Sanitas
Revista arbitrada de ciencias de la salud
Vol. 3(3), 1-13, 2024
https://doi.org/10.62574/at86vk90

Ergonomic hazards of primary health care medical personnel

Riesgos ergonómicos del personal médico de atención primaria en salud

Marian Elisa Paredes-Colina
marianp99.mp99@gmail.com
Universidad Iberoamericana del Ecuador, Quito, Pichincha, Ecuador
https://orcid.org/0009-0003-5580-257X

Michael Danny Pinargote-Galarza
michael10mpg@hotmail.es
Universidad Iberoamericana del Ecuador, Quito, Pichincha, Ecuador
https://orcid.org/0009-0006-3496-4651

Richard Andrés Cabrera-Armijos
rcabrera@unibe.edu.ec
Universidad Iberoamericana del Ecuador, Quito, Pichincha, Ecuador
https://orcid.org/0000-0001-9480-885X

ABSTRACT

Objective: to analyse the ergonomic risk of primary health care medical staff in type A health centres in the Chillanes canton of Bolivar Province, Ecuador. **Method**: The research had an observational design with a descriptive level. It addressed a purposive sample of 22 doctors who were administered the modified Nordic questionnaire and were observed using the ROSA method. **Results**: the mean age of the population was 36 years, most of them had a long working relationship and 86% reported neck pain. When assessing the ergonomic risk, 90% are at very high risk and require the necessary action as soon as possible. **Conclusion**: Ergonomic risks have a direct impact on the musculoskeletal health of workers and a redesign of the work environment is required, along with comprehensive interventions that address other elements that contribute to occupational health.
Keywords: ergonomics; occupational health; musculoskeletal diseases; medical personnel (Source, DeCS).

RESUMEN

Objetivo: analizar el riesgo ergonómico del personal médico de atención primaria en salud de centros de salud tipo A del cantón Chillanes de la Provincia de Bolívar, Ecuador. **Método**: La investigación tuvo un diseño observacional con un nivel descriptivo. Abordó una muestra intencional de 22 médicos a quienes se les administro el cuestionario Nórdico modificado y fueron observados con el método ROSA. **Resultados**: la media de la población tiene 36 años, en su mayoría cuentan con una relación laboral prolongada y el 86% manifestó dolor en el cuello. Al evaluar el riesgo ergonómico, el 90% se encuentra en una situación de riesgo muy alto y requiere una actuación necesaria cuanto antes. **Conclusión**: Los riesgos ergonómicos impactan directamente la salud musculoesquelética de los trabajadores y se requiere de un rediseño del ambiente laboral, y junto a ello, intervenciones integrales que aborden otros elementos que contribuyen a la salud laboral.
Descriptores: ergonomía; salud ocupacional; enfermedades musculoesqueléticas; personal médico. (Fuente, DeCS).

Received: 15/08/2024. Revised: 18/08/2024. Approved: 23/08/2024. Published: 01/09/2024.
Original short

INTRODUCTION

Health work is a service activity centred on quality, continuity and sustainability of care, without prejudice to the worker. (1,2,3). The work environment should be a safe and ergonomic space, with healthy interaction, adapted to body dimensions and technologically personalised for the worker (4,5). In particular, ergonomic hazards lead to musculoskeletal disorders, manifested in chronic pain, fatigue and other health problems (6). This affects the level of accident rates, sick leave, incapacity for work and increases worker absenteeism (7). (7).

According to the World Health Organisation (8)work-related musculoskeletal disorders are one of the most common problems among health professionals, affecting 1.71 billion people worldwide, comprising more than 150 disorders of joints, bones, muscles and associated systems. (5). Recent studies have shown that inadequate working conditions, such as poorly designed furniture and lack of ergonomic equipment, contribute to musculoskeletal injuries. (9).

The research conducted by Ortiz-Pazmiño and Brossard-Peña (10) identified that the administrative staff evaluated are mainly exposed to ergonomic risks with 100% of musculoskeletal symptomatologies. Similarly, the article published by Simbaña, Cárdenas and Campos (11)showed that workers who used laptop computers, static chairs and tables had symptoms in the lower back (75%), demonstrating the need to redesign the workstations.

