Burnout among Emergency Physicians
from detection to prevention

Proefschrift voorgelegd tot het behalen van de graad van doctor in
de medische wetenschappen aan de Universiteit Antwerpen te verdedigen door

Francis Somville

Promotoren:
Prof. dr. Erik Franck
Prof. dr. Peter Van Bogaert

Faculteit Geneeskunde
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Promotors

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Members of the doctoral jury

Promotors

Prof. dr. Erik Franck

Prof. dr. Peter Van Bogaert

Internal jury

Prof. dr. Filip Van Den Eede

Prof. dr. Didier Schrijvers

External jury

Prof. dr. Ives Hubloue

Prof. dr. Gwendolyn Portzky

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General Introduction

General Introduction

Background:

The general concept of Burnout:

The concept of “Burnout”, as we use it in its current form according to the medical scientific literature, actually has a longer history and also a broader social influence than most of us suspect. It was already explained by Chabot Pascal in his work “Global Burnout” published in 2013 [1] .He describes the concept we call burnout as a “disease of civilization”. It is not just an individual disorder that affects certain people who are poorly adapted to the social system, or, on the contrary, too committed, or who do not want (or are not able to) set limits on their professional endeavors. It is also a disorder that reflects certain exaggerated values of our current society: the urge for more, for exaggeration, for performance, for the highest limit, all fueled by technologies that often impose their temporality on people.

In his first part of the work he outlines and analyzes three historical birth moments of the burnout concept: its description in 1974 by the psychiatrist Herbert Freudenberger about the psychiatrist himself and later extended to the condition of his colleagues [2] ; the inventing of the concept by the novelist Graham Greene in 1961, who is credited with being the first to use it for his character in his novel as "A Burnt-out Case" [3] ; the historical precursor, the monastic "acedia" or impudence [4]. Furthermore, by thinking about perfectionism, about the place of helping professions in our society (teachers, doctors, nurses), about the relationship of women with the professional environment, about the issue of recognition by others in the work situation and family situation.

He proposes a series of philosophical implications: the meaning of this concept and the ability to change to get closer to his inner self. Whether this experience of uselessness means a reorientation towards a more meaningful relationship with society. His original work was published in French and was subsequently translated into several languages, including English (Global Burnout) and eventually also into Dutch (Filosofie van de burnout). The sociologist Van Hulle speaks in his PhD thesis at the VUB in 2022 and later in his book “The Burn-out Paradox” of 2023 about how the contemporary phenomenon / concept arose by using a timeline starting from

Freudenberger in 1974 to and 2018 from a series of 4306 articles. Finally, to provide an insight into how it has expanded into a social phenomenon of epidemic proportions. Although he refrains from a medical interpretation by indicating that he is not a clinical psychologist, psychiatrist or physician. [5]

This brings us more to what this thesis is all about. Healthcare providers, including nurses, paramedics, and physicians, are at risk of burnout due to the psychological burden of providing care [6] [7]. The medical term “burnout”, created in the 1970s by Christina Maslach, is the result of long-term emotional stress [8] [9]. The syndrome causes emotional exhaustion, causing doctors to multitask and struggle with psychological tasks. Depersonalization manifests as negativity toward others, in physicians, specifically patients, while a lack of personal achievement creates a sense of failure. In contrast to the general population, emergency physicians are exposed to unique stressors such as sudden changes in work demands and exposure to life and death situations [10]. Burnout is linked to health problems and impacts professional and personal life, with economic consequences; as we know, it also occurs in the general population [11]. Despite extensive research into burnout among physicians, the differences in stress factors for emergency physicians remain underexposed. This thesis attempts to focus on burnout in emergency physicians specifically.

<u>The more specific concept of burnout in emergency physicians:</u>

Emergency physicians are a distinct group of physicians, and their specialization is characterized by unique challenges and demands. The nature of their work in emergency departments exposes them to a range of stressors, trauma, and occupational hazards, contributing to the distinctive features of their profession. Several factors make emergency physicians a unique group of medical professionals.

Emergency physicians often work in high-stress environments where they have to make rapid decisions and respond to critical situations. The unpredictable nature of emergencies can create a constant state of alertness and tension. This creates a high-stress environment for this unique group of physicians. [12]

This particular group of physicians regularly encounters patients with severe injuries, life-threatening conditions, and acute medical crises. Dealing with trauma on a daily

basis can take an emotional toll on these professionals. [13] Exposure to trauma is one of the most challenging occupational issues for emergency physicians. [11] [14]

Emergency departments are prone to occupational hazards such as exposure to infectious diseases, needle stick injuries, and other physical risks. The need for fast and efficient care sometimes leads to a higher risk of accidental exposure to biological hazards. This was, in particular, seen during the COVID-19 pandemic, in which the emergency physicians were the first physicians to be confronted with the exposure and the treatment of patients with COVID-19. [15] [10] [16]

Emergency physicians often face a high patient volume and manage diverse cases. Emergency physicians operate in an environment where cases range from minor injuries to life-threatening emergencies. The unpredictability and variety of cases demand a broad spectrum of medical knowledge and the ability to make fast, critical decisions. [17] The need to triage and prioritize patients based on the severity of their condition adds to the pressure. [18] [19]

Because of the continuous multitasking in the emergency department [20], high task load and time pressure can contribute to burnout. The demanding nature of emergency medicine, together with exposure to trauma and high-stress situations, makes emergency physicians susceptible to burnout. Burnout is a state of chronic physical and emotional exhaustion, often accompanied by feelings of cynicism and detachment from work. [21]

Additionally, studies showed that emergency physicians often work longer hours than physicians in other specialties, and burnout rates in emergency medicine have been a topic of concern. We notice that emergency physicians frequently work irregular hours and night shifts, contributing to disruptions in their circadian rhythm. The challenges associated with shift work, such as sleep disturbances, further impact their overall well-being. [22] [23] [24]

In the emergency department, emergency physicians need to collaborate closely with other healthcare professionals, including nurses, paramedics, and specialists, to provide comprehensive and timely care. [25] Effective communication and coordination are essential in this dynamic and fast-paced environment. [26]

Several studies highlighted the unique challenges faced by emergency physicians. Research explored burnout rates, mental health issues, and strategies to enhance resilience and well-being within this medical specialty. [27] Coping with this is vital to have insight in the process of the challenges as mentioned earlier. [28]

Understanding these challenges is crucial for developing support systems, training programs, and interventions to promote emergency physicians' health and resilience. [29] [30] [31]

By developing more extensive research into the complexity of the challenges emergency physicians face, a better understanding can be gained through scientific research. This dissertation aims not only to gain insights into their occupational stressors, but also to pave the way for tailored interventions and support systems, fostering an environment that improves their well-being and efficacy in the demanding field of emergency medicine .

Also, when investigating emergency physicians as a distinct group with unique challenges, it's essential to ask relevant questions and consider hypotheses that can provide insights into their professional experiences and well-being.

The study is structured around suppositions that aim to extend our understanding of the following key issues:

1. Occupational Stress: Examining how emergency physicians perceive occupational stressors in their daily work, the study investigates whether their levels of stress surpass those of professionals in other medical specialties due to the unpredictable and high-pressure nature of their tasks.

2. Trauma Exposure: Focusing on the impact of repeated exposure to trauma on mental health, the research explores whether regular exposure to traumatic events puts emergency physicians at a higher risk of developing psychological distress or symptoms of PTSD.

3. Occupational Hazards: Investigating how emergency physicians perceive and manage occupational hazards in the emergency department, the study explores challenges they face in maintaining safety and well-being.

4. Task Load and Decision-Making: Analyzing the influence of high task loads and time pressure on decision-making abilities, the research considers whether the demanding workload in emergency departments contributes to decision fatigue and potential lapses in judgment.

5. Burnout and Resilience: Scrutinizing factors contributing to burnout, the study explores strategies employed by emergency physicians to build resilience, questioning whether interventions like peer support or mindfulness programs can mitigate the cumulative impact of stressors.

6. Shift Work and Sleep Patterns: Examining the effects of irregular shift work on sleep patterns and overall well-being, the research explores potential disruptions in circadian rhythms impacting the physical and mental health of emergency physicians.

7. Interdisciplinary Collaboration: Investigating how emergency physicians perceive and navigate interdisciplinary collaboration in the emergency department, the study considers the crucial role of effective communication and teamwork in managing the complex and dynamic nature of emergency medicine.

8. Training and Preparedness: Assessing the influence of training and preparedness on handling high-stress situations, the research questions whether specialized training in trauma care and crisis management enhances emergency physicians' confidence and effectiveness in emergencies.

Thus, by implementing cross-sectional surveys to track the mental health and well-being of emergency physicians over time, examining the factors that contribute to burnout and resilience. And compare the experiences of emergency physicians with those in other medical specialties to identify unique stressors and challenges specific to emergency medicine. Finally, an intervention study is conducted to assess the effectiveness of strategies such as stress management programs, peer support initiatives, or changes in work schedules in mitigating the impact of occupational stressors.

This extensive approach, using various research methodologies and hypotheses throughout this thesis, aims to understand the multifaceted landscape of challenges that emergency physicians face and in turn promote improvements in their support structures and overall well-being. Therefore, the overall goal of the dissertation is to

study burnout among emergency physicians, with a focus on detection and prevention, to provide essential insights and practical recommendations that contribute to the well-being of healthcare professionals, the quality of patient care, and the broader healthcare system's sustainability.

