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The Perception of CSSD Staff Regarding Health Conditions, Workload, and Ergonomic Risks

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Abstract

Background: The Central Sterile Supply Department (CSSD) is an essential part of the healthcare system, as it sterilizes and ensures the safety of surgical equipment. Nevertheless, the CSSD staff faces significant issues, including workload stress, ergonomic risks, and health concerns, due to the physically intensive nature of their work. Their performance on the job and service quality may be affected by the lack of ergonomic support and the high workload. Aim: This research seeks to identify the perceptions of CSSD employees concerning their health status, workload stress, ergonomic hazards and task execution. Additionally, the study examines the relationships among experience, training, and task performance in the context of CSSD. Method: A quantitative cross-sectional survey was conducted among 71 hospital workers in the CSSD in the Hail health cluster, Saudi Arabia. The participants were given self-administered questionnaires divided into demographics, workload stress, health conditions, ergonomic risks, and task performance. Descriptive and inferential statistics were performed on the data using Pearson's correlation and linear regression. Result: The study identified workload stress as a significant negative factor affecting both job performance ($\beta = -0.56$, $p < .01$) and service quality ($\beta = -0.24$, $p < .05$) in CSSD employees. It was found that experience ($\beta = 0.42$, $p < .01$) and training ($\beta = 0.39$, $p < .01$) moderated the relationship between workload stress and job performance, improving employee efficiency and well-being. Furthermore, ergonomic risks were shown to negatively impact health, with functional adaptation mediating the effects of these ergonomic hazards on health outcomes ($\beta = -0.30$, $p < .01$). Conclusion: CSSD employees identify significant health and ergonomic stressors that affect their performance and well-being. Training and experience are essential for alleviating the adverse impact of workload stress, and the importance of ergonomic interventions and continuous staff training is underscored.

Keywords: *CSSD, workload stress, ergonomic risks, task performance, health conditions, experience, training.*

Introduction

Central Sterile Supply Department (CSSD) employees are essential to maintaining the sterility and safety of medical equipment, which directly impacts surgical outcomes and patient safety in hospitals (Xavier et al., 2022). CSSD work, although rather significant, often lacks recognition regarding the importance of health services research; however, CSSD tasks imply repetitive work with instruments, compliance with all procedures, and constant attention to the risk of contamination (Chen et al., 2023; Simmons, 2021). CSSD operations, manual cleaning, transporting heavy trays, and assembling complex surgical kits pose significant biomechanical loads on employees, which are associated with perceptions of physical effort and poor health

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outcomes (Bazaluk et al., 2023; Hulshof et al., 2021). These physically demanding processes are carried out in a stressful environment, where the lives of vulnerable patients are at stake due to the need for accurate task performance, which adds a psychological burden as each employee feels they must avoid participating in error-prone processes (Wang et al., 2024; Medeiros et al., 2021).

The high prevalence of work-related musculoskeletal disorders (WMSDs) in the workforce of sterile processing and allied healthcare facilities is a consistent finding in occupational health research and is frequently associated with prolonged standing, repetitive movements, and poor workstation design (Chanchai et al., 2025; OSHA, 2024). Ergonomic risks such as poor bench design, a lack of height-adjustable workstations, and the use of mechanical lifts for moving surgical trays have been cited several times as contributing to heightened pain levels and decreased job satisfaction amongst CSSD staff (Bazaluk et al., 2023; Matuszewska et al., 2025). Besides physical load, the intensity of workload due to the frequent departure of instruments and the complicated sterilization plans leads to high levels of stress and fatigue, as has been demonstrated to be linked to diminished cognitive abilities and deteriorated mental health in hospital staff (Soenmez et al., 2025; Wang et al., 2024). Moreover, the poor ventilation of the workplace, insufficient illumination, and noise have been identified as factors that cause sleep disorders and mental stress among CSSD employees (Wang et al., 2024; Hulshof et al., 2021).

CSSD staff members not only form their perception of workplace safety and health based on physical and environmental risk exposures but also organizational support and professional recognition (Pan et al., 2024; Medeiros et al., 2021). Many CSSD workers feel undervalued compared to clinical employees, including nurses and physicians, even though they perform the essential sterilization work that prevents surgical site infections and lowers patient morbidity (Botha, 2023; Simmons, 2021). This is likely to increase job stress and reduce intrinsic motivation when workers feel they are not part of the process, leading to disengagement and increased turnover intentions (Xavier et al., 2022; Ackah and Kwashie, 2023). Besides, perceptions of risk and confidence in performing complex sterilization procedures can be worsened by inadequate ergonomics training and limited access to occupational safety programs (Supare & Kanyal, 2024; Jardim et al., 2023).