On the other hand, the study by Guimarães et al. (12)in assessing risks in administrative staff, observed a prevalence of pain of 92.7%, with an association of neck pain with mental overload due to stress, physical inactivity, the work table at elbow height and the unsupported chair. Similarly, Vera-Márquez et al. (4) identified that workers who had been working for more than 5 years presented pain and

discomfort in the neck, shoulder and dorsal region in 65% of the workers for more than 12 months, together with sedentary lifestyles and the majority being overweight.

Abdollahi et al. (13)(13) also state that ergonomic risks are closely related to musculoskeletal disorders but can be reduced with the correct training of staff. Compatibility between the worker and the workspace, managing a healthy work culture and a safe environment have an impact on worker comfort and job satisfaction. (14).

Therefore, the article presents the research carried out in the population of doctors working in the Chillanes Health Centre in the Province of Bolivar, which aimed to analyse the ergonomic risk of primary health care medical staff in type A health centres in the canton of Chillanes in the Province of Bolivar, Ecuador.

METHOD

This article presents a quantitative, analytical and observational research study. The population consisted of 27 doctors working in type A primary care centres in the Chillanes canton in the province of Bolívar, Ecuador. There was an intentional sample of 22 for the survey, when the inclusion criteria were applied, such as presenting the position of doctor, giving written consent to participate in the research and being actively working in type A centres. Only 11 of these 22 professionals agreed to be observed and assessed with the ergonomic risk sheet.

Data collection was carried out with the triangulation of instruments, with the administration in a single contact of an observation form with the ROSA Method and the modified Nordic Questionnaire. The research involved a documentary search in PubMed, Scielo and Latindex, as well as consultation of the publications of the World Health Organisation and OSHA. The analysis of the information took place in an analysis matrix, which was subsequently processed in the SPSS statistical package in version 29.

RESULTS

The socio-demographic results of the study are presented in table 1. All doctors work 8 hours per day.

Table 1. *Socio-demographic characteristics.*

VARIABLE	INDICATOR	FREQUENCY	%
Sex			
	Male	8	64
	Female	14	36
Age group	20-29	2	9
	30-39	14	64
	40-49	6	27
Length of service (years)	4-6 years	6	27
	7-10 years	4	18
	More than 10 years	12	55

Source: Own elaboration.

According to figure 1, the average age distribution of the work is 36 years, with the 50th quartile being 35 years.

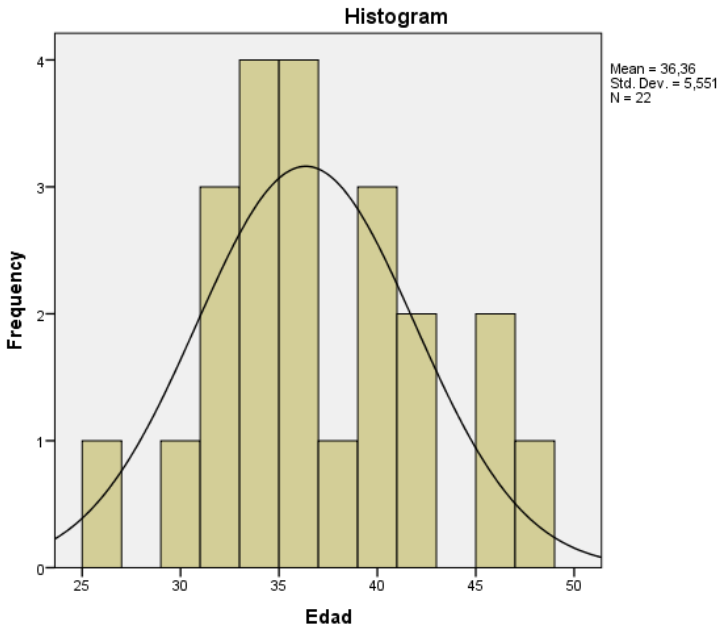

Figure 1. Histogram of the ages of the study population.

Source: Own elaboration.

Figure 2 shows the frequency of these symptomatologies according to working conditions.