Aim of the thesis:

The aims of this thesis are multifaceted, addressing several critical aspects of the well-being of emergency physicians and healthcare providers. The overarching goals of this research endeavor are as follows:

- *To understand the prevalence and determinants of burnout:* The primary aim is to investigate the prevalence of burnout among emergency physicians in Flanders, Belgium and understand the key determinants contributing to this alarming trend. This involves exploring work-related factors, personal characteristics, and their interplay in the development of burnout.
- *To examine the role of Type D personality:* This thesis aims to investigate the role of Type D personality as a potential risk factor for burnout among emergency physicians. By comprehensively exploring this personality trait, we seek to shed light on its significance in the context of healthcare professionals.
- *To investigate the impact of COVID-19 on work stress in emergency physicians:* Given the unprecedented challenges posed by the COVID-19 pandemic, another key aim is to assess how this global health crisis has affected the work-related stress and well-being of emergency physicians. This includes examining the perceived risk of physical hazards, violence, and burnout in the context of COVID-19.
- *To highlight the role of resilience:* The thesis aims to emphasize the importance of resilience as a critical factor in mitigating the impact of work stress and burnout. Understanding how individual and team resilience can influence the well-being of emergency physicians is a central focus.
- *To develop and test an intervention for stress reduction:* A significant goal is to introduce and evaluate interventions aimed at reducing stress and improving the overall quality of life and well-being of emergency physicians. The SMART-EM program serves as a valuable tool for this purpose.

In essence, this thesis aspires to provide a holistic understanding of the challenges faced by emergency physicians, offer insights into potential risk factors, and propose practical solutions and support systems to enhance the quality of care provided by these dedicated professionals while safeguarding their own well-being.

Outline of the thesis:

- Chapter 1: General introduction of the thesis

In the opening chapter of this thesis, we set the stage for our exploration of the critical issues affecting emergency physicians and healthcare providers. We begin by providing a background that highlights the alarming prevalence of work-related stress and burnout among these professionals. Our primary aim is to shed light on the complex relationship between individual personality traits, work-related factors, and the development of burnout. To guide the reader, we present an outline of the thesis, providing a roadmap for the journey ahead. Additionally, we offer an overview of the predictors and outcomes that will be examined throughout the subsequent chapters.

- Chapter 2: Work Stress and Burnout Among Emergency Physicians: A Systematic Review of the Last 10 Years of Research

In this chapter, we made a comprehensive review of the existing literature on work stress and burnout among emergency physicians. Our analysis reveals that emergency physicians consistently report higher levels of emotional exhaustion and depersonalization compared to their peers in the healthcare field. We delve into the various factors contributing to this trend, including work-related characteristics, traumatic incidents, and aggression. Personal characteristics such as age, Type D personality, prior experiences, and coping strategies also emerge as significant determinants. The chapter concludes by emphasizing the high-risk emergency physicians face regarding burnout and work-related stress.

- Chapter 3: Burnout, Stress, and Type D Personality Amongst Hospital/Emergency Physicians

Building upon the insights from the previous chapter, this section explores a novel perspective by examining the interplay between burnout, stress, and Type D personality. Type-D personality independently predicts poor prognosis in patients with

cardiovascular disease. However, no previous study has determined the influence of type-D personality among emergency physicians. We introduce the idea that Type D personality may be a personality-related risk factor for burnout among emergency physicians. This revelation underscores the need for enhanced prevention measures that consider this individual factor when designing coaching programs. With the backdrop of the demanding COVID-19 pandemic, we stress the urgency of improving the professional well-being of emergency physicians, especially in the context of acute and emergency care departments.

- *Chapter 4: Work Stress-Related Problems in Hospital Physicians/Emergency Physicians in COVID Times*

In this chapter, we shift our focus to the unique challenges that have emerged in the wake of the COVID-19 pandemic. We explore the heightened exposure to physical hazards, violence, and burnout experienced by physicians, with a particular emphasis on emergency and hospital physicians. These professionals express grave concerns about violence, burnout, and the added burden of COVID-19. The chapter provides an in-depth analysis of these concerns, underlining a need for targeted interventions.

- *Chapter 5: The Impact of Perceived Work Stress on Burnout Among Emergency Physicians: The Moderation Role of Resilience*

This chapter investigates the intricate web of factors contributing to the risk of burnout among emergency physicians. We highlight the crucial role played by personal characteristics, work conditions, perceived stress, and resilience. Moreover, we uncover the significant moderating effect of resilience on the impact of perceived work stress on burnout. This revelation underscores the importance of promoting individual and team resilience to safeguard the well-being of emergency physicians and ensure the delivery of quality emergency care.

- *Chapter 6: SMART-EM Study Among Emergency Physicians Program*

In this section, we introduce the SMART-EM program, a valuable tool designed to reduce stress among emergency physicians. We discuss the effectiveness of this intervention, demonstrating statistically and clinically improved perceived stress, quality of life, and overall well-being. Nevertheless, we acknowledge the need for additional studies with larger sample sizes and extended follow-ups to refine this

program further.

- *Chapter 7: The General Discussion of the thesis*

In the concluding chapter, we engage in a comprehensive discussion of the thesis's findings and its implications. We stress the critical need for a holistic approach to address the well-being of emergency physicians and healthcare providers. This approach should encompass comprehensive support systems, tailored interventions, and a deep understanding of the complex interplay between individual personality traits and work-related factors in burnout development. Our findings underline the necessity for continued research and the development of targeted programs aimed at preserving the physical and mental well-being of those dedicated to saving lives in high-pressure emergency departments.

Overview of the methodology assessed in the different studies of the thesis:

In the next paragraph, we review the overall methodology used to answer the dissertation’s research questions.

In Chapter 2: Work Stress and Burnout Among Emergency Physicians: A Systematic Review of the Last 10 Years of Research [12] presents a systematic review following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review, conducted through searches on NCBI PubMed and Embase, includes comparative primary studies quantifying burnout in Emergency physicians between 2011 and 2022.

In Chapter 3: Burnout, Stress, and Type D Personality Amongst Hospital/Emergency Physicians [21] used a cross sectional study design with various validated instruments to measure burnout, work engagement, and related factors among hospital physicians. Cronbach's alpha coefficients indicated good reliability for these measures. Statistical analyses using SPSS version 27.0 included one-way ANOVA, chi-square tests, Pearson's correlation, and multiple logistic regression. The analyses aimed to explore associations between various factors (e.g., Type D personality, job demands, social support) and the risk of burnout among emergency physicians.

In Chapter 4: Work Stress-Related Problems in Hospital Physicians/Emergency Physicians in COVID Times [10] presents a survey-study that aimed to comprehensively assess occupational hazards among physicians, encompassing demographic and professional characteristics, exposure, occurrence, risk perception, and worry across four hazard categories. Data analysis utilized SPSS 26.0, computing descriptive statistics such as means, standard deviations, and percentages. Pearson correlations were calculated to explore relationships between predictors and outcomes. Hierarchical regression analyses were conducted in three blocks: the first block focused on demographic characteristics; the second block included exposure and occurrence to physical hazards, COVID-19, violence, and work-related stress factors contributing to burnout symptoms; the third block considered risk perception for these hazards.

In Chapter 5: The Impact of Perceived Work Stress on Burnout Among Emergency Physicians: The Moderation Role of Resilience [32] presents a cross-sectional survey that employed validated instruments to measure demographics and explore key psychological constructs among participants. Sociodemographic characteristics were analyzed descriptively. Average scores and regression analysis with the process model type 4.2 were applied to the obtained data. Independent samples T-tests were utilized to examine differences in perceived stress, resilience, and BAT, while Mann-Whitney U-tests explored differences based on work schedule and work regime in emergency physicians and residents. Pearson correlations and multiple regression analyses were conducted to identify relationships between personal factors, perceived stress, resilience, and BAT. An alpha level of 0.10 was considered in some calculations to capture potential trends.

In Chapter 6: SMART-EM Study Among Emergency Physicians Program [33] presents a pre-post pilot intervention study testing an online administered Stress Management and Resilience intervention aimed to impact stress, burnout, and professional quality of life among emergency physicians. The SMART-EM program, a pilot clinical trial, included Belgian emergency physicians with a medium to high perceived stress level. The statistical analyses focused on changes in stress, resilience, professional quality of life, and burnout scores, comparing baseline and 3-month outcomes within and between groups. One-sample t tests evaluated changes

within groups, and two-sample t tests compared baseline values between groups. For participants not completing three-month evaluations, baseline values were extended for estimation.

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CHAPTER 2

Review article Work stress and Burnout among emergency physicians: a systematic review of last 10 years of research

Somville F, Van Bogaert P, Wellens B, De Cauwer H, Franck E (2023). Work stress and burnout among emergency physicians: a systematic review of last 10 years of research.
Acta Clinica Belgica, DOI: 10.1080/17843286.2023.2273611

Abstract

Aim:

First, to provide a synthesis and analysis of available scientific literature regarding the level of work stress and burnout among emergency physicians. Second, to identify the effect of the specific work situation-related factors.

