WebLog Journal of Head and Neck Surgery

Editorial
Published: 29 Oct, 2026

Beyond Surgical Precision: Innovating with Artificial Intelligence to Prevent WMSDs and Promote Global Health Equity

Philippe Gorce*

University of Toulon, France



Editorial

Work-Related Musculoskeletal Disorders (WMSDs) represent a major occupational health issue among surgeons in the context of global health [1, 2]. Prolonged static postures, repetitive movements, and visual strain inherent in surgical work expose practitioners to neck, back, and upper limb pain, which can impair their quality of life and professional longevity [3]. A meta-analysis estimated the prevalence of neck pain at 60% and that of back pain at 49% over a 12-month period among surgeons and interventional physicians [4]. More recently, a systematic review and meta-analysis reported a prevalence of WMSDs in the neck of 41% and in the back of 37.7% among surgeons not using video-assisted or robotic techniques [5]. In head and neck surgery, similar studies focused on otolaryngology estimated the prevalence of neck pain at 54% (95% CI: 40-67%) and back pain at 49% (95% CI: 40-59%) [6]. Furthermore, a study of 76 oral and maxillofacial surgeons identified the neck, shoulders, and lower back as among the most affected areas [7]. This research demonstrates that preventing WMSDs is a major challenge for the sustainability of surgical practices. Although these estimates vary depending on the population, assessment methods, and surgical settings, they nevertheless highlight the magnitude of the problem. In head and neck surgery, these findings reinforce the value of ergonomic innovations and artificial intelligence in identifying risky postures, supporting prevention, and protecting practitioners' health.

Artificial Intelligence (AI) and technological innovation are opening up new avenues for transforming the prevention of WMSDs [8, 9]. Computer vision, machine learning, and deep learning algorithms enable the automation of posture recognition and the identification of ergonomic risk factors, thereby offering opportunities for more objective and continuous assessment of biomechanical stresses [10, 11]. Furthermore, integrating AI with wearable sensors - particularly inertial measurement units and electromyographic sensors - could facilitate the quantification of strain-inducing postures, repetitive movements, and muscle load in work settings [12, 13]. In the healthcare sector, wearable technologies hold potential for assessing healthcare professionals' exposure to physical risk factors and guiding ergonomic interventions [13]. These approaches could complement existing innovations, such as surgical assistance systems and visualization devices, by contributing to the individualized adaptation of the operating environment. Nevertheless, despite promising results in posture recognition and risk assessment, the available data remains inconsistent, and validation under real-world conditions is still necessary. Longitudinal and interventional studies are therefore essential to determine whether these technologies can effectively reduce exposure to ergonomic risks, the incidence of WMSDs, and musculoskeletal symptoms [11].

However, innovation cannot consider progress if its benefits remain unevenly accessible. Differences in resources, equipment, and working conditions among health care systems risk exacerbating inequalities in prevention [14, 15]. Algorithms developed in highly technological environments are not necessarily suited to the diversity of professional practices and populations, particularly when the training data are not representative of the contexts in which these tools will be deployed [14, 16]. The World Health Organization thus emphasizes that equity, inclusion, and the protection of human rights must guide the design and deployment of AI in healthcare [14]. This requirement involves developing affordable solutions that have been validated in various contexts and designed with the participation of the relevant professionals [14, 15].

Making equity a global health imperative also requires evaluating innovation beyond its technical performance alone. The effective reduction of musculoskeletal risks, the protection of occupational data, and the acceptability and accessibility of these tools must be essential criteria

OPEN ACCESS

Correspondence:
Philippe Gorce, University of Toulon, France,
E-mail: gorce@univ-tln.fr

Received Date: *13 Oct 2026*
Accepted Date: *27 Oct 2026*
Published Date: *29 Oct 2026*

Citation:
Philippe Gorce. Beyond Surgical Precision: Innovating with Artificial Intelligence to Prevent WMSDs and Promote Global Health Equity. WebLog J Head Neck Surg. wjhns.2026.j2903. https://doi.org/10.5281/zenodo.23912495

Copyright *© 2026 Philippe Gorce. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

for their evaluation and deployment [14, 17]. The World Health Organization specifically emphasizes the need to protect privacy, ensure the security of artificial intelligence systems, and promote equitable access to these technologies [14]. Furthermore, the prevention of Work-Related Musculoskeletal Disorders (WMSDs) cannot rely exclusively on technological solutions: it must be part of a comprehensive strategy combining ergonomic training, equipment adaptation, worker participation, and improvements in work organization [18, 19]. Data from systematic reviews on participatory ergonomic interventions highlight the value of combined approaches for improving workers' musculoskeletal health [18, 19]. Thus, AI should be viewed as a complementary prevention tool, not as a substitute for fundamental ergonomic and organizational measures.

True progress lies in responsible, inclusive, and equitable innovation. By integrating AI into a global strategy for the prevention of WMSDs, head and neck surgery can help protect the health of healthcare providers, regardless of where they practice. The goal should not only be to make surgery more precise and effective, but also to ensure that every surgeon has a safer, healthier, and more sustainable work environment.