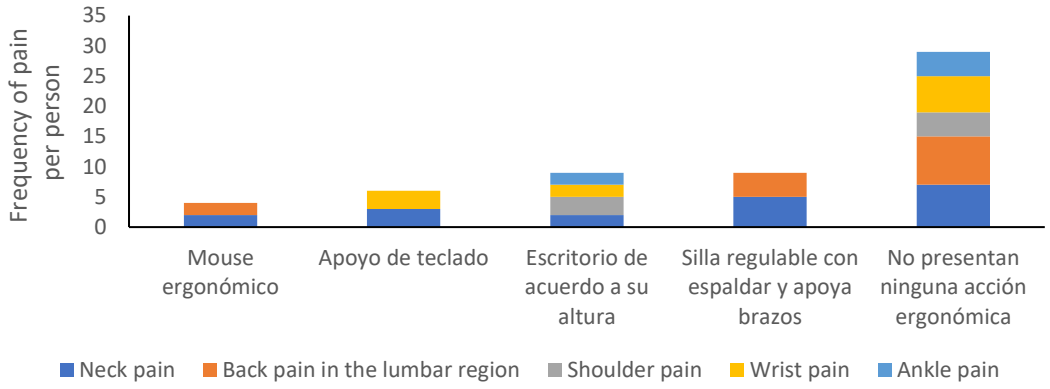

Figure 2. Frequency of pain due to ergonomic actions in work furniture.
Source: Own elaboration.

The results shown in figure 2 indicate that neck pain is the most prevalent symptomatology in all ergonomic elements of the workplace, being present in all five study variants, with a prevalence in women of 56.3% and in men of 43.7%.

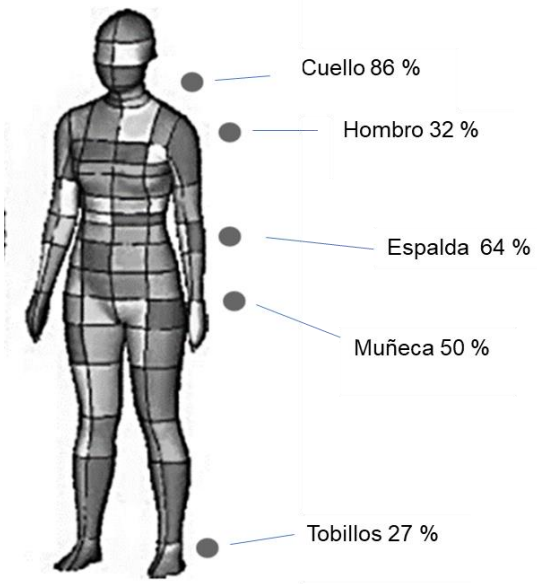

Figure 3. Body schema based on the percentage of involvement in the study population.
Source: Own elaboration.

As shown in figure 3, neck pain was the most prevalent in the study population with 86% recurrence followed by back pain with 64%. Regarding the frequency of risk factors in relation to exposure time, 60% adopt positions that can cause fatigue and 53% perform repetitive movements for periods of 30 minutes to 2 hours. The risk analysis based on the ROSA method applied to the study personnel showed that 90% of the workers observed had a high risk of contracting a skeletal symptomatology.

Figure 4 presents a neural network with different input variables and their coding, such as gender, work furniture, sitting time in front of the computer and age. The model yielded seven neural layers, with two output variables as high and very high risk. The interactions indicate that there is a direct connection of very high risk with work furniture 3 and 4 in the coding corresponding to adjustable chair with backrest and armrest.

