

Evaluation of the Working Conditions of Emergency Medical Dispatchers in Different Emergency Medical Systems

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Abstract

Background

Emergency Medical Dispatchers (EMD) are the first point of contact in emergency medical services (EMS). Their work is characterized by high-pressure environments, with heavy call volumes and life-or-death decision-making. Prolonged computer use, continuous telephone communication, and cognitive demands in call centers further expose EMD to visual strain, hearing disorders, and musculoskeletal issues, combined with the psychological stressors inherent to emergency care. This study aimed to describe the working conditions and occupational risk factors among EMD across four different EMS systems: the Czech Republic, France, Thailand, and the USA.

Methods

This was a multicentric prospective descriptive survey. EMD completed a culturally adapted survey using internationally validated instruments. Continuous variables were presented as medians with interquartile ranges, while categorical variables were reported as frequencies and percentages.

Results

278 EMD (77%) participated. The median age ranged from 30.5 years (Thailand) to 39.5 years (Czech Republic), with a majority of women (50%–76%). Full-time work predominated in France, Thailand, and the USA (81%–98%), while part-time work was more common in the Czech Republic (41%). Average weekly working hours were 35 in France and 42 in the USA, with 81% of US and 100% of Czech EMD reporting shifts exceeding 10 hours. Tense interactions with the public and healthcare professionals were most frequent among Thai EMD. An effort–reward imbalance ratio ≥ 1.5 was observed in 14% of Thai and US EMD, 9.1% in France, and none in the Czech Republic. Overcommitment was highest in Thailand (60%), compared to 32% in the USA, 30% in France, and 23% in the Czech Republic. Poor self-reported health and depressive symptoms were notably higher in Thailand. Most participants reported moderate perceived stress, and over 40% slept fewer than six hours per. Abnormal daytime sleepiness affected 39%–55% of respondents, while musculoskeletal pain was widespread.

Conclusions

This study underscores the impact of working conditions on EMD health, revealing cross-national differences in training, schedules, and psychosocial stressors. The high prevalence of depressive symptoms, stress, musculoskeletal pain, sleep deprivation, and effort–reward imbalance highlights the urgent need for tailored interventions to mitigate occupational hazards in this critical profession.

Background

Emergency Medical Dispatchers (EMD) play a critical role in emergency response by answering calls, prioritizing cases, and in some countries allocating appropriate medical resources. However, their work presents significant challenges. Exposure to high-pressure environments, characterized by heavy call volumes and life-or-death decision-making, directly contributes to occupational stress (1). Furthermore, the inherent nature of working in a call center can also lead among other to musculoskeletal disorders (2).

EMD operate in contexts where their decision-making is either supervised by physicians, as in France, where EMD handle initial calls but physicians take full control of dispatch decisions, or constrained to varying degrees by Computer-Aided Dispatch systems, which limit their ability to deviate from algorithmic protocols. In addition, EMD must allocate scarce resources and prioritize requests under constant time pressure (3).

Furthermore, night shifts, irregular schedules, and extended working hours are well-recognized risk factors for adverse health outcomes, including obesity, stroke, acute coronary syndromes, musculoskeletal disorders, sleep disturbances and increased occupational injury risk (4, 5). Periods of high volume, such as during the COVID-19 pandemic, seasonal epidemics (influenza, bronchiolitis) or in case of mass casualties, further increase workload and psychological strain (6, 7).

Over the last few years, EMD are increasingly encountering poorly defined conditions, such as psychosomatic and psychiatric disorders (8). Work conditions are further exacerbated by cultural differences and language barriers among specific population groups (9). Concurrently, the integration of new technologies and dispatching tools, including video livestreaming, is transforming their traditional workplace (10–12).

International Variability of EMD Roles

The term EMD covers a variety of roles depending on the country and healthcare system (Table 1).