Methods:

A systematic search was performed in NCBI PubMed and Embase. Comparative primary studies, both systematic review and cross-sectional, quantifying burnout in emergency physicians were included. Only studies published between 2011 and 2022 were retained. Synonym sets were compiled for the search key for "burnout & stress", "emergency", "physician" and "burnout & posttraumatic stress disorder".

Results:

35 papers were retained for further research. Emergency physicians scored significantly higher for all dimensions of burnout compared to other health care professions. Significant correlations for burnout were found with work characteristic and organizational factors. Critical incidents and aggression were identified as the most important acute work characteristics and organizational factors impacting emergency physician's mental wellbeing including the development of posttraumatic stress disorder. Moreover, personal factors such as age, personality, and coping strategies also play an important role in the development of burnout as well as work-related trauma.

Conclusion:

Available studies show that emergency physicians report higher scores of emotional exhaustion and depersonalization when compared to other healthcare professionals. Work characteristics contribute to this, but work-related traumatic incidents and aggression are important determinants. Personal characteristics such as age, personality type D, previous experiences and coping strategies seem to be determining factors likewise. Emergency physicians showed a high risk for developing burnout and work stress related problems.

Introduction

Nurses, paramedics and physicians are at risk for the development of burnout [1]. In particular, the psychological burden of caregiving is an important factor [2]. The concept of "burnout" was defined in the early 1970s, and was especially elaborated by Christina Maslach, as a psychological status resulting from of long-term emotional burden or psychological stress [3]. The first basic aspect of this syndrome is "emotional exhaustion" (EE).

When the emotional reserves are exhausted, physicians feel that they are no longer able to perform(adequately) on a psychological level. They are no longer able to concentrate on the multitasking they have to perform in order to adequately diagnose and/or treat a patient.

The second -aspect, "depersonalization" (DP), manifests itself in the shape of pronounced negativity and increasing cynicism, both in thought and in behaviour, towards the patient.

The physicians behave without any empathy and sometimes assertively in their contacts with patients and/or family in the acute setting of the emergency department when receiving patients.

The third aspect is lack of personal accomplishment (PA): a sense of diminished personal capacity and a sense of failure in achieving set goals. The physicians estimate their professional capacity much lower than their actual capabilities and ultimately have the impression that they are no longer able to achieve their professional goals to help patients in acute situations on the work floor in the emergency department [4].

Physicians are at increased risk of developing burnout if they are exposed to certain work characteristics and organizational factors such as increased workload, conflict with fellow physicians, conflict with other staff members, confrontation with death and dying, ineffective support from colleagues and supervisors, and coping with the suffering of patients [5].

Several studies show that the nature and extent of impact of these stressors could be different for each specialization within the group of physicians. Personal factors also determine whether burnout occurs [6]. Typical factors of emergency departments and the profession of emergency physician potentially creates a series of specific stressors to which other hospital physicians are not or less

exposed such as sudden extreme changes in workload, instantaneous decisions about life and death and the feelings of guilt for the failure of therapy, the unpredictable and uncontrollable flow of patients, incidents with children, confrontation with mutilations and extreme human suffering and loss of control in major incidents [5, 7, 9].

In addition, Posttraumatic Stress Disorder (PTSD) was linked to the confrontation with verbal and physical aggression and exposure to extreme situations. More specifically, a hindering anxiety disorder that consists of a pronounced urge to avoid anything that reminds of the traumatic incidents, as well as the occurrence of limited quality of care provided [7]. Studies reported a correlation between the degree of burnout and the occurrence of muscle strain, obesity, insomnia, depression and the abuse of alcohol and psychotropic drugs.

Furthermore, burnout also negatively affects the quality of the caregiver's private life, which is confronted with more conflict and aggression. Finally, literature shows that burnout causes a significant economic loss through increased absenteeism at work, early retirement from the profession and increased healthcare costs [7].

However, much research has been done on burnout among the global group of physicians but less attention has been paid to the differences in the composition of the stressor set of Emergency physicians compared to other professional groups. This systematic review attempts to provide an update on factors related to Emergency physicians burnout and in addition focus on the differences in factors compared to other medical specialities.

Aim of the study

The aim of the present study was twofold: First, to provide an analysis and synthesis of the available scientific literature on the level of work stress and burnout among Emergency physicians, and second, compare the specific work situation-related factors to other professional groups of medical specialties. As such, this study aimed to stimulate and challenge initiatives towards the development of research endeavours on burnout in Emergency physicians from detection to prevention.

Methods

A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidance. A systematic search was performed in the data sources NCBI PubMed and Embase. Comparative primary studies, both longitudinal and cross-sectional, quantifying burnout in Emergency physicians were included. Articles in PubMed that were “ahead of print” yet fully available, were also eligible for inclusion. Only the studies published between 2011 and 2022 in English, French or Dutch, were included. A supplementary addition could be made by hand searches. Synonym sets were compiled for the search key for " burnout & stress", "emergency", "physician” and "burnout & posttraumatic stress disorder ".

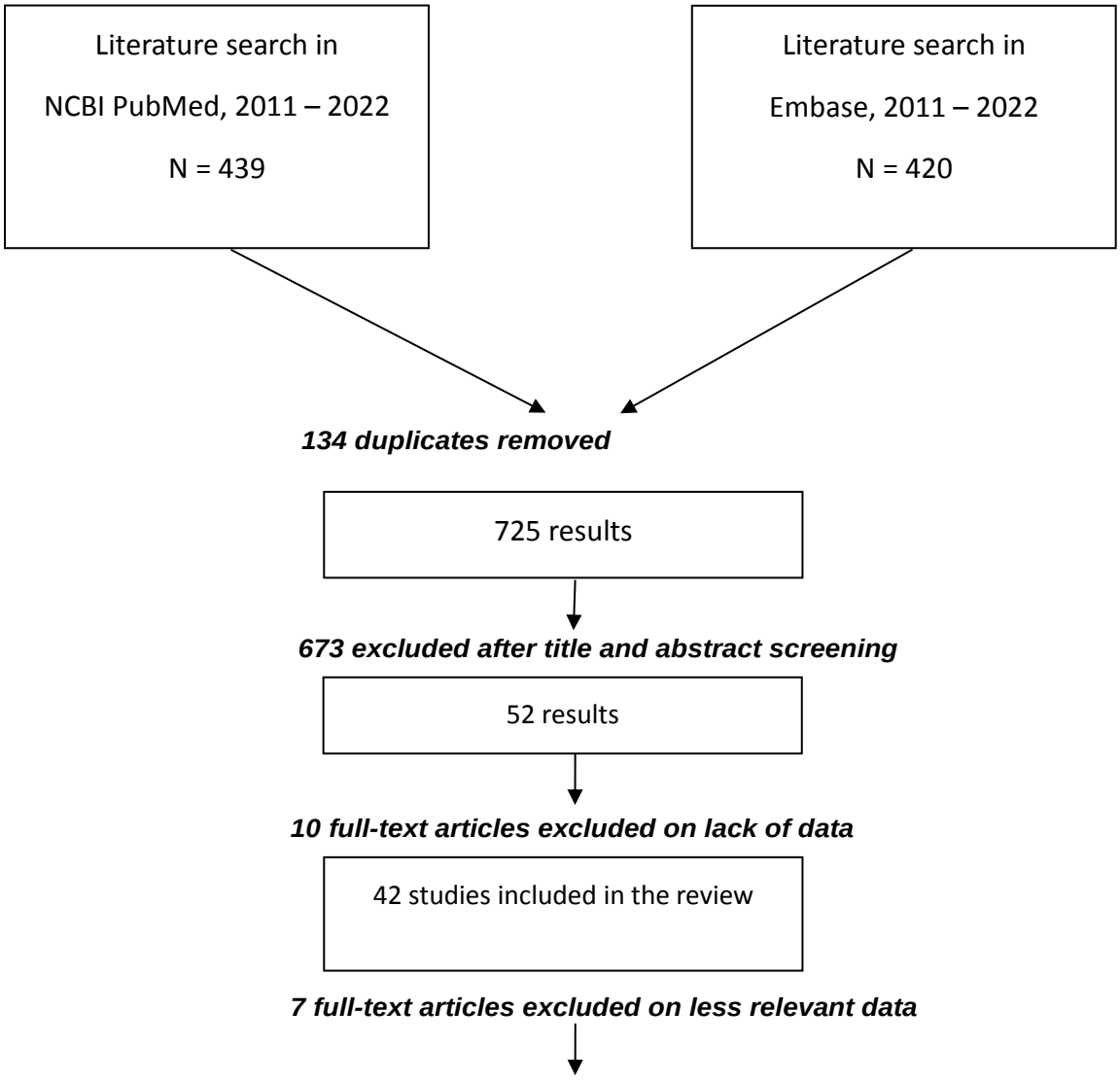
Sources, selection of the studies and data extraction