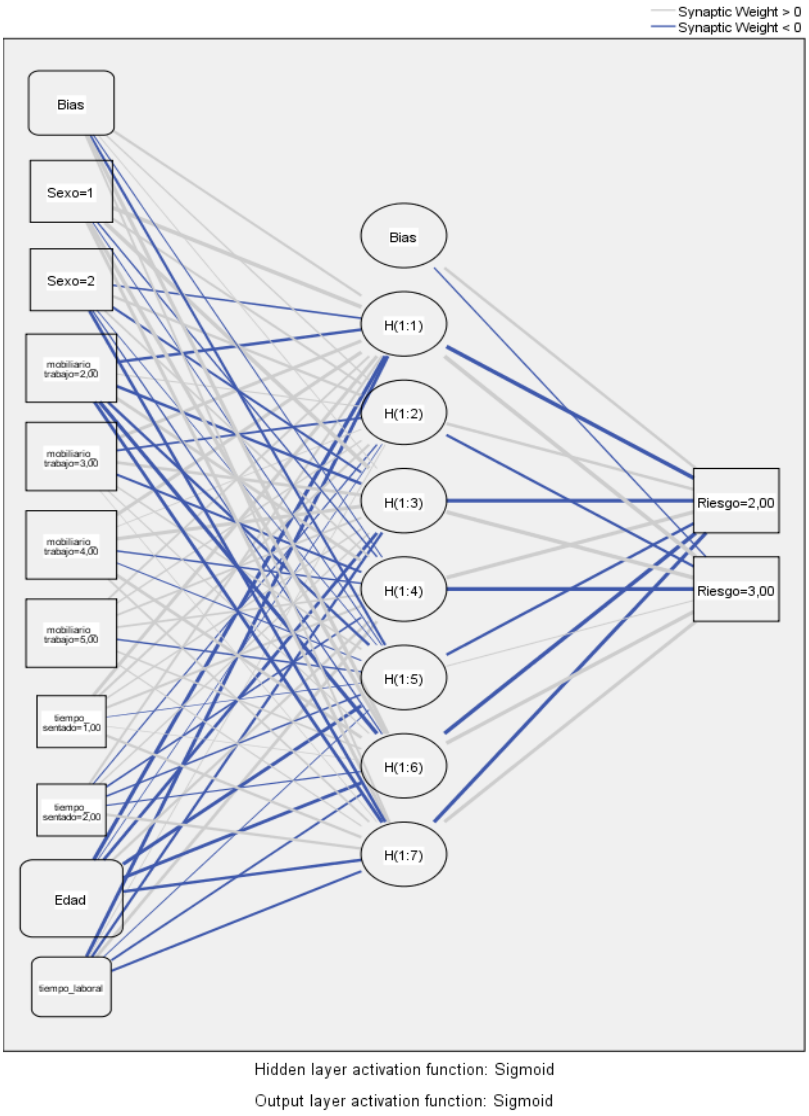

Figure 4. Neural network of ergonomic risks and musculoskeletal symptomatology.
Source: Own elaboration.

Figure 5 shows the variables with the highest weights, age and work furniture. There is no weight in the neural model with respect to time spent sitting in front of the computer. The area under the curve was 1, indicating that there was no error in the

data processing, moreover, the simulation matched the risk level of the study subjects.