Table 1
Roles, responsibilities and training of Emergency Medical Dispatchers in Czech Republic, France, Thailand and USA

Country	Roles and Responsibilities	Training and Standards
Czech Republic	Typically, registered nurses or paramedics; answer calls, perform initial triage, and decide on the appropriate response.	Paramedics (university degree) – no other education is required. Registered nurses: Certified national education (212 hours)
France	Dedicated call-takers who collect essential information (chief complaint, name, location, contact details), transfer calls to emergency physicians for medical decisions. Some assist with hospital coordination and ambulance follow-up.	Standardized national training program in place since 2020.
Thailand	Manage emergency calls, coordinate patient transport, and may participate in ambulance operations depending on regional organization.	Standardized by NIEM. EMD specific training is approx. 35–40 hours, typically requiring prior EMS or medical background (e.g., EMT, Nurse).
United States	Often paramedics or EMTs; handle emergency calls using CAD systems, manage inter-facility transfers, liaise with hospitals, and may work in ambulances. Some may have another job and work in an ambulance.	Training standardized through organizations like the International Academies of Emergency Dispatch (IAED).
CAD: Computer-aided dispatch, EMD: Emergency Medical Dispatcher, EMT: Emergency Medical Technician, NIEM: National Institute for Emergency Medicine		

Terminology in the literature varies widely: ambulance call takers (13), call takers and dispatchers (7), emergency call operators (14), or emergency medical service nurses acting as dispatchers (15). Despite these differences, all EMD share the common role of being the first point of contact for emergency medical calls, working under time pressure and cognitive load within call center environments.

Occupational Health Risks

EMD work inherently combines call center operations with high-stress medical emergency response, exposing workers to the combined challenges of both environments. Working in call centers carries documented health consequences. Prolonged computer use and continuous telephone communication increase the risk of visual strain (16), hearing disorders (17), and musculoskeletal disorders affecting the neck, shoulders, and upper limbs (2, 18).

Simultaneously, EMD additionally face psychological stressors inherent to emergency care. Calls routinely involve death, serious injuries, or critically ill children, frequently leading to vicarious trauma or compassion fatigue (14, 19). Time pressure, unpredictability, and constant monitoring of verbal and written interactions contribute to stress and professional isolation (3, 20, 21). Research shows that EMD

experience sleep disturbances, fatigue, anxiety, depression, and higher risk of post-traumatic stress disorder (14, 15, 22).

Methods

Objectives

The primary objective of this study was to describe the working conditions and main occupational risk factors among EMD operating within different Emergency Medical Service (EMS) systems:

- Zdravotnická záchranná služba (ZZS) Prague, Czech Republic
- Service d'aide médicale urgente des Hauts-de-Seine (SAMU 92), Garches, France
- In Thailand, 7 different EMS took part to the study: Chiangrai, Erawan Bangkok Metropolitan, Konkaen, Lampang, Nakornsawan, Phuket, Ratchaburi, Suphanburi and Ubonratchathani
- Center for Emergency Medical Services Northwell Health, Long Island, New York, USA

The secondary objective was to identify occupational risk factors that were common across these dispatch systems.

Study Design

This was a cross-sectional, multicenter survey conducted among EMD in four countries with diverse EMS systems, cultures, and languages from December 2023 to May 2024.

Study Sample

All EMD working at dispatch center were recruited. Participants were eligible for inclusion if they were employed in a dispatch center (full- or part-time). Announcements were made and all EMD were invited to complete the survey. EMD had the option to not complete the survey (Table 2).

Table 2
Emergency Medical Dispatch (EMD) - Overview by Country

Country	Organization	Number of EMD	Training	Population Covered	Annual Call Volume
Czech Republic	ZZS	42	Paramedic – university degree, no other education required/nurse;212 hrs EMD education (60 theory/simulations, 132 on-job training)	1.5 million	246.111 (2025), 225.882 (2024) (only calls to emergency lines included)
France	SAMU 92, Hauts-de-Seine	59	11-month diploma (21 weeks theory, 21 weeks clinical)	1.6 million	217,941 (2024)
Thailand	Chiangrai Erawon Bangkok Metropolitan Konkaen Lampang Nakornsawan Phuket Ratchaburi Suphanburi Ubonratchathani	222	Thailand's NIEM certifies three main dispatch courses: the Emergency Medical Call Taker (24 hours), the Emergency Medical Dispatcher (40 hours), and the Dispatch Supervisor (24 hours).	22.65 million	2020: 2,345,339 calls 2021: 2,173,143 calls 2022: 3,011,028 calls
United States	Northwell Health, Long Island	40	Advanced Emergency Medical Dispatch (AEMD) certification; mostly EMTs or paramedics	-	> 95,000
EMD: Emergency medical dispatcher, ZZS: Zdravotnická záchranná služba, SAMU 92: Service d'aide médicale urgente des Hauts-de-Seine, NIEM: National Institute for Emergency Medicine					

Survey Development and Translation

The survey was translated and culturally adapted for each country. Internationally validated instruments were used when available. Back-translation by bilingual experts ensured semantic equivalence.