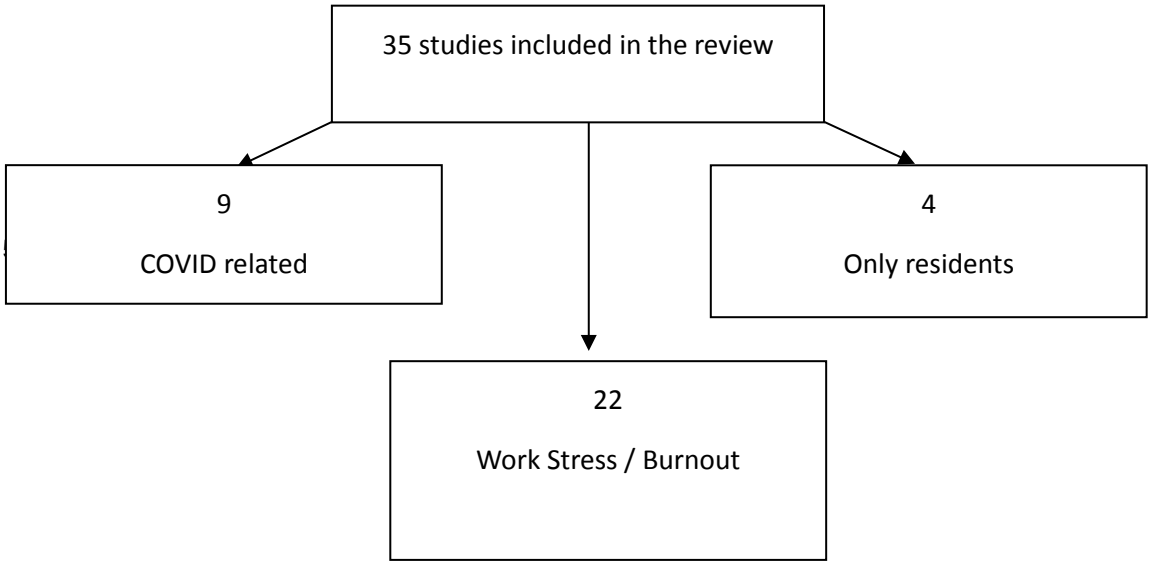
For each study, the design, research methodology and validity of the research instruments as Strengthening the Reporting of Observational studies in Epidemiology (STROBE), were assessed before proceeding to analysis of the results. It is an instrument which includes a checklist of items to include in observational research articles and then takes into account cohort, case-control, cross-sectional studies, and conference abstracts. One reviewer (FS) searched PubMed and Embase for suitable papers. Results were adjudicated through consensus discussion between two authors (FS and BW). In case of doubt or discrepancies, the other authors (PVB, HDC and EF) advised on the final decision which articles to include in the study.

Data extracted from articles included information concerning the publication, the study population/target group involved, and outcomes of interest. Publication items included the first author, year of publication, the country in which the data were collected, and date of data collection. Subject data collected included the sample size, the response rate, male/female ratio, the burnout scores used, the calculated burnout ratio, the scores of exhaustion, depersonalization, and personal accomplishment. Finally, the significant determinants for Emergency physicians burnout were included in the data extraction (Figure 1).

Figure 1 :

Flow Diagram of strategy to search literature for “Work Stress and Burnout in emergency physicians” between 2011 - 2022





The flowchart in Figure 1 depicts the article selection process. We initially identified 439 papers in PubMed and 420 papers in Embase, that appeared to be suitable. After the removal of duplicates, and three consecutive exclusion emergency physicians, 35 studies were selected for further research.

Concerning the quality assessment of the included studies we notice:

All studies were assessed with the EAI (Epidemiological Appraisal Instrument) [8]. This is a recognized methodological quality assessment for epidemiological studies. The results for all included studies are listed in Table 1. Of which 33 studies were cross-sectional and 2 systematic reviews.

Table 1: Selected Studie with specific design information and results

Ref.	Research design	Speciality	Sample size	Response rate	Gender M - F	Measure of burnout	Diagnostic Criteria	Burn out Rate	High Emotional Exhaustion	High Deperson alization	Low Personal Accomplish ment	Significant determinants for EM physicians burnout explained by various stressors
M. Estryn-Behar et al. (1)	CS	4799 physicians, 538 EM physicians	5337	66%	57.5% - 42.5%	CBI	CBI score >/= 3	51.5 %	not mentioned	not mentioned	not mentioned	work-family conflict, quality of teamwork as stress at work
M. Jalili et al. (2)	CS	EM residents en practioners	188	88%	91% - 9%	MBI	not mentioned	not mentioned	0,37	0,39	0,46	19 stressors, like shortage of equipment, problem with work physical environment, and relationship with other services
J.K Takayesu et al. (3)	CS	residents	289	75%	59 %- 41%	MBI	high EE/DP or low PA	0,65	0,33	0,59	0,59	having a significant other or spouse, poor global job satisfaction, lack of administrative autonomy, lack of clinical autonomy, intolerance of uncertainty
S.A.M. Abdo et al. (4)	CS	248 nurses, 266 physicians (ED)	514	N:100%, P:89.9%	27.7% - 72.3 %	MBI	high EE and DP and low PA	0,66	46.9%	44.9%	97.7%	age, sex, frequency of exposure to work-related violence, years of experience, work burden, supervision and work activities
M. Howlett et al. (5)	CS	ED staff members (nurses/ EP)	616	51%	15.2% - 84.8%	MBI (CISS: coping)	not mentioned	not mentioned	not mentioned	not mentioned	not mentioned	Emotion-oriented coping
Lu et al.(6)	CS	EM attending physicians and residents	155	49.7%	62.3% - 37.7%	MBI	high EE or high DP	57.1 %	16%	38%	6%	Positive screen for depression and low career satisfaction
Ben-Ithzak et al.(7)	CS	EM physicians	200	35%	70% - 30%	MBI	high EE or high DP	71.4 %	61%	51%	17%	Extent to which work stress provides meaning and degree of worry

Salmoirago-Blotcher et al.(8)	CS	EM physicians	422	32.7%	71.4% - 28.6%	2-item validated version of MBI	not mentioned	27.2 %	not mentioned	not mentioned	not mentioned	No significant relationship with religious/spiritual indicators
Schooley et al. (9)	CS	EM physicians	38	100%	54% - 46%	MBI + Demographics	not mentioned	not mentioned	71.05%	78.94%	28.94%	No significant relationship with number of patient encounters per day
Zafar et al.(10)	CS	EM physicians	52	92.2%	41.3% - 58.7%	MBI-HSS	high EE or high DP or low PA	not mentioned	aOR = 2.48*	aOR = 0.32*	not mentioned	No significant relationship with experience of physical attack or verbal abuse or current mental distress as work stress
Hamdan et al.(11)	CS	EM physicians	215	65.8%	76.8% - 23.2%	MBI-HSS	not mentioned	not mentioned	72.3%	32.1%	32.1%	Exposure to workplace violence and younger workers (≤ 30 years)
Lu et al.(12)	CS	EM trainees	54	66.7%	60.3% - 39.7%	MBI	high EE or high DP	70%	not mentioned	not mentioned	not mentioned	No significant relationship with postgraduate year
Lu et al. (13)	CS	EM trainees	89	65.2%	60.3% - 39.7%	MBI	high EE or high DP	53.4 %	not mentioned	not mentioned	not mentioned	no important determinants such as work stress were retained
O. Yuguero et al. (14)	CS	EM physicians	245	40.8%	33% - 67%	MBI	MBI>/=31	not mentioned	not mentioned	not mentioned	not mentioned	low levels of empathy (high JSPE score)
Lu et al. (15)	CS	EM trainees	53	50.9%	70.4% - 29.6%	MBI	high EE or high DP	77.8 %	not mentioned	not mentioned	not mentioned	no important determinants such as work stress were retained
Rajan et al.(16)	CS	EM physicians	124	80%	45.2% - 54.8%	MBI-HSS	high EE or high DP or low PA	not mentioned	66.7%	53.8%	30.1%	Younger doctors (≤ 40 years)
Soltanifar et al.(17)	CS	Female EM physicians	108	71%	0 %-100%	MBI	not mentioned	not mentioned	42.9%	11.7%	55.8%	Significant relationship between lower job satisfaction and high EE-score
Truchot et al.(18)	CS	Young EM physicians (<5 years)	1280	34%	47% - 53%	Modified MBI	not mentioned	not mentioned	23%	10%	not mentioned	Female physician and workload of more than 48 hours a week