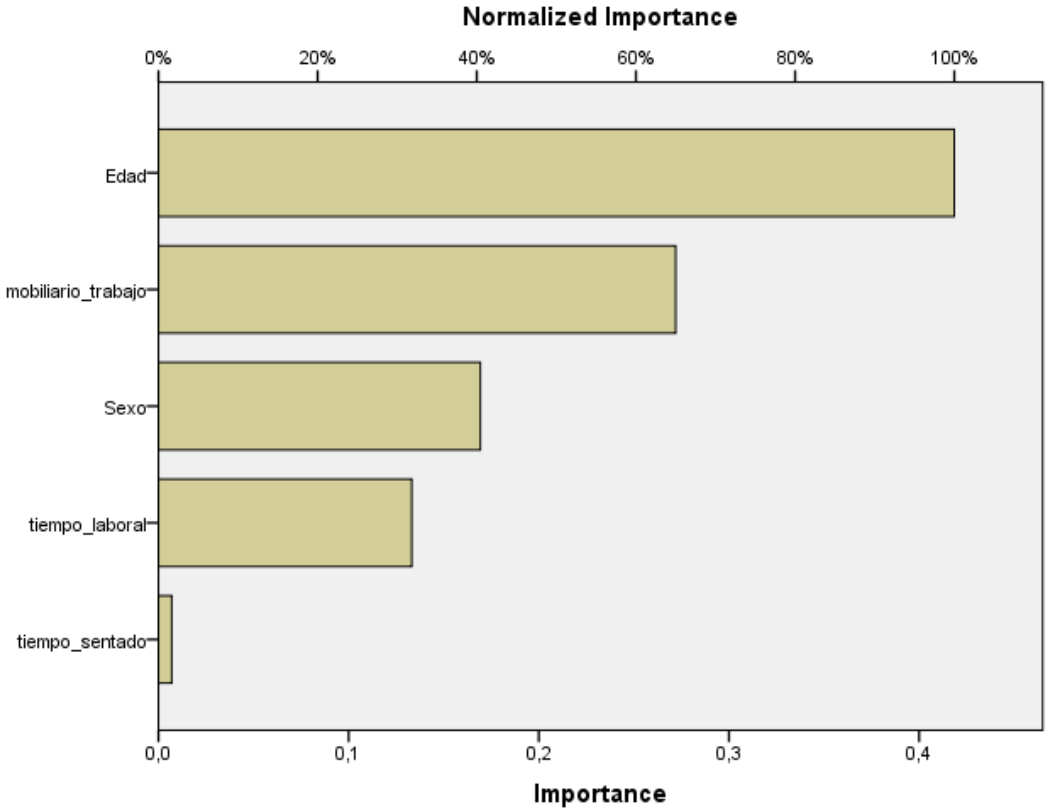

Figure 5. Variables with the greatest weight in the neural network model with ergonomic risk and musculoskeletal symptomatology as the response variable.
Source: Own elaboration.

DISCUSSION

Ergonomic risk has a significant impact on the occurrence of musculoskeletal disorders, the work environment can cause cumulative effects resulting in adverse health conditions, disability or, in extreme cases, loss of life of the worker. (15). These

problems are associated with exposure time to repetitive procedures, application of forces and weight overloading (6).

The adult female population has a higher prevalence of musculoskeletal disorders of the trunk and upper extremities, which increases with years of work service. (16)Accordingly, for every 10 professionals with neck pain, 6 are women and for every 10 professionals with back pain, 7 are women, most of whom have been working for more than 10 years. Also, the prolonged work routine and the collective psychological state can lead to physical and emotional exhaustion, leading to burnout syndrome. (17).

The pre-professional stage of medicine can be a risky environment, so many of these conditions start and go undetected. (18). Medical education, laboratory learning activities involve neck flexion and upright sitting posture.(19). However, healthcare workers are receptive to preventive and corrective ergonomics, safety and occupational health programmes (13,19). (13,19).

Reducing risks in repetitive activities, adapting the workstation according to the anthropometric measurements of the workers, encouraging the use of both hands and the use of display screens instead of laptops (11,20).

The worker is often subjected to high levels of work pressure, workload and work demands, developing stress and anxiety. (21). Systemic interventions are highly successful, the use of techniques to increase motivation and resilience, such as structural empowerment, recognition of achievements, conflict management, music therapy and aerobic exercise, are favourable to help the professional cope with organisational and personal challenges. (22).

CONCLUSION

There is a high ergonomic risk in the assessed medical staff, who already show latent musculoskeletal disorders in the last 12 months and according to the assessment

require immediate intervention. The risks are mainly focused on the age of the workers and the furniture, which leads us to recommend the redesign of the work area and the strengthening of a healthy work culture in the work dynamics.

CONTRIBUTION OF THE AUTHORS

Marian Elisa Paredes-Colina and **Michael Danny Pinargote-Galarza**. They contributed to the conceptualisation of the study, methodological design, data collection, statistical analysis, writing the initial draft of the manuscript and critical revision of the intellectual content. **Richard Andrés Cabrera-Armijos**, participated in the interpretation of the data, supervision of the research process and final approval of the manuscript for publication.

FUNDING

Non-monetary

CONFLICT OF INTEREST

There is no conflict of interest with persons or institutions involved in research.

ACKNOWLEDGEMENTS

To the Master's programme in Occupational Health and Safety. Ibero-American University of Ecuador.