Survey Content

Working conditions

Occupational details included whether they were full-time or part-time employees, the number of hours worked per week and whether participants experienced voice strain. Information on shift work was also collected including, number of shifts longer than 10 hours, average commute time and whether the participants experienced tense interactions between the public or other healthcare workers.

Occupational Stress

Occupational stress was evaluated using the 22-item Effort–Reward Imbalance (ERI) Questionnaire (23). Data on effort, reward, overcommitment and the ER ratio (at a specified threshold of 1.5) were collected.

Sleep Patterns

Participant sleep patterns were evaluated in two ways. The first was question about sleep duration (less than 6 hours). Epworth Sleepiness Scale (24, 25) was used to assess the participant level of daytime sleepiness. Each of the 8 items is scored on a scale from 0 to 3 based on the chance of dozing or falling asleep, with ‘0-would never doze’ to ‘3-high chance of dozing’. The total score ranges from 0 to 24. Scores lower than 10 are considered normal, indicating adequate daytime alertness.

Perceived health

Individual perceived health was collected via a visual analogue scale ranging from A (very good) to H (very bad). The top 10th percentile was considered as « poor health” with a threshold at “F”.

Mental health

Participants’ depression and perceived stress were assessed using the Center for Epidemiological Studies Depression scale (CES-D) (26) and the Perceived Stress Scale (PSS) (27). The CES-D is a screening tool designed to measure symptoms of depression and comprised 20 items that ask participants how often they have experienced a particular symptom during the past week. Responses are scored on a 4-point Likert scale, ranging from ‘0-Rarely or none of the time’ to ‘3-Most or all of the time’. The total score ranges from 0 to 60. A score of 16 or greater indicates the clinical cutoff for significant depressive symptoms. The PSS is a 10-item scale that measures the subjective experience of stress. Responses are rated on a 5-point Likert scale, ranging from ‘0-Never’ to ‘4-Very Often’. Similarly, the total score ranges from 0 to 40, where scores from 14 to 26 is considered as moderate stress and from 27 to 40 as high perceived stress.

Musculoskeletal disorders

The Standardized Nordic Questionnaire (28) was used to screen for and assess the prevalence of musculoskeletal symptoms (pain, aching, or discomfort) across 3 distinct regions (neck, shoulder and lower back). The instrument consists in a series of ‘yes/no’ items evaluating symptoms within these anatomical areas.

Other variables

Sociodemographic variables, including age, gender, highest education level was classified according to the European Qualifications Framework (EQF) (29) – EQF promotes cross-border mobility by standardizing qualification comparisons across Europe- previous job before the current one, EMD training, and holding a permanent post as civil servant were additionally collected.

Data Collection and Ethics

Data were collected prospectively and entered into a secure database. To ensure participant confidentiality, the survey was designed to collect non-identifying information, ensuring that all data were strictly anonymous from inception. Participants were informed orally and in writing about the study's objectives, their voluntary participation, and their right to withdraw at any time without consequences. Each site ensured that the study was conducted in accordance with local regulations.

Statistical Analysis

Continuous variables are presented as median and IQR; categorical variables as frequencies and percentages. Missing data were excluded. Analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC, USA).

Results

Response rate and sample characteristics

A total of 278 (77%) EMD took part to the survey out of 363 respectively: 34 EMD/42 (81%) for Czech Republic, 44/59 (75%) for France, 172/222 (78%) in Thailand and 28/40 (70%) for USA.

Age varied from 30.5 years for Thai to 39.5 years for Czech EMD. EMD were most often women 76% for Czech, 72% for Thai, 66% for French, and 50% for US participants. Education level differed from one site to another, with more than 88% of French EMD having no formal qualification vs 88% of Thai EMD with post-secondary/technical certificate.

In all groups, most of EMD had a former job. Specific training as EMD was very homogenous for Czech group, whereas being trained and/or number of training hours varied a lot among participants within the other groups. (Table 3).

