and training can lead to improved outcomes. A randomised control trial of no ergonomic training versus a preventive program (followed by ergonomic teaching and specific exercises) showed a significant reduction of low back pain (66.2% vs 50.0%; $p=0.04$) and analgesic consumption (30.9% vs 15.5%; $p=0.03$) after 6 months [21]. Thuy et al. reported 69.6% of otolaryngologists who applied ergonomic principles observed improved symptoms [22]. Inexpensive interventions such as micropauses during surgery for 20 s have also been shown to reduce muscular fatigue [23]. A study investigating the Ipswich Microbreak Technique (neck rotation, neck glide, and upper back stretch every 5–10 min for 30 s) showed a delay in subjective neck and shoulder pain and reduced objective surface electromyogram muscle activation during prolonged working under a microscope [24]. Simple medication and physiotherapy were therapeutic measures commonly sought in our study cohort. Fifty-five percent of those requiring treatment for WRMD attended a physiotherapist. This is a similar to published literature with 83% of otolaryngologists seeking a physiotherapy review due to WRMD in Babar-Craig's series [15].

This study provides the first data on WRMD in a cohort of Irish surgeons. The results highlight a significant prevalence of WRMD, demonstrate an impact on work practices/workforce planning, and demonstrate a willingness to engage with further training amongst surgeons. The study does, however, have a number of limitations. A survey of this nature is subject to responder bias, with an increased likelihood for those suffering from WRMD or interested in ergonomics training more likely to complete the questionnaire. The authors acknowledge that the methodology does not capture surgeons who have already left the specialty or retired, potentially due to severe WRMD. The total number of respondents is relatively small, despite an excellent response rate. Another limitation of this study is the lack of a comparative specialty, to highlight differences in prevalence of WRMD between medical subspeciality groups. Despite these limitations, we feel the study provides useful insights into WRMD in the Irish surgical workforce and provides a mandate for further study.

Conclusion

We highlight a high prevalence of WRMD amongst otolaryngologists in Ireland, demonstrating a need for awareness of ergonomic principles and additional training for surgeons, including at a junior level. These principles ought to be assessed as part of a regular workplace safety assessment to ensure early detection and prompt adjustments to ensure a healthy otolaryngology and surgical workforce for the future.

Appendix

1.1

Questions

1. Have you suffered from work-related work-related musculoskeletal disorder (MSD)?
2. What body part is affected?
3. What were the effects of musculoskeletal disturbance (MSD) on yourself?
4. What do you find really exacerbates your MSD?
5. In view of recent changes due to the COVID-19 pandemic, have you found performing telephone clinics exacerbates your symptoms?
6. What type of treatment have you had for this pain?
7. Have you ever had surgery for pain?
8. Are you aware of the recommendations of surgical ergonomics, studies, and research?
9. Do you feel your department provides adequate equipment to help reduce the risk of MSD?
10. Have you taken ergonomic measures in your practice?
11. Would you be interested in ergonomic training?
12. How would you like this training to be delivered?
13. Gender
14. Age
15. Height (cm)
16. Dominant hand

17. How many hours of ward rounds do you do per week?
18. Are you ENT consultant?
19. Years of practice including years of training
20. What is your subspecialty?
21. What procedures do you find if any, cause musculoskeletal disturbance?
22. Fellowship trained
23. How many theatre sessions (1 = half a day/4 h) per week do you have?
24. How many clinic sessions (1 = half a day/4 h) per week do you have?
25. Any other feedback/comments?

1.2

Treatment sought by respondents.

What type of treatment have you had for this pain? (You may tick more than one box).

Respondent 1. Simple analgesia.
Respondent 2. Simple analgesia, physiotherapy, massage.
Respondent 3. Simple analgesia, physiotherapy, yoga/pilates, massage, self-managed symptoms—gym/exercise.
Respondent 4. Simple analgesia, physiotherapy, yoga/pilates, self-managed symptoms—gym/exercise.
Respondent 5. Simple analgesia, physiotherapy, acupuncture, self-managed symptoms—gym/exercise.
Respondent 6. Simple analgesia, self-managed symptoms—gym/exercise.
Respondent 7. Simple analgesia, yoga/pilates, massage, self-managed symptoms—gym/exercise.
Respondent 8. Simple analgesia, physiotherapy.
Respondent 9. Physiotherapy, massage, self-managed symptoms—gym/exercise.
Respondent 10. Simple analgesia, self-managed symptoms—gym/exercise.
Respondent 11. Massage.
Respondent 12. Simple analgesia, self-managed symptoms—gym/exercise.
Respondent 13. Simple analgesia, physiotherapy, massage, chiropractic/osteopathic treatment, self-managed symptoms—gym/exercise.
Respondent 14. Simple analgesia, acupuncture.
Respondent 15. Simple analgesia, physiotherapy, yoga/pilates, massage.
Respondent 16. Simple analgesia, physiotherapy, acupuncture, massage.
Respondent 17. Simple analgesia, physiotherapy, yoga/pilates, chiropractic/osteopathic treatment, self-managed symptoms—gym/exercise.
Respondent 18. Simple analgesia, massage.

Availability of data and material Available on request.

Declarations

Ethics approval Granted by Tallaght Research and Ethics Board.

Conflict of interest The authors declare no competing interests.

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