REFERENCES

1. International Labour Organization. *The working relationship*. Report V. International Labour Office Geneva. ISBN 92-2-316611-X. [Online]; 2005. Available from: https://webapps.ilo.org/public/spanish/standards/relm/ilc/ilc95/pdf/rep-v-1.pdf.
2. World Health Organization. *Occupational health: health workers* [*Occupational health: health workers*]. Press centre publications: Fact sheets. [Online]; 2022. Available from: https://www.who.int/es/news-room/fact-sheets/detail/occupational-health--health-workers.

3. Pan American Health Organization. *Expanding equitable access to health services. Expanding equitable access to health services. Recommendations for health systems transformation towards universal health. Recommendations for health systems transformation towards universal health*.] ISBN: 978-92-75-32426-4 (pdf). [Online]; 2022. Available from: https://iris.paho.org/bitstream/handle/10665.2/55657/9789275324264_spa.pdf
4. Vera-Márquez MC, Valle-Delgado VM, Mazacón-Gómez MN, Nuñez-Olalla PT, Vargas Bedoya CV. Ergonomic problems in the workplace of academic and central administrative staff in the university context [Problemas ergonómicos existentes en el puesto de trabajo del personal administrativo académico y de dependencia de planta central en el contexto universitario]. Revista Pertinencia Académica. ISSN 2588-1019, 7(1), 54-65. [Online].; 2023. Available from: https://revistas.utb.edu.ec/index.php/rpa/article/view/2865.
5. Krishnan KS, Raju G, Shawkataly O. Prevalence of Work-Related Musculoskeletal Disorders: Psychological and Physical Risk Factors. International journal of environmental research and public health, 18(17), 9361. [Online].; 2021. Available from: https://doi.org/10.3390/ijerph18179361.
6. Carrasco J, López-Asqui AI, Barreno-Gadvay AD. Ergonomic risks and their influence on work performance [Ergonómicos riesgos y su influencia en el desempeño laboral]. LATAM Revista Latinoamericana De Ciencias Sociales Y Humanidades, 4(2), 3294-3306. [Online]; 2023. Available from: https://doi.org/10.56712/latam.v4i2.836.
7. Olmedo-Vera JH, Tello-Moreira JA, Cantos-Santana EM, Murillo-Moreira KX. Psychosocial risk factors associated with administrative staff in a general hospital in Ecuador [Factores de Riesgo Psicosocial asociados al personal administrativo de un hospital General en Ecuador]. RECIAMUC, 7(1(esp), 11-17. [Online]; 2023. Available from: https://doi.org/10.26820/reciamuc/7.(1.esp).enero.2023.11-17.
8. World Health Organization. Musculoskeletal health. Fact sheets: detail. [Online].; 2022. Available from: https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions.
9. Marín-Vargas B, González-Argote J. Ergonomic risks and their effects on the health of nursing personnel [Riesgos ergonómicos y sus efectos sobre la salud en el personal de Enfermería]. Revista Información Científica, 101(1), e3724. [Online]; 2022. Available from: https://revinfcientifica.sld.cu/index.php/ric/article/view/3724/5069.
10. Ortiz-Pazmiño O, Brossard-Peña E. Evaluación de los riesgos ergonómicos en funcionarios de la Red Ecuatoriana de Pedagogía [Evaluation of ergonomic risks in employees of the Ecuadorian Pedagogical Network]. Revista Cubana de Reumatología, 25(3), e1193. [Online]; 2023. Available from: https://revreumatologia.sld.cu/index.php/reumatologia/article/view/1193.