Table 3

Description of socio-demographic, background and status among Czech, French, Thai and US EMD (n = 278)

Gender – female n (%)	Czech Republic (n = 34)	France (n = 44)	Thailand (n = 172)	USA (n = 28)
	26 (76.47%)	29 (65.91%)	124 (72.09%)	13 (50.00%)
Age Median (IQR)	39.5 [34–49]	33.5 [27.5–44]	30.5 [26–38]	31.0 [28–37]
Highest education level n (%)	13 (38.24%)	38 (88.37%)	20 (11.63%)	12 (46.15%)
- No formal qualification, Some college, no degree	21 (61.76%)	5 (11.63%)	152 (88.37%)	14 (53.85%)
- Post-Secondary Certificate / Technical Certificate				
Other job before working at dispatch center – yes	22 (66.67%)	36 (83.72%)	132 (76.74%)	24 (92.31%)
Training as EMD n (%)	34 (100.00%)	14 (34.15%)	58 (33.72%)	21 (80.77%)
- Specific training – yes	34 (100.00%)	16 (57.14%)	57 (33.14%)	14 (53.85%)
- Theoretical training – yes	34 (100.00%)	21 (80.77%)	53 (30.81%)	19 (73.08%)
- Practical training – yes	80 (80–80)	303.33 (35–750)	53 (30.81%)	143 (12–400)
- Theoretical mean number hours (min-max)	120 (120–120)	254.17 (30–735)	29.77 (1–300)	140.80 (12–640)
- Practical mean number hours (min-max)			38.42 (1–200)	
Civil servant – yes n (%)	34 (100%)	21 (43.73%)	145 (84.30%)	0 (0%)
IQR: Interquartile range; EMD: Emergency medical dispatchers				

Work conditions

Most French, Thai and US EMD worked full-time (81–98%), whereas part-time work was more common among Czech participants (41%). Average weekly working hours differed across countries: EMD in Thailand and the USA worked 40 and 42 hours per week, respectively, versus with 37.5 and 35 hours in the two European sites.

Czech participants did not report fixed daily schedules or consistent daily working hours, unlike most EMD in the other countries. With the exception of the French group, EMD were required to clock in.

In USA and Czech Republic, 81% and 100% of EMD, respectively, reported working shifts longer than 10 hours on at least 50 days per year. Working in an environment requiring a raised voice was reported by 85% of participants in Czech Republic and 53% in Thailand.

Frequent tense interactions with the public were reported by 30% of Thai EMD, whereas 66% of French EMD reported such situations as never or rarely occurring. Regarding interactions with healthcare professionals, 50% of Thai EMD reported tense situations occurring always or nearly always, compared with 98% of French EMD who reported that these situations never or rarely occurred. (Table 4).

Table 4
Description of working conditions among Czech, French, Thai and US EMD (n = 278)

Full time work n (%)	Czech Republic (n = 34)	France (n = 44)	Thailand (n = 172)	USA (n = 28)
	20 (58.82%)	43 (97.73%)	139 (80.81%)	24 (92.31%)
Average number of work hours per week - median (IQR)	37.50 [18.00-37.50]	35.00 [35.00-35.00]	40.00 [30.00-56.00]	42.00 [40.00-45.00]
Working hours n (%)	0 (0.00%)	42 (95.45%)	108 (62.79%)	17 (65.38%)
- Work same number of hours each day (yes)	0 (0.00%)	0 (0.00%)	86 (50.00%)	9 (34.62%)
- Work same number of days each week (yes)	0 (0.00%)	33 (75.00%)	150 (87.21%)	23 (88.46%)
- Work fixed hours (yes)	0 (0.00%)	6 (13.95%)	150 (87.21%)	3 (11.54%)
- Can choose own work hours (yes)	34 (100%)	1 (2.27%)	64 (37.21%)	26 (100.00%)
- Clock in (badge, time-keeper, paper registration, etc.)? (yes)			161 (93.60%)	
Average commute time, (one-way) n (%)	24 (70.59%)	33 (75.00%)	147 (85.47%)	24 (92.31%)
- Less than 1 hour	10 (29.41%)	11 (25.00%)	25 (14.53%)	2 (7.69%)
- 1 to 2 hours	0 (0.00%)	0 (0.00%)	25 (14.53%)	0 (0.00%)
- More than 2 hours			0 (0.00%)	
Daily work time > 10 hours at least 50 days per year -yes n (%)	34 (100.00%)	11 (28.21%)	101 (58.72%)	21 (80.77%)
Tense situations with the public n (%)	16 (47.06%)	27 (65.85%)	61 (35.47%)	9 (36.00%)
- Never or rarely	14 (41.18%)	11 (26.83%)	60 (34.88%)	13 (52.00%)
- Frequently	4 (11.76%)	3 (7.32%)	51 (29.65%)	3 (12.00%)
- Always or nearly				
Tense situations with healthcare professionals n (%)	18 (52.94%)	40 (97.56%)	9 (5.88%)	18 (69.23%)
- Never or rarely	14 (41.18%)	1 (2.44%)	67 (43.79%)	7 (26.92%)
- Frequently	2 (5.88%)	0 (0.00%)-	77 (50.33%)	1 (3.85%)
EMD: Emergency medical dispatchers,IQR: Interquartile range				