Chernoff et al.(19)	CS	EM physicians	30	77%	32% - 68%	OLBI	not mentioned	70%	not mentioned	not mentioned	not mentioned	History of depression
Dyrbye et al.(20)	CS	EM residents (4th year) responded	299	not mentioned	49.1% - 50.9%	2-item tool from MBI	high EE or high DP	53.8 %, RR = 1.32**	not mentioned	not mentioned	not mentioned	Female physician and higher anxiety score - adverse relationship with higher empathy score
Perera et al.(21)	CS	EM physicians	118	72%	61.7% - 39.3%	MBI-HSS	high EE or high DP	66.2 %	mean EE-score = 26.46	mean DP-score = 11.96	mean PA-score = 31.51	Female physician and fewer years of practice
Lin et al.(22)	CS	EM residents	7213	21.1%	57.8 %-42.2%	MBI-HSS	high EE or high DP	76.1 %	46.1%	72.5%	30.6%	no important determinants such as work stress were retained
Alqahtani et al.(23)	CS	EM physicians	95	100%	29.1% - 70.9%	MBI	high EE and high DP and low PA	18.9 %	81.1%	24.2%	27.4%	No significant relationship with work-related characteristics
Q. Zhang et al. (24)	SR	EM physicians	1943	not mentioned	not mentioned	MBI	high EE and DP	40%	40%	41%	35%	no important determinants such as work stress were retained
R. Lim et al. (25)	CS	EM physicians	427	90%	55.6% - 44.4%	MBI-HSS	EE>27; DP>10; PA <34	86.1 %	mean score 34.07	mean score 16.35	mean score 45.64	young age, CCFP-EM trained, high PHQ-9 scores (indication for depression)
M.D. Lall et al. (26)	CS	EM physicians	1102	82%	55.1% - 44.9%	LSEP survey/ self-reported burnout	not mentioned	33% (32% M and 37.3 % W)	not mentioned	not mentioned	not mentioned	not mentioned
D. Verougstraete et al. (27)	SR	EM physicians and residents	n m	not mentioned	not mentioned	82% MBI/ 18% MBI others	not mentioned	25,4 %--> 71,4 %(EM), 55,6 %--	not mentioned	not mentioned	not mentioned	not mentioned

								>77,9%(ER)				
M. C. T. Dimitriu et al. (28)	CS	A:50=EM, radiology, ICU/ B: 50 other speciality	100	100%	58.0% - 42.0%	MBI	high EE and DP and low PA	76%(66%vs 86%)	A: 36%; B: 50%	A: 8%; B: 10%	A: 22%; B: 26%	Threat posed by Covid-19, working in normal wards (instead of front line)
L. O. Somnez et al. (29)	CS	GP, residents, specialists, EM physicians	141	not mentioned	58.2% - 41.8%	MBI	not mentioned	not mentioned	(high)	(moderate)	(moderate)	younger age, shorter duration of employment
J. Nguyen et al. (30)	CS	EM physicians, during Covid	890	18.7%	72.9% - 27.1%	adapted MBI-HSS	not mentioned	74.7 %	not mentioned	not mentioned	not mentioned	work related emotional strain and anxiety, isolation from family and friends, and increased workload.
F. Somville et al. (31)	CS	EM physicians and other physicians	497	64.2% > 39.4%	54% - 46%	UBOS	not mentioned	47%	not mentioned	not mentioned	not mentioned	age, exposure/ occurrence of burnout, violence, occurrence of Covid-19
J. Chang et al. (41)	CS	EM residents	22	55%		MBI-HSS	high EE/DP or low PA	not mentioned	mean score 2.47	mean score 2.57	mean score 4.61	threat posed by Covid-19, cumulative stress due pandemic, PTSD
A. Tabur et al. (42)	CS	67 nurses, 87 physicians (ED), 200 health staff	354	50%	17.2% - 82.8	MBI	not mentioned	53.4 %	not mentioned	not mentioned	not mentioned	work-related anxiety, increased workload, threat posed by Covid-19
R. Petrino et al. (43)	CS	223 nurses, 1614 physicians (ED), 41 paramedics ,47 others	1925	not mentioned	52.3% - 47.5%	MBI	high EE/DP or low PA	62%	48.5%	46.5%	47.4%	female, understaffed, having less experience, threat posed by Covid-19

M. Alwhaibi et al. (44)	CS	67 nurses, 36 physicians (ED), 27 pharmacists, 9 others	139	not mentioned	56.7% - 43.3%	MBI	high EE/DP or low PA	not mentioned	61.8%	58.3%	41.0%	workplace, female physician, workload

Abbreviations: CS: cross-sectional, EM : emergency physicians, CBI: Copenhagen Burnout Inventory, MBI: Maslach Burnout Inventory, MBI-HSS: Maslach Burnout Inventory Human Services Scale, LSEP: Longitudinal Survey of Emergency Physicians, CISS: Coping Inventory for Stressful Situations OLBI: Oldenburg Burnout Inventory, EE: Emotional Exhaustion, DP: Depersonalisation , PA: Personal Accomplishment, ER: Emergency Room .

As for the respondents and research design we note:

Only 16 studies focused on Emergency physicians. Eleven studies involved emergency medicine residents and trainees. Four out of 35 studies compared emergency physicians to other physician groups [9-12] and 6 studies made the comparison with nurses [13,14,15,42,43,44]. In several studies, the target group turned out to be small compared to the entire population sample. The survey by Nguyen et al. had a response rate of 18,7 % which is marginal[13]. Seven studies surveyed a wider population that also included paramedics [9,13,14,16,42,43,44]. The studies of Q. Zhang et al. and D. Verougstraete et al. were systematic reviews [17,18].

Some interesting studies made the interesting comparison between physicians and nurses in their article.

Somville F. et al.[7] also showed that the incidence of posttraumatic stress disorder appears to be much higher among emergency physicians than among other physicians and even emergency department nurses. One of the reasons for this may be varying degrees of exposure to traumatic events and their occupational hazards.

Schooley B. et al. [15] described, that his data showed that the emotional exhaustion and depersonalization scores were high in all relevant occupational groups, although the scores on personal accomplishment were low. A statistically significant difference was shown between nurses and medical technicians ($P < 0.05$) for emotional exhaustion; and between physicians and both nurses and medical technicians ($P < 0.05$) for personal accomplishment. However, no difference between the groups was found for depersonalization. Age, gender, economic well-being and income level were all significant; while patient load and marital status had no significance.

Research tools and variables

In almost all studies, the outcome variable 'burnout' was quantified using the Maslach Burn-out Inventory (MBI). The MBI is an internationally used questionnaire, developed by Maslach and Jackson, which provides 22 questions with four answer options. Three scales describe participants feelings of burnout [4]: emotional exhaustion, depersonalization, and personal accomplishment.

Burnout is quantified by the sum of the answers from each dimension. As we already explained more deeply in the introduction. Not all researchers presented their results as such [5,9,19-21,42]. Most of the 35 studies use the cut-off values as described by Maslach [22]. Cutoff values for the 3 dimensions of burnout have been determined for several professional groups, including physicians (EE 16, DP 8 and PA 17). These stated cut-off scores concern those used by physicians. As we found in the physician-only studies, these were found to be EE 16 (0-16); DP 8 (0-8), and PA 17 (0–30). But most studies are mixed studies of doctors and nurses as shown in Table 2 as the review generally shows mixed scores in those studies. Which in turn can give a somewhat distorted picture in terms of cut-off scores compared to those found among physicians alone. Several types of scales were used to quantify determinants. These were partly self-designed scales for demographic and organizational variables, among other variables. We have made a general overview of the burnout scales used and their cut-offs of the various groups of respondents involved in the respective studies in table 2.

Table 2 : cut-off scores for the MBI-HSS, MBI-GS, UBOS-A and OLBI for human services occupations

MBI-HSS	Target respondents	Cut off	Normative values
Emotional Exhaustion	Physicians and nurses (1)	≥ 26	
			Mn(SD) 23.80 (11.80)
	Mental Health personnel (2)	≥ 21	
Depersonalisation	Physicians and nurses (1)	≥ 9	
			Mn(SD) 7.13 (6.25)
	Mental Health personnel (2)	≥ 8	
Personal Accomplishment	Physicians and nurses (1)	≤ 33	
			Mn(SD) 13.53 (8.15)
	Mental Health personnel (2)	≤ 28	
MBI-GS/UBOS-A			
Emotional Exhaustion	Human service personnel (3)	≥ 2.38	
			Mn(SD) 1.78 (0.99)
Depersonalisation	Human service personnel (3)	≥ 1.60	
			Mn(SD) 1.12 (0.77)
Personal Accomplishment	Human service personnel (3)	≤ 3.70	
			Mn(SD) 4.21 (0.80)
OLBI			

Emotional Exhaustion	Mental Health personnel (4)	≥ 2.25	Mn(SD) 2.15 (0.52)
Depersonalisation	Mental Health personnel (4)	≥ 2.10	Mn(SD) 2.15 (0.52)

Cut-off scores for MBI-HSS (1/Maslach, Jackson and Leiter, 1996; 2/ Maslach and Jackson,1986), MBI-GSI and UBOS-A (3/ Schaufeli and van Dierendonck, 2000) and OLBI (4/Demerouti, Bakker, Nachreiner and Schaufeli, 2001)

Concerning more information about stress factors. We noticed interesting articles with the most prominent article of Estryn-Behar M. [9].

Somville F. et al.[5] stated that the exposure to, and occurrence and perceived risk of, occupational hazards and, more clearly, exposure to COVID-19 (88%) and its occurrence (10%), as well as concerns about these hazards, appear to be high in physicians working in the emergency department. The concerns about each of these outcomes are predictable by the assumed exposure, the occurrence and the perceived risks.