11. Simbaña Amendaño S, Cárdenas Cahueñas H, Campos YY. Prevalence of musculoskeletal disorders due to awkward postures in teleworkers in financial institutions [Prevalencia de trastornos musculoskeletal disorders por postura forzada en trabajadores que realizan teletrabajo en instituciones financieras]. Revista Conecta Libertad ISSN 2661-6904, 5(3), 1-12. [Online]; 2021. Available from: https://revistaitsl.itslibertad.edu.ec/index.php/ITSL/article/view/251.
12. Guimarães B, Silva T, Munhoz D, Landivar P. Ergonomic risks and musculoskeletal symptoms in administrative technicians of the Instituto Federal Catarinense during telework in the COVID-19 pandemic [Ergonómicos riesgos y síntomas musculoskeletal symptoms en técnicos administrativos del Instituto Federal Catarinense durante telework in the COVID-19 pandemic]. Fisioter. Pesqui. 29 (3). [Online]; 2022. Available from: https://doi.org/10.1590/1809-2950/22010829032022PT.
13. Abdollahi T, Razi S, Pahlevan D, Yekaninejad M, Amaniyan S, Sieloff C, et al. Effect of an Ergonomics Educational Program on Musculoskeletal Disorders in Nursing Staff Working in the Operating Room: A Quasi-Randomized Controlled Clinical Trial. International Journal of Environmental Research and Public Health, 17. [Online]. 2020. Available from: https://doi.org/10.3390/ijerph17197333.
14. Chen X, Wang X, Ai C. Application of Ergonomics in Health Care. IOP Conference Series: Earth and Environmental Science, 707. [Online]; 2021. Available from: https://doi.org/10.1088/1755-1315/707/1/012004.
15. Torres-Ruiz S. Riesgo ergonómico y trastornos musculoskeletal trastornos musculoskeléticos en trabajadores de industria alimentaria en el Callao en el Callao en el 2021 [Ergonomic risk and musculoskeletal disorders in food industry workers in Callao by 2021]. Horizonte Médico (Lima), 23(3), e2207. [Online]; 2023. Available from: https://dx.doi.org/10.24265/horizmed.2022.v23n3.04
16. Yong X, Li F, Ge H, Sun X, Ma X, Liu J. A Cross-Sectional Epidemiological Survey of Work-Related Musculoskeletal Disorders and Analysis of Its Influencing Factors among Coal Mine Workers in Xinjiang. BioMed Research International, 2020. [Online]. 2020. Available from: https://doi.org/10.1155/2020/3164056
17. Zhumanbayeva Z,KA,SA,RN,AG,&SA. Burnout Syndrome among medical professionals: literature review. Kazakhstan Oncology and Radiology. [Online].; 2022. Available from: https://doi.org/10.52532/2521-6414-2022-2-64-59-65.
18. Walters Z, Chang K, Cervenka B, Collar R, Hsieh T. Ergonomics in Otolaryngologic Surgery: A State of the Art Review. Otolaryngology--head and neck surgery: official journal of American Academy of Otolaryngology-Head and Neck Surgery, 1945998221117095. [Online].; 2022. Available from: https://doi.org/10.1177/01945998221117095.

19. Shavit S, Golub J, Lustig L. The Risks of Being Otologist, an Ergonomic and Occupational Hazard Review. Otology & Neurotology, 41, 1182 - 1189. [Online]; 2020. Available from: https://doi.org/10.1097/MAO.0000000000002769.
20. Cervantes-Morant R, Hernández-Soto A. Biomechanical overload risk assessment of quinoa workers in Bolivia [Evaluación de riesgo por sobrecarga biomecánica en trabajadoras de la quinua en Bolivia]. Revista de la Asociación Española de Especialistas en Medicina del Trabajo, 32(3), 189-197. [Online]; 2023. Available from: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S3020-11602023000300003&lng=es&tlng=es.
21. Trujillo-Ulloa WA. Psychosocial work factors and anxious and depressive symptomatology in intensive care in a public hospital in Nuevo Chimbote [Factores psicosociales laborales y sintomatología ansiosa y depresiva en cuidados intensivos de un hospital público de Nuevo Chimbote]. Horizonte Médico (Lima), 24(1), e2501 [Online]; 2024. Available from: https://dx.doi.org/10.24265/horizmed.2024.v24n1.08.
22. Farias P, Santos C, Pinho R, Pereira M, Teixeira I, Ferreira M. Riscos psicossociais: prevenção e controlo do stress ocupacional [Psychosocial risks: prevention and control of occupational stress]. Revista de Investigação & Inovação em Saúde, 6(1), 125-137. [Online]; 2023. Available from: https://doi.org/10.37914/riis.v6i1.212.