Full time work n (%)	Czech Republic (n = 34)	France (n = 44)	Thailand (n = 172)	USA (n = 28)
	20 (58.82%)	43 (97.73%)	139 (80.81%)	24 (92.31%)
- Always or nearly				
Work environment requiring to raise voice to be heard – yes n (%)	28 (84.85%)	28 (63.64%)	91 (52.91%)	18 (69.23%)
EMD: Emergency medical dispatchers,IQR: Interquartile range				

EMD health aspects

Self-reported poor health was noticeably higher in Thailand (44%) than in the US (8.3%), France (4.8%), and Czech Republic (8.8%). Depressive symptoms (CES-D) affected 41% of Thai EMD, 36% in France, and 32% in USA, compared with 8.8% in Czech Republic.

Most participants reported moderate perceived stress (PSS), particularly in Thai call centers (83%), France (64%), and Czech Republic (73%), while high stress levels were uncommon (0–13%). More than 40% of participants in all sites reported sleeping less than six hours per night during the previous week (42–59%). Abnormal daytime sleepiness (Epworth scale) was frequent, ranging from 39% in USA to 55% in France.

Musculoskeletal pain during the previous 12 months was common, particularly for low back pain (68–82%). Neck and shoulder pain were also frequently reported across sites, although shoulder pain was less common in France (33%). Current pain intensity greater than 5 was less frequent but notable, especially for low back pain in USA (36%) and France (34%). (Table 5)

Table 5

Description of physical and psychological health profile among Czech, French, Thai and US EMD (n = 278)

Poor health n (%)	Czech Republic (n = 34)	France (n = 44)	Thailand (n = 172)	USA (n = 28)
	3 (8.82%)	2 (4.76%)	75 (43.60%)	2 (8.33%)
Depressed – CES-D n (%)	3 (8.82%)	16 (36.36%)	70 (40.70%)	9 (32.14%)
Stress level – PSS n (%)	9 (27.27%)	11 (28.21%)	23 (13.37%)	10 (41.67%)
- Low stress	24 (72.73%)	25 (64.10%)	142 (82.56%)	11 (45.83%)
- Moderate stress	0 (0.00%)	3 (7.69%)	7 (4.07%)	3 (12.50%)
- High perceived stress				
Less than 6 hours of sleep on average in the last week n (%)	20 (58.82%)	20 (45.45%)	89 (51.74%)	11 (42.31%)
EPSWORTH sleepiness scale n (%)	18 (52.94%)	17 (38.64%)	66 (38.37%)	13 (46.43%)
- Normal sleep	2 (5.88%)	3 (6.82%)	33 (19.19%)	4 (14.29%)
- Moderate sleepiness	14 (41.18%)	24 (54.55%)	73 (42.44%)	11 (39.29%)
- Abnormal sleepiness				
Musculoskeletal pain over the past 12 months n (%)	25 (73.53%)	23 (52.27%)	113 (65.70%)	19 (73.08%)
- Neck	17 (50.00%)	14 (33.33%)	119 (69.19%)	16 (66.67%)
- Shoulder	28 (82.35%)	34 (77.27%)	121 (70.35%)	17 (68.00%)
- Low back				
Current pain rating > 5 n (%)	3 (8.82%)	8 (18.18%)	19 (11.05%)	8 (28.57%)
- Neck	3 (8.82%)	7 (15.91%)	23 (13.37%)	7 (25.00%)
- Shoulder	4 (11.76%)	15 (34.09%)	21 (12.21%)	10 (35.71%)
- Low back				
EMD: Emergency medical dispatchers CES-D: Center for Epidemiological Studies Depression scale, PSS: Perceived Stress Scale				

Effort/reward imbalance

Psychosocial work characteristics varied across sites. High effort was reported by 44% of Thai EMD, 68% in USA, 25% in France, and 53% in Czech Republic. Perceived reward ranged from 28% in Thailand to 76% in Czech Republic (46% in USA and 55% in France).