Somville F. et al.[7] reported that emergency physicians are regularly exposed to work-related traumatic events and hectic working conditions. The results of that study showed that the levels of anxiety, depression, somatic complaints and post-traumatic stress reactions are effectively high in emergency physicians. The occurrence of violence is accompanied by psychological problems, perceived fatigue and somatic complaints, but the occurrence of situations that increase the risk of burnout is linked to all outcomes. Estryn-Behar M. et al. [9] explained in his results that they indicate that the intention to leave the profession was quite widespread among French physicians and even more among emergency physicians (17.4% and 21.4% respectively), and that burnout was much more common (42% respectively). .4% and 51.5%). Among the study sample and among emergency physicians, work-family conflict (OR=4.47 and OR=6.14, respectively) and the quality of teamwork (OR=2.21 and OR=5.44, respectively) were linked to burnout in a multivariate analysis. The risk factors were clearly more common among emergency physicians than among other physicians. A severe lack of quality teamwork appears to be linked to a higher risk of intention to leave the profession (OR=3.92 among physicians in the study sample and OR=4.35 among emergency physicians), and burn- out doubled the risk of intention to leave the profession in the multivariate analysis.

Study population and variables

We found in Table 1, which explicitly report the ratio of men and women (Gender column M-F), that there were more male ED physicians than female ED physicians. Except for 1 article after Soltanifar et al.[17] which only included women. The percentage of males in EDs ranged from 0% to 91%, with a higher percentage of males among the emergency physicians compared to other hospital physicians (Table 1). Looking at all the studies together, the age variance was between 20 and 67 years. But of course this varies from study to study. Most physicians were under the age of 45. The majority of the respondents were married or cohabiting and almost half had one or more children. Most studies appeared to include emergency physicians versus physicians of other specialties. Nine studies surveyed a wider population that included other healthcare workers such as nurses and paramedics [9,11,13-15,17,42,43,44]. The mean seniority in emergency care was beneath 15 years [18,23-25,43,44]. As far as stated, approximately 80% of the respondents had a full-time mandate and 20% worked half-time or less. Emergency care providers scored significantly higher for emotional exhaustion in all studies. Likewise, they scored significantly higher for depersonalization (DP) and significantly lower for sense of personal accomplishment (PA) in 8 studies compared to caregivers in intensive care unit and other disciplines and departments [9,12,14,15,26,42,43,44]. We note that the studies by Alqahtani et al. and Nguyen et al. show low burnout scores, in contrast to all other studies in this review [16, 12]. Neither in their methodology nor in their discussion is this clearly explained by the 2 authors why these were so low in their studies. But emergency physicians scored worse on EE and DP but scored better on PA in comparison with other caregivers in the emergency department [15,27]. Concerning the fact that individuals are categorized into four distinct personality types based on their behavior, attitudes, and responses to stress. We noted that the type D among emergency physicians and hospital physician physicians accounted for nearly a third of a recent study. Type D Personality: People with a Type D personality tend to be more anxious, more concerned, and have a more negative view of what they are doing or how they are feeling. They are also more introverted and have a strong tendency to keep their emotions to themselves. This in contrast to the A, B, C types.

Somville F. et al.[6] indicated that Type D personality ranged from 28.5 to 29.1% among emergency physicians and other hospital physicians. In addition, even after adjusting for work-related and organizational factors, emergency physicians with Type D personality were seven times more likely to be at high risk of burnout. As a result, this study provided a new perspective on the links between burnout, stress and Type D personality. Type D personality may represent a personality-related risk factor for burnout among emergency physicians.

Discussion

The current study examined research related to stress and burnout, which was conducted over the last decade among emergency physicians and emergency medicine residents. Concerning basic characteristics of the respondents, not all studies gave an equally clear representation of the basic characteristics of their population. This means that these measures can only approximately be interpreted. This finding may give rise to a bias effect in connection with an extrapolation of the results obtained. The percentage of males in emergency departments ranged from 0% to 91%, with a higher percentage of males among emergency physicians compared to other hospital physicians as shown in table 1. So there is a reasonable spread variation in the gender population in the results of the various studies. This may be due to the fact that it is often mixed groups of emergency care providers that are used in the studies. Considering all the studies together, the age variance was between 20 and 67 years. Which may also be related to the fact that the studies used a population of emergency responders from different disciplines. The vast majority of physicians in the studies were under the age of 45. Which is not surprising given the last 10 years that emergency departments have more and more specific emergency physicians in their staff. The majority of the respondents were married or cohabiting and about half 50% of them had at least 1 child. Most studies appeared to include emergency physicians versus physicians of other specialties. One can argue that in the 9 studies surveyed which a wider population that also included paramedics [9,11,13,14,15,17,42,43,44] can influence the degree of total burnout rate, due to the use of a mixed population of physicians and non-physicians. The mean seniority in emergency care was

beneath 15 years, [18,23,25,42,43,44] is also understandable to us, given that the branch of specific discipline of emergency physicians has only existed on its own for decades. The fact that emergency physicians score worse on EE and DP, but better on PA compared to paramedics and other healthcare providers, can be explained by their specific professional activity in the emergency department. [15,27] The ultimate responsibility for the entire emergency care management, lies in their hands. However, their work autonomy gives them the opportunity to develop better than other care providers in an ED. Already in the older study by Escribà-Agüir, a stronger inverse correlation between self-monitoring and EE was found in specialized emergency care providers [9]. It is true that the contacts of other care providers with patients are more extensive and last longer than those of Emergency physicians. Verbal aggression, threats and violence are directed more often at the emergency physicians than at other care providers. This may explain the lower scores of the EE and DP and the higher score of PA in the emergency physicians [5]. In Emergency physicians several stress factors were identified, both in the quantitative and the qualitative studies on determinants for work stress and burnout. The majority of the studies investigated a relationship between the stress factors present and work characteristics factors [5,9-12,14,19,20,28-35,42,43,44]. Other studies distinguish between classical daily stressors and striking stressors, especially the acutely pronounced stressors and the more chronically occurring stressors [5,9-12,14,20,28,30,32,33-35,37]. The influence of the violent environment in which one has to work, is another consideration [14,32,38,39].

Personal factors such as age, and gender of Emergency physicians were identified in the study as relevant for feeling of burnout. This pattern may also be reflected in the response to stress factors according to age, gender in Emergency physicians. Several studies indicated that the personality structure of the Emergency physicians, including Type D personality, may play a role in the occurrence of burnout [6,22]. Furthermore, environmental factors are put forward as/reported to be an important determinant when defining work stress and/or burnout [5,9-12,14,28,30,40,41,42,43,44].

Generally, the studies included in this review, show that Emergency physicians are strongly influenced by the stress impact of work and burnout. They confirm the individual characteristics as well as the specific nature of Emergency

physicians in their professional activity, stress factors and population. A clearer look at the nature and severity of these stress factors is important for management of the consequences and prevention, both in professional well-being and physical health, as well as in environmental and economic areas. This may lead to a better understanding of the increased absenteeism in the emergency department. And also a better understanding of why emergency physicians permanently leave the emergency department or switch professions [9,26,35,42].

Limitations and strengths

The majority of the studies (33 studies of the 35) had a cross-sectional design The stress factors to which one is exposed in a chronic way give rise to feelings of burnout and thus repeated measurements in study populations provides a better look at the correlation between burnout and work characteristic and organizational a well as other factors. All the studies focused more on the impact of the various stress factors on the various dimensions used to explain the burnout syndrome that occurred as a result of these factors. To a limited extent, personal or environmental interference factors were considered in the interpretation of the data. This review does give the impression that burnout is an event that is influenced by a series of factors from an approach of multiple stress factors and environmental factors. Therefore, an extensive combination of validated surveys is indicated to limit interference of the outcome by dimensions that were not surveyed. Some possible interfering factors should be considered. The absence of effective randomization in some selected studies may affect the generalizability of the results found. Persons with a significant degree of burnout and/or type D have a greater pattern of absence as a result of illness and therefore non-respondents to a survey design and impact study results ad deeper insights of the phenomenon of burnout of a certain professional group at risk such as Emergency physicians. Several authors indicate that with some limitations at an international level, the MBI scores of care providers should be compared in view of the large differences in status in the professional field, their education level, job activity and tasks in the various countries. It is therefore not an obstacle within this overview study to compare these groups with each other. As we have already noted and explained in Table 1 (the different emergency

department professionals in the studies) and in Table 2 (the differences in threshold values of the different emergency department professionals in the studies).

Conclusion

The impact of burnout, both on a psychosocial and physical level, as well as on work characteristics and organizational factors, and finally as well as economically, cannot be ignored. Emergency physicians also have their own specific potential risks to stress factors. The 35 studies show that several aspects of stress factors play a role in relation to burnout. The Emergency physicians score even lower than emergency nurses and other physicians. They score higher on emotional exhaustion and depersonalization and lower for personal accomplishment than other occupational groups. As far as the personal factors are concerned, the influence on whether burnout occurs is an item that should be considered. An important factor remains exposure to work-related traumatic events which can be an important factor in contracting posttraumatic stress disorder. Coaching, psychological support programs as support and prevention of burnout are recommended. In addition, self-control over the life work balance, emergency activity and social support by work environment and service heads are protective determinants against the development of burnout. Job satisfaction and peer support are protective factors likewise. All the above factors provide an impetus for the development of a multi-level approach to work stress management in emergency departments and emergency care policies regarding the quality of professional well-being of Emergency physicians and the quality of their care for the patient. Further research on the multiple factors in work stress and burnout among Emergency physicians, is recommended. This review provides a solid basis for developing a way to manage work stress and prevent burnout in Emergency physicians.

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CHAPTER 3

Burnout, stress and Type D personality amongst hospital/emergency physicians

Somville F, Van der Mieren G, De Cauwer H, Van Bogaert P, Franck E. Burnout, stress and Type D personality amongst hospital/emergency physicians. Int Arch Occup Environ Health. 2022 Mar;95(2):389-398. doi: 10.1007/s00420-021-01766-z.

Abstract

Introduction:

In previous studies, physicians have been identified as a high-risk group for burnout. Although the work environment has received more attention than specific determinants of personality traits, the latter might contribute to burnout.

Study objective:

We aimed to investigate the association of Type D personality, job and organizational determinants with burnout, stress and work engagement as outcome factors among emergency physicians and hospital physicians working in intensive care and surgery departments. We specifically focused on our group of emergency physicians.

Methods:

In this cross-sectional study, self-report questionnaires were distributed via social media using a specific survey link to 531 Belgian hospital physicians working at the Emergency Department, Intensive Care, and Surgery Department between October 21, 2018, and April 11, 2019. The survey instrument included questions about sociodemographic characteristics, job characteristics, organizational factors, job satisfaction, social support by supervisors and colleagues (Leiden Quality of Work Questionnaire for Medical Doctors) and Type D personality (Distress Scale-14) and as outcomes burnout (Oldenburg Burnout Inventory) and work engagement (Utrecht Work Engagement Scale). A multiple regression analysis was used to examine the associations between the determinants and each of the outcomes with emergency physicians as the study population.

Results:

Eligible data were available for 436 questionnaires and involved 212 emergency physicians, 162 other hospital physicians (Intensive Care and Surgery Department) and 62 residents concerning both groups of physicians. Type D personality ranged from 28.5% to 29.1% in emergency physicians and other hospital physicians. Additionally, even after correcting for job-related and organizational factors, emergency physicians with Type D personality were seven

times more likely to have a high risk for burnout.

Conclusion:

As a result, this study offers a new perspective on the associations between burnout, stress and Type D personality. Type D personality might be a personality-related risk factor for burnout among emergency physicians. Therefore, we recommend enhanced prevention measures that take into account this individual factor in the further development of coaching programs. Improving the professional well-being of emergency physicians is necessary, especially in the scope of the recent COVID-19 pandemic, which has put a high demand on acute and emergency care departments.

Introduction

In the last decade, awareness of occupational stress and burnout among physicians has increased. In fact, physician burnout has reached epidemic levels, with studies demonstrating prevalence ranging from 43.9% to near 54%. [1, 2, 3, 4]
In particular, emergency physicians are at risk because of emotional, physical and intellectual challenges. [5] Burnout was defined by Maslach et al. as a psychological syndrome that has three dimensions: emotional exhaustion, depersonalization (disengagement) and reduced personal accomplishment. [6]
In some studies, a clear significant relationship between observed patient outcomes and physician burnout was found. [7]
Several pathogenic work-related factors have been identified in the course of burnout [8], yet personality traits were found to moderate the relationship between work-related factors and burnout [9].
Work stress factors in physicians are often multifactorial. Physicians are at high risk for burnout development. [10]

Emergency physicians are especially prone to work-related traumatic events, hectic stressful working conditions, occupational risks, lack of social support, psychological problems, subjective fatigue, somatic complaints, and conflicts with other physicians. [11]
A wide range of studies have been conducted on work-related and organizational factors and highlighted the working relationship between physicians and nursing staff, ED supervisors, and hospital management. [12, 13].
Although all physicians in the ED are exposed to the same job-related and organizational factors, individual characteristics such as personality traits of the physicians may also play a crucial role in the development of burnout. [14]

This study focused on the impact of individual determinants contributing to the development of burnout. In the current study, these individual determinants were studied by using the limited body of evidence of Type D personality (D stands for Distressed) research method. It is a relatively stable personality trait and consists of a combination of negative affectivity and social inhibition. [15, 16, 17]

Those who experience a high grade of negative affectivity have a tense feeling, loss of personal contact and an uneasy feeling when interacting with other people [10, 18]. This social inhibition contributes to the concept of negative affectivity. [19]

Mols and coworkers indicate that individuals with a Type D personality are more likely to experience their environment as stressful but are less likely to ask for help. [20] Type D personality has been identified as a determining factor for mental health problems, long-lasting stress periods, and burnout. [15]

The correlation between Type D personality and burnout has been validated in European and Canadian general populations, as well as in Dutch anesthesiologists. [10, 17, 20, 21]

However, these studies only investigated personality factors and did not include job-related and organizational factors. Personality traits account for nearly 60% of the variance in burnout. [15, 22, 23] In the current COVID-19 pandemic, the impact of various determinants on mental health is increasing even more among health care workers.

Multiple determinants should be considered when approaching and making considerations to offer support to colleagues in these COVID-19 times. [24, 25, 26, 27]

We aimed to investigate the association between Type D personality and burnout in emergency physicians and compare this personality trait with hospital physicians working in intensive care and surgery departments.

The unique approach of our study is to investigate the influence of type D personality on the job content of ED physicians.

Methods

Study design and sample collection

Procedures and ethical aspects

Study approval from the Ethical Committee of St. Dimpna Hospital, Geel was obtained (EC OG099 nr:709). Confidentiality was guaranteed to all participants. Informed consent was signed by each respondent before data collection.

Data collection

During this cross-sectional study, data were collected using self-report questionnaires distributed to Belgian hospital physicians (ED, IC, surgery). A reminder was sent one month after the initial invitation. To guarantee confidentiality, questionnaires could be returned in a closed envelope or were protected online by a personal code. Of the 531 questionnaires that were sent, eligible data were available for 436 questionnaires (response rate 82.1%; N = 436/531). The survey instrument included questions such as sociodemographic characteristics, job characteristics, organizational factors, job satisfaction, social support by supervisors and colleagues (LQWQ-MD) and Type D personality (DS-14) and outcomes burnout (OLBI) and work engagement (UWES). The departments and physicians surveyed between October 21, 2018, and April 11, 2019, and the respondents were working in fully specialized ER. Hierarchical multiple regression analyses were used to examine the association between the determinants and each of the outcomes.

Measuring instruments

Several instruments that measure feelings of burnout have been developed, but only a few have been validated in physicians. Demerouti introduced the Oldenburg Burnout Inventory (OLBI), which is the modified and validated version of the Maslach Burnout Inventory Human Service Survey (MBI-HSS), which can be applied specifically to physicians. In addition, we used the Utrecht Work Engagement Scale (UWES) to measure engagement, which is the opposite of burnout [28, 29]. Seppälä and Schaufeli described the validity of the work engagement measure. [30, 31]

The questionnaire consisted of validated instruments concerning Type D personality (DS-14), burnout (OLBI) and work engagement (UWES). A fourth validated instrument, the Leiden Quality of Work Questionnaire for physicians (LQWQ-MD), assessed job-related and organizational factors and was added to correct for the influence of these factors. These validated instruments were supplemented with demographical questions and job characteristics.

Type D personality was measured using the DS-14 questionnaire, which assesses negative affectivity and social inhibition. Example items for measuring negative affectivity included statements such as "I often feel unhappy" and "I am often in a bad mood". The score for social inhibition was determined through statements such as "I find it hard to start a conversation" and "I often feel inhibited in social interactions". For both subscales, participants were asked to rate to what degree the statements were true for them on a scale from 0 to 4. Type D personality was diagnosed when scores reached 10 or more on both the negative affectivity scale and the social inhibition scale. In the present study, Cronbach's alpha coefficient was 0.87, indicating good reliability. [15]

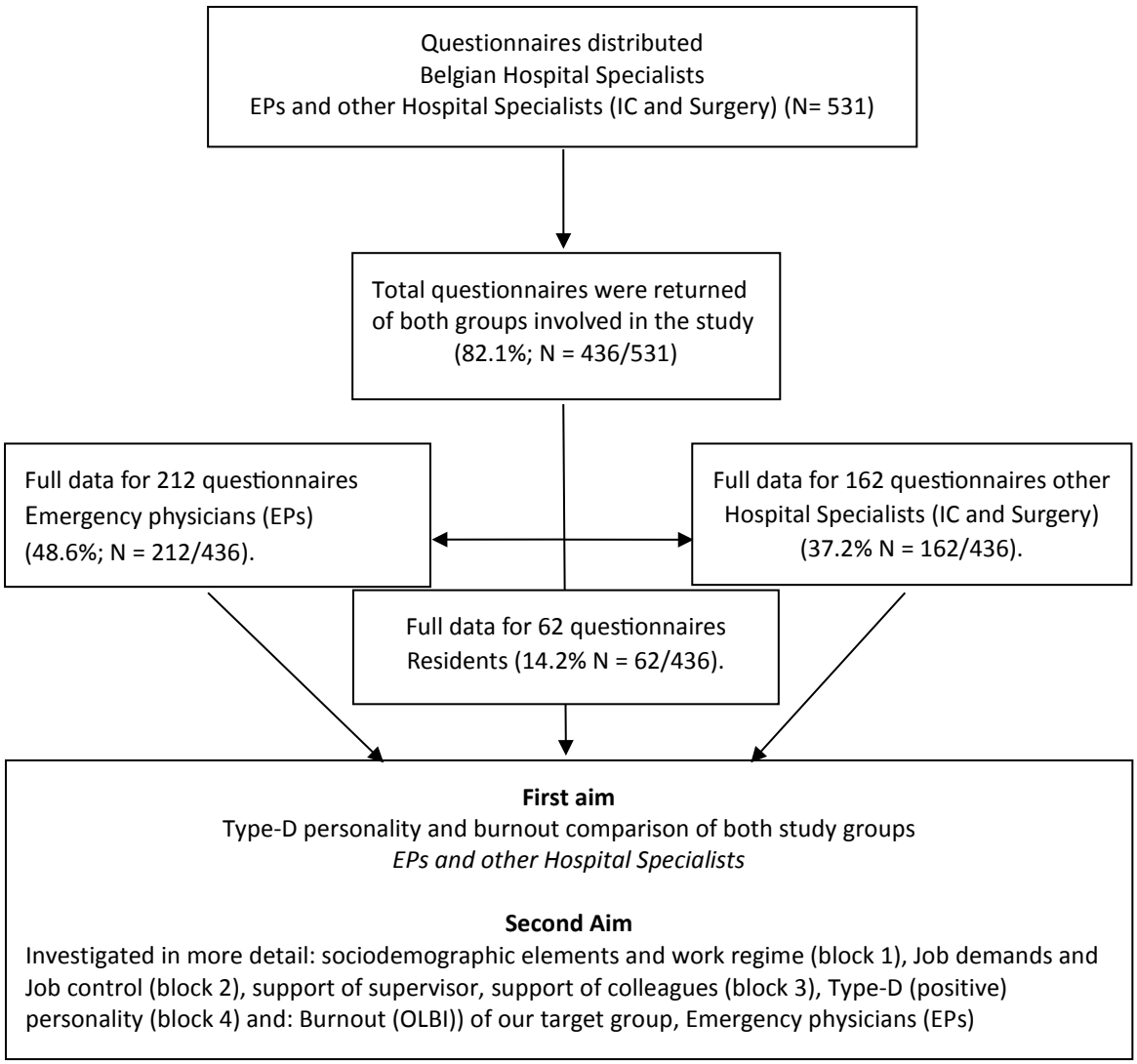
Burnout was evaluated using the OLBI (the Oldenburg Burnout Inventory). [30] The instrument consists of 16 items that measure the frequency of the main burnout symptoms on a 4-point scale across two dimensions: emotional exhaustion and disengagement. For the emotional exhaustion dimension, example statements included "During my work, I increasingly feel emotionally exhausted". For the disengagement dimension, example statements included “lately I tend to think less at work and do my job almost mechanically”. Dutch cutoff values specified for physicians were used because Belgian cutoff values were not available. Using these cutoff scores, burnout was indicated by a score ≥2.25 for exhaustion and a score ≥2.10 for disengagement. [32] Participants responded by choosing one of four responses from “strongly agree” to “strongly disagree”. For calculating mean scores for each of the two components, items were reversed when necessary, so that a higher score indicated more exhaustion or disengagement. In the present study, the Cronbach’s alpha coefficient (α) was 0.83 for exhaustion and (α) 0.87 for disengagement. The binary variable indicating whether the participant was suffering from problematic burnout was created using the cutoff scores on the OLBI, which correspond to those on the MBI-HSS found to predict physician-diagnosed burnout.

Work engagement was assessed using the Utrecht Work Engagement Scale. [31] The UWES-9 work engagement score is the translated and validated version of the UWES. [33], which can be applied specifically to physicians. The instrument consists of 9 items that measure the frequency of engagement. Cronbach's alpha coefficient for this scale was $\alpha = 0.92$. The items of the UWES are grouped into three subscales: vigor ($\alpha = 0.86$; 3 items) (e.g., 'At my work, I feel that I am bursting with energy'); dedication ($\alpha = 0.86$; 3 items) (e.g., 'I am enthusiastic about my job'); and absorption ($\alpha = 0.75$; 3 items) (e.g., 'I am immersed in my work'). All items were scored on a 7-point rating scale, ranging from 0 (never) to 6 (daily). As a result of the moderate intercorrelations of the subscales, only the total score was used in the present study. High scores are indicative of work engagement.

The Leiden Quality of Work Questionnaire for physicians (LQWQ-MD) instrument was used to assess job-related and organizational factors. [12] For the purpose of this study and in accordance with the guidelines of the LQWQ-MD [13], the total score for the subscales Work and Time Demands and Physical Demands was used to measure job demands ($\alpha = 0.79$; 9 items); the total score for the subscales Skill Discretion and Decision Authority was used as a measure of job control ($\alpha = 0.78$; 6 items). Social support by the supervisor and colleagues was measured using two subscales of the validated LQWQ-MD[13]. Social support supervisor ($\alpha = 0.93$; 4 items) measures perceived social support by the supervisor. Social support colleagues ($\alpha = 0.89$; 4 items) measured perceived instrumental and emotional support by colleagues. Job satisfaction was measured using the job satisfaction subscale ($\alpha = 0.87$; 3 items) of the validated LQWQ-MD [13]. Turnover intention was measured by the turnover subscale ($\alpha = 0.88$; 3 items) of the validated LQWQ-MD [9]. The outcome work-home interference ($\alpha = 0.77$; 4 items) was measured by a subscale of the LQWQ-MD [13]

SPSS version 27.0 was used to analyze the data. Only parametric statistics were applied. One-way ANOVA and chi-square tests were selected for between-group comparisons of Type D personality, stress and burnout within the hospital physicians.

Figure 1: Flow diagram of the strategy used to collect survey data and develop the strategy for the study



In addition, Pearson's correlation was selected to calculate the relation between the total Type D score and the burnout dimensions. Furthermore, we conducted a multiple logistic regression analysis with age (per 1 year), gender (male 1 >< female 0), work regime (full time 1 >< part time 0), job demands(1 point per increase), job control(1 point per increase), support supervisor(1 point per increase), support colleagues(1 point per increase), Type D personality(positive 1 versus negative 0) as explanatory variables and risk of burnout among emergency physicians (yes 1 >< no 0) as dependent variables. A statistical significance level of P <.05 and 95% confidence interval was set.

Results

Full data were available for 436 participants (response rate 82.1%; N = 436/531). Women represented 56.2% of the total study sample, and the mean age of respondents was 37 years. The majority were emergency physicians (48.8%), with a mean seniority year working in the emergency department of 9.9 years and 90.9% working alternating shifts of 12 hours (full time). (Table 1)

Table 1: Personal and job-related characteristics.

Characteristics		**All** N=436 %/*Years*	**Other** hospital specialists N = 162 %/Years	EPs N=212 %/Years
Women		56.2	56.0	54.2
Age		*37.4*	40.5	*38.9*
Marital Status				
	Married/Cohabitating	65.0	73.5	72.6
	Single/Living alone	35.0	26.5	27.4
Seniority		*8.0*	*8.1*	*9.9*
Specialty area:				
	Hospital Specialist (IC/Surgery)	37.2		
	Emergency Physicians (Eps)	48.8		
	Master Medicine	14.0		
Function				
	Emergency Fellow			63.2
	Emergency Resident			36.8
Work-regime 12 h				
	Alternating shifts(full time)	72.3	80.1	90.9
	Day or Night shifts only(part time)	27.2	19.9	9.1

Within the total study sample, the average prevalence of burnout was 58.0% based on the cutoff values [32], and the average UWES score was 3.87 (SD 1,13). The exhaustion, disengagement and burnout rates of the emergency physicians (N=212) were 75.7% (mean score 2.60 SD 0.43), 67.4% (mean score 2.29 SD .47) and 61.6% (mean score 2.45 SD 0.49), respectively, as well as a mean UWES score of 3.91 (SD 1.06) (Table 2).

Table 2: Prevalence of Burnout/UWES (Work engagement) Hospital Specialists and Emergency Physicians.

Burnout/Work Engagement	**Total sample N = 436**	**Other Hospital Specialists N = 162**	**Emergency Physicians N = 212**
OLBI	% (SD)	% (SD)	% (SD)
Exhaustion	76.0 (0.45)	67.2 (0.45)	75.7 (0.43)
Disengagement	66.0 (0.47)	72.5 (0.47)	67.4 (0.47)
Burnout score	**58.0 (0.49)**	**58.0 (0.50)**	**61.6 (0.49)**
UWES	mean (SD)	mean (SD)	mean (SD)
Work Engagement score	**3.90 (1.06)**	**3.87 (1.13)**	**3.91 (1.06)**

In this study sample, the average prevalence of Type D personality among emergency physicians was 28.5% (Table 3).

Table 3: Prevalence of Type D and Burnout/UWES (Work engagement) among Other Hospital physicians and Emergency physicians.

Type D personality	**Burnout/UWES**	**Other Hospital Specialists N = 162 %**	**Emergency Physicians N = 212 %**
Type D positive	**Type D (SD)**	**29.1 (0.47)**	**28.5 (0.45)**
Type D negative		70.9	71.5
Type D positive	**with Burnout (SD)**	**75.9 (0.49)**	**86.7 (0.48)**
Type D negative	with Burnout	27.0	31.8
Type D positive	**with UWES (SD)