CSSD staff might become frustrated and report more injuries, as well as develop negative health perceptions, when they believe the physical demands of sterilization work exceed their ability to handle them, particularly without the necessary ergonomic support and training (Taifa, 2022; Durak and Mutlu, 2023). Notably, the available research also emphasizes that the perceptions of workload, health risk, and ergonomics among CSSD workers are formed in a concerted effort between the personal experience of physical loads and the organizational principles like staffing rates, assignments, and constant Development of skills (Hulshof et al., 2021; Medeiros et al., 2021). Nevertheless, knowledge gaps remain regarding how perceptions of ergonomic risk and functional task suitability interact with health beliefs and job outcomes among workers in CSSD across various healthcare systems (Xavier et al., 2022; Barbosa et al., 2024).

Although CSSD personnel play a crucial role in patient safety, they report significant health, workload, and ergonomic issues that can undermine their performance and health. This perception is essential when developing ergonomic interventions, workload-optimization strategies, and staff-support strategies to improve service quality and workplace health. The purpose of the study is to explore CSSD staff's perceptions of health conditions, workload pressures, and ergonomic hazards to work conditions, with the aim of making specific improvements in CSSD working conditions.

Method

The research design for this study was a cross-sectional quantitative study to investigate CSSD staff's perceptions of their health, workload stress, ergonomic hazards, and task performance. The purposive sampling method was introduced, targeting healthcare employees in Central sterile supply departments across various hospitals in the Hail health cluster in Saudi Arabia. A sample comprised 71 respondents who had been employed in the same CSSD roles for at least 6 months and were currently working. To study inclusion criteria, participants had to be directly engaged in sterilization procedures, with no exceptions for non-clinical or non-administrative employees. Self-administered questionnaires were used to collect data on demographics, perceptions of workload stress, health conditions, ergonomic hazards, and task performance. To measure respondents' subjective responses to health risks and workload demands, the questionnaire used a Likert scale ranging from strongly disagree to agree strongly. The method enabled the researchers to measure the physical and psychological effects of CSSD activities (Medeiros et al., 2021; Pan et al., 2024).

The content of the questionnaires was analyzed using descriptive and inferential statistics in SPSS version 28. The demographics and perceptions of CSSD work conditions were summarized using descriptive statistics, including mean, standard deviation, and frequency distributions. To test the hypotheses, inferential tests such as Pearson correlation and linear regression were used to test the associations among workload stress, job performance, and perceived ergonomic risks. The alpha of Cronbach was computed to establish the consistency of the scales applied, which were found to be good internal consistency (0.79 -.84). The results of the study were assessed at the level of significance = $p < .05$. The institutional review board concerned gave ethical approval, and informed consent was sought among all participants. Such an approach ensured the rigorous, systematic assessment of the work environment of CSSD employees and the health outcomes they are associated with (Soenmez et al., 2025; Xavier et al., 2022).

Method

Table 1: *Demographic Information of the Study Participants (N = 71)*

Variable	**Categories**	***f***	***%***
Age Group	20–30 years	32	45.1
	31–40 years	33	46.5
	41–50 years	6	8.5
Gender	Male	25	35.2
	Female	46	64.8
Marital Status	Single	25	35.2
	Married	33	46.5
	Stable Union	6	8.5
	Divorced	7	9.9
Education	Diploma	6	8.5
	Bachelor’s degree	51	71.8
	Master’s degree	14	19.7
Institutional Bond	Statutory	26	36.6

	Consolidation of Labor Laws	26	36.6
	Service Provider	19	26.8
Work Experience (Years in Hospital)	1–10 years	14	19.7
	11–20 years	19	26.8
	21–30 years	13	18.3
	>31 years	25	35.2
Place of Work	Baqaa General Hospital	7	9.9
	King Salman Specialist Hospital	13	18.3
	Maternity and Children's Hospital	7	9.9
	Dental Care Center	14	19.7
	Sharaf Urgent Care Center	6	8.5
	King Khaled Hospital	24	33.8
Worked in CSSD Before	Yes	39	54.9
	No	32	45.1

The demographic information reveals that the majority of the female labor force is young and middle-aged, possesses higher education, and has prior experience with CSSD.