Esteem was reported by 27% of Thai EMD compared with 57% in USA, 61% in France, and 65% in Czech Republic. Opportunities for promotion ranged from 18% in France to 56% in Czech Republic, while job security was reported by 26% of Thai EMD versus 61%, 80%, and 85% in USA, France, and Czech Republic, respectively. Salary satisfaction was low across sites (7.0–21%).

An effort–reward imbalance ratio greater than or equal to 1.5 was observed in 14% of Thai EMD, 14% in USA, and 9.1% in France, and was not observed in Czech Republic. Finally, overcommitment was reported by 60% of Thai EMD compared with 32% in USA, 30% in France, and 23% in Czech Republic. (Table 6)

Table 6

Description of Effort–Reward Imbalance status among Czech, French, Thai and US EMD (n = 278)

Effort	Czech Republic (n = 34)	France (n = 44)	Thailand (n = 172)	USA (n = 28)
	18 (52.94%)	11 (25.00%)	75 (43.60%)	19 (67.86%)
Reward	26 (76.47%)	24 (54.55%)	49 (28.49%)	13 (46.43%)
– Esteem	22 (64.71%)	27 (61.36%)	47 (27.33%)	16 (57.14%)
– Promotion	19 (55.88%)	8 (18.18%)	55 (31.98%)	7 (25.00%)
– Job security	29 (85.29%)	35 (79.55%)	45 (26.16%)	17 (60.71%)
– Salary	7 (20.59%)	9 (20.45%)	12 (6.98%)	4 (14.29%)
Ratio effort/reward ≥ 1.5	0 (0.00%)	4 (9.09%)	24 (13.95%)	4 (14.29%)
Overcommitment	8 (23.53%)	13 (29.55%)	103 (59.88%)	9 (32.14%)

Discussion

This study reveals cross-national differences in the profiles, working conditions, and health outcomes of EMD. The demographic disparities—such as the higher proportion of women in Czech (76%) and Thai (72%) centers compared to the US (50%)—alongside variations in age, education, and prior work experience, reflect diverse recruitment and professionalization pathways across healthcare systems. Particularly, the contrast between Thai EMD, most of whom held post-secondary or technical certificates (88%), and French dispatchers, predominantly lacking formal qualifications (88%), stresses the lack of standardized training requirements in this profession.

Working conditions varied between centers, with structural differences likely influencing health, stress, and job satisfaction. Full-time work dominated in Thailand, the US, and France (81–98%), while part-time work was more common in the Czech Republic (41%), with differences in weekly hours (29–32h vs. 42–44h). The high prevalence of long shifts (> 10h), reported by 81% of US and 100% of Czech EMD, aligns with findings by Montassier et al. (2015) (30), who demonstrated that shift configurations significantly impact dispatch center performance and operator well-being. These demanding schedules have been linked to adverse health outcomes in shiftwork research and affect accident risk, as highlighted by Silva (2023) (31) and Wagstaff et al. (2011) (32), who identified long and irregular working hours as risk factors for chronic diseases. Additionally, the need to raise one's voice, reported by 85% of Czech EMD—may contribute to noise-induced hearing loss (33).

Insufficient sleep emerges as a shared issue, with 42–59% of EMD reporting fewer than six hours of sleep per night and frequent daytime sleepiness. Given the safety-critical nature of emergency dispatch, chronic sleep deprivation is particularly concerning. Cash et al. (2021) (34) demonstrated that sleep deprivation in EMS professionals can affect cardio-vascular health and impair cognitive performance and decision-making, increasing the risk of errors in emergency response—a critical concern for patient safety (35).

Musculoskeletal complaints—such as lower back (68–82%), neck, and shoulder pain—were widespread across all sites, likely due to the sedentary demands of the profession. These findings are consistent with Tahernejad et al. (2024) (36), who reported high rates of musculoskeletal disorders in EMS personnel, and Dzakpasu et al. (2021) (37), who linked prolonged sedentary work to musculoskeletal discomfort. These physical symptoms highlight the need for ergonomic interventions, as Barkhordarzadeh et al. (2022) (38) demonstrated that structured programs based on the PRECEDE-PROCEED model effectively reduced work-related health problems among EMD.