References

1. Gorce, P. Global Ergonomics: A New Systems Paradigm for Preventing Work-Related Musculoskeletal Disorders in the Era of Global Health. Theor. Appl. Ergon. 2026; 2, 18. https://doi.org/10.3390/tae2030018.
2. Gorce P. Rethinking the prevention of work-related musculoskeletal disorders in the era of global health: Toward a convergence of One Health, Planetary Health, and Total Worker Health®. Global Health Economics and Sustainability, 2026; 4, 3, 026310048. https://doi.org/10.36922/GHES026310048.
3. Gorce P, Jacquier-Bret J. Systematic Review and Meta-Analysis of Work-Related Musculoskeletal Disorder Prevalence Among European Surgeons: Effect of Demographic, Economic, and Quality-of-Life Indicators. Int J Environ Res Public Health. 2026; 23, 398. doi: 10.3390/ijerph23030398.
4. Epstein S, Sparer EH, Tran BN, et al. Prevalence of Work-Related Musculoskeletal Disorders Among Surgeons and Interventionalists: A Systematic Review and Meta-analysis. JAMA Surg. 2018; 153(2). doi: 10.1001/jamasurg.2017.4947.
5. Gorce P, Jacquier-Bret J. Effect of Assisted Surgery on Work-Related Musculoskeletal Disorder Prevalence by Body Area among Surgeons: Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2023; 20, 14, 6419. doi: 10.3390/ijerph20146419.
6. Ryan MT, Montgomery EA, Fryer J, Yang AW, Mills C, Watson N, Noller M, Riley CA, Tolisano AM. Ergonomics in Otolaryngology: A Systematic Review and Meta-analysis. Laryngoscope. 2023; 133, 3, 467-475. doi: 10.1002/lary.30216.
7. Chavez JA, Nam YS, Schwartz A, DeMoulin D, Swift JQ, Turner C. Preventing work-related musculoskeletal injuries among oral and maxillofacial surgeons. Work. 2023; 76, 1, 243-249. doi: 10.3233/WOR-220059.
8. Gorce, P.; Jacquier-Bret, J. Current Trends in Artificial Intelligence for Recognizing Work Postures to Prevent Work-Related Musculoskeletal Disorders: Systematic Review and Meta-Analysis by Occupational Activity. Bioengineering, 2026; 13, 298. https://doi.org/10.3390/bioengineering13030298.
9. Safari M, Naserbakht AH, Badri Kouhi A, Varmazyar S. Artificial intelligence and emerging technologies in assessing ergonomic risk factors in the workplace: A systematic review. Work. 2025; 82, 3, 727–739. doi: 10.1177/10519815251349793.
10. Prem Kumar A, Sindhu S, Manangi M, et al. An Adaptation of Computer Vision of Artificial Intelligence for the Assessment of Postural Ergonomics in Laparoscopic Surgery. World J Lap Surg, 2023; 16, 3, 119–124.
11. Donisi L, Cesarelli G, Pisani N, Ponsiglione AM, Ricciardi C, Capodaglio E. Wearable Sensors and Artificial Intelligence for Physical Ergonomics: A Systematic Review of Literature. Diagnostics, 2022; 12, 12, 3048. doi: 10.3390/diagnostics12123048.
12. Inês Sabino, Maria do Carmo Fernandes, Cátia Cepeda, Cláudia Quaresma, Hugo Gamboa, Isabel L. Nunes, Ana Teresa Gabriel, Application of wearable technology for the ergonomic risk assessment of healthcare professionals: A systematic literature review. International Journal of Industrial Ergonomics. 2024; 100, 103570. doi: 10.1016/j.ergon.2024.103570.
13. Motta F, Varrecchia T, Chini G, Ranavolo A, Galli M. The Use of Wearable Systems for Assessing Work-Related Risks Related to the Musculoskeletal System-A Systematic Review. Int J Environ Res Public Health. 2024; 21, 12, 1567. doi: 10.3390/ijerph21121567.
14. World Health Organization. Ethics and governance of artificial intelligence for health: WHO guidance. Geneva: WHO ; 2021.
15. World Health Organization Regional Office for Europe. Equity within digital health technology within the WHO European Region: a scoping review. Copenhagen: WHO Regional Office for Europe; 2022.
16. Celi LA, Cellini J, Charpignon ML, et al. Sources of bias in artificial intelligence that perpetuate healthcare disparities—A global review. PLOS Digital Health. 2022; 1, 3, e0000022. doi: 10.1371/journal.pdig.0000022.
17. Stephenson J. WHO Offers Guidance on Use of Artificial Intelligence in Medicine. JAMA Health Forum. 2021. doi: 10.1001/jamahealthforum.2021.2467.
18. Rivilis I, Van Eerd D, Cullen K, Cole DC, Irvin E, Tyson J, et al. Effectiveness of participatory ergonomic interventions on health outcomes: a systematic review. Applied Ergonomics. 2008; 39, 3, 342–358. doi: 10.1016/j.apergo.2007.08.006.
19. Krishnanmoorthy G, Rampal S, Karuthan SR, Baharudin F, Krishna R. Effectiveness of Participatory Ergonomic Interventions on Work-Related Musculoskeletal Disorders, Sick Absenteeism, and Work Performance Among Nurses: Systematic Review. JMIR Hum Factors. 2025; 12, e68522. doi: 10.2196/68522.