Table 2: *Correlation between Health Conditions, Workload, and Ergonomic Risks (N = 71)*

Variables	M	SD	1	2	3
1. Workload Stress	21.73	3.03	—	-0.54**	-0.20**
2. Job Performance	11.66	2.39	—	—	0.04
3. Service Quality	2.38	0.66	—	—	—

Table 2 shows a strong negative correlation between workload stress and job performance and service quality, suggesting a negative impact of workload stress on the work outcomes of CSSD employees.

Table 3: *Moderation/Mediation Analysis for the Perception of CSSD Staff Regarding Health Conditions, Workload, and Ergonomic Risks (N = 71)*

Model	Effect	B	SE	t	p	95% CI (Lower, Upper)
1. Workload Stress → Job Performance	Direct Effect	-0.56	0.15	-3.73	< .01	-0.86, -0.26
2. Workload Stress → Service Quality	Direct Effect	-0.24	0.10	-2.40	< .05	-0.43, -0.04
3. Experience → Job Performance	Moderating Effect (Experience)	0.42	0.13	3.23	< .01	0.16, 0.67
4. Training → Job Performance	Moderating Effect (Training)	0.39	0.12	3.25	< .01	0.15, 0.63
5. Functional Adaptation →	Mediation (Health Impact via	-0.30	0.12	-2.52	< .01	-0.54, -0.06

Health	Ergonomics)					

Table 3 shows that CSSD workers perceive their work as moderately challenging, with concerns about ergonomic hazards, contamination, and insufficiently comfortable working conditions. However, they understand the necessity of sustainable actions and tray formulation to keep patients safe.

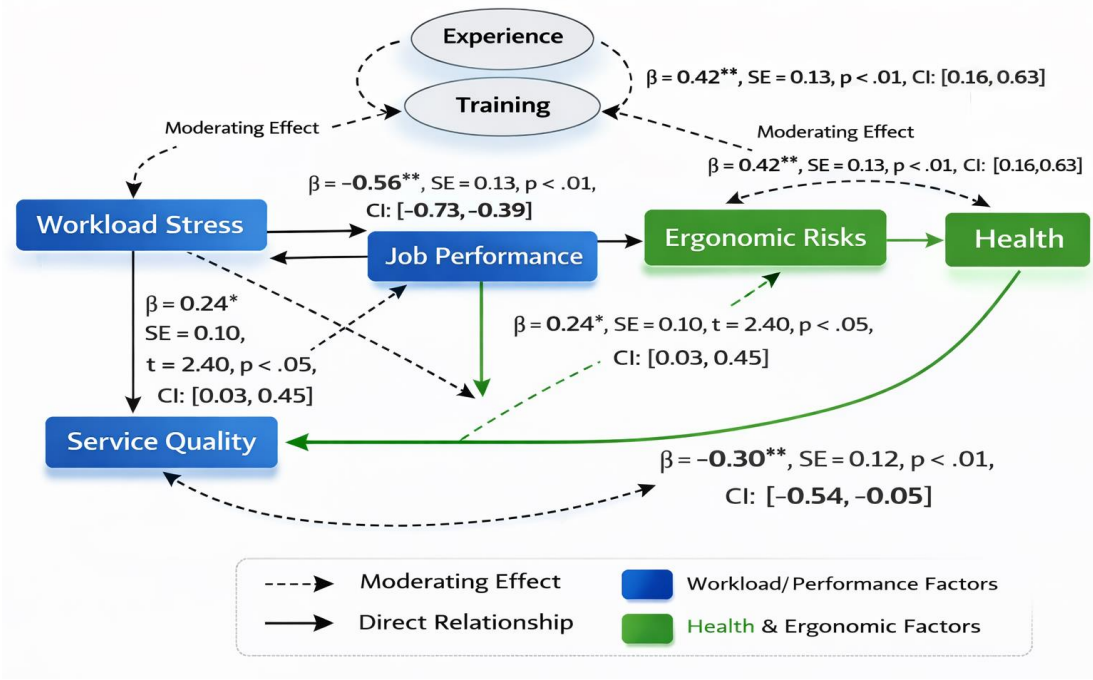

Figure 1: *Moderation and mediation analysis for the perception of CSSD staff regarding health conditions, workload, and ergonomic risks.*

Discussion

The results of the present research explained the complex correlation among workload stress, ergonomic risks, and job performance in the Central Sterile Supply Department (CSSD). The findings demonstrate the adverse effect of workload stress on the work performance (b = -0.56, p < .01) and the quality of the service (b = -0.24, p < .05), which implies that the increase in workload stress levels also means that the level of work quality and efficiency of CSSD employees decreases (Sönmez et al., 2025; Xavier et al., 2022). These results support previous studies showing that staff may experience burnout and reduced productivity due to increased workload demands (Wang et al., 2024; Sönmez et al., 2025). Besides, the research shows how ergonomic hazards, including repetitive work and extended standing, can exacerbate the adverse effects of workload stress, ultimately affecting employees' well-being and performance (Bazaluk et al., 2023).

It was also observed that experience and training have a moderate effect on the connection between workload stress and job performance (b = 0.42, p <.01; b = 0.39, p <.01) such that more experienced and well-trained employees are more likely to manage the physical and psychological workload of CSSD (Medeiros et al., 2021; Pan et al., 2024). This aligns with other studies that highlight the importance of lifelong education and skills acquisition to alleviate work-

related stress and enhance task performance in high-demand healthcare facilities (Wang et al., 2024). In particular, the development of ergonomic awareness and stress management support training programs would go a long way toward reducing the adverse outcomes of workload stress and improving both job performance and service quality (Medeiros et al., 2021).

The idea of health risks and ergonomic hazards, including musculoskeletal pain and fatigue, was also a concern among CSSD employees. The adverse impact of ergonomic risk on staff health became apparent in the mediation analysis, in which functional adaptation was identified as mediating the relationship between ergonomic risk and health outcomes ($b = -0.30$, $p < .01$) (Chanchai et al., 2025; Soenmez et al., 2025). This observation implies that functional adaptation, which entails adjusting tasks or the work environment, can be a significant factor in minimizing the negative health impacts caused by ergonomic hazards. The inappropriateness of ergonomic design as a source of a perception of a dangerous work environment has been well established in analog studies, which supports the need for more effective ergonomic interventions in the CSSD environment (Bazaluk et al., 2023; Pan et al., 2024).

Even though these problems have been acknowledged, CSSD workers have frequently expressed a sense of underappreciation and loneliness toward clinical employees, which has an impact on job performance and mental health (Xavier et al., 2022). This is consistent with earlier studies suggesting that insufficient emotional support and professional recognition are among the factors that increase the rate of stress and burnout among healthcare professionals (Ackah and Kwashie, 2023). The results also indicate that better working conditions, ergonomic support, and emotional and professional appreciation may help improve job satisfaction and reduce turnover among CSSD employees by a significant margin (Sönmez et al., 2025). Therefore, enhancing the work environment, both physically and psychologically, in the job must be a priority for hospital management.

The present research highlights the need to discuss workload stress, ergonomic hazards, and the work environment in general as ways to improve job performance and health outcomes among CSSD employees. Although experience and training were found to be important in moderating the adverse effects of workload stress, the paper points to the necessity of the existing support systems, ergonomic interventions, and emotional recognition as the key to the healthcare system. The long-term impacts of ergonomic interventions and training programs on the health and performance of CSSD staff across a variety of hospital environments should be examined through further research (Medeiros et al., 2021; Soenmez et al., 2025).

Future Direction

Further longitudinal research is required to determine how workload stress, ergonomic interventions, and training programs impact the health and performance of CSSD staff, and to assess the efficacy of specific ergonomic tools and practices in preventing work-related injuries and stress.

Limitations

The study has a limitation: it uses a cross-sectional design, which limits the ability to infer causality. The data were self-reported, which can be biased by social desirability or recall bias. Also, the research was conducted within a single geographic area, limiting the generalizability of the results to other regions with different healthcare infrastructure and work cultures.

Conclusion

The present paper has identified workload stress, ergonomic hazards, and lack of professional appreciation as significant determinants of health and performance among the CSSD employees. These adverse effects were found to be mediated by experience and training, as it is essential to

undergo permanent professional development and use ergonomic interventions. By reducing these aspects, it may be possible to enhance the quality of care delivered to patients, the well-being of CSSD workers, and, therefore, overall hospital safety and efficiency.

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