Stress levels reported by EMD were generally moderate, which may reflect their adaptation to high-pressure environments. This resilience is particularly notable in countries like the USA, where many EMD—often emergency medical technicians or paramedics—have prior experience delivering patient care under intense conditions. This background aligns with what Regehr et al. (2017) (39) identified as a potential barrier against occupational stress. Supporting this physiological adaptation, Kulczycka et al. (2025) (40) observed that the cortisol profiles of EMD remain within physiological norms, indicating that the work environment, does not negatively impact their physical health at a short term. However, psychological outcomes vary across different cohorts. Rubens et al. (2026) (41) investigated psychosocial predictors among various emergency responders and found that female personnel, especially paramedics and EMD, reported higher levels of depression, anxiety, stress, and somatic symptoms compared to firefighters. These findings are further supported by Osório et al. (2025) (42), whose systematic review and meta-analysis revealed elevated prevalence rates for depression, anxiety, and PTSD within this specific workforce, with higher rates than other frontline first responders and the general population. Consequently, these disparities underscore the importance of developing tailored occupational health strategies to support different subgroups within the emergency services.

Thailand emerges as a high-risk environment, with respondents reporting the poorest outcomes: the highest rates of self-rated poor health (44%)—despite having the youngest reported median age—depressive symptoms (41%), and frequent tense interactions.

The frequency of tense interactions with the public and healthcare professionals varied among different systems, with Thai EMD reporting more frequent tensions compared to French dispatchers, who reported rare occurrences. This might be related to callers' lack of knowledge about how to use the emergency number and the complexity of medical dispatch, including both technical and human aspects (43).

This suggests that contextual or organizational factors in Thailand may exacerbate stress and reduce well-being. The effort-reward imbalance may partially explain these disparities, as Thai EMD reported low job security (26%) and high overcommitment (60%), factors known to contribute to poor health outcomes in Siegrist's model (1996) (23, 44–47).

Finally, perceived fairness, recognition, and job security may serve as protective factors, protecting against the negative effects of occupational stress. Strengthening these aspects could enhance both individual well-being and operational effectiveness in this demanding profession (48).

Strengths of this study include its multinational design, capturing diverse organizational, cultural, and professional contexts across four countries, enabling robust cross-cultural comparisons. The use of validated tools ensures reliable assessment of mental health, stress, and sleep outcomes, while the comprehensive dataset—covering demographics, working conditions, health status, and psychosocial factors—provides a holistic view of EMD's occupational challenges. These strengths align with recommendations from the WHO/ILO (2021) for comprehensive occupational health assessments (49).

However, limitations must be acknowledged. Self-reported data introduce potential selection and recall biases. The cross-sectional design precludes causal inferences between working conditions and health outcomes. Furthermore, heterogeneity in training systems, work structures, and cultural contexts complicates direct comparisons between centers, as noted in the EU-OSHA ESENER survey (2019) (50). Varied response rates (from 70% to 81%) and missing data may also limit generalizability.

Conclusions

This study highlights the impact of working conditions on the health and well-being of EMD. The marked cross-national differences in training, work schedules, and psychosocial stressors—alongside high rates of depressive symptoms, stress, musculoskeletal pain, sleep deprivation and Effort-Reward Imbalance demonstrate the need for tailored interventions. To improve EMD well-being and operational effectiveness, policymakers should prioritize standardized training, shift length regulations, mental health support, and better recognition. Future research should explore causal pathways to inform evidence-based strategies for this high-pressure profession.

Declarations

Ethics approval and consent to participate:

This study complied with the ethical principles of the Declaration of Helsinki. Each site ensured that the study was conducted in accordance with local regulations.

Consent for publication:

As all data were anonymized and no individual participant could be identified, no consent for publication was required. Participants were informed that their anonymized responses would be used for research and potential publication.

Competing interests:

The authors declare that they have no competing interests

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Author Contribution

AO, KGJ, MB, TL2 – Conceptualization, study design. AO, GS, AD, MB, TL2: Data interpretation, manuscript review. AO – Data collection (France), analysis, drafting the manuscript, and revision. OF, KP, PP, NT, MMP, TL1 – Data collection (Czech Republic/Thailand/USA), local coordination, and manuscript review. AO, TL1, MMP, GS, AD – Statistical analysis, methodology, and critical revision of the manuscript. All authors – Read, approved the final version of the manuscript, and agreed to be accountable for all aspects of the work.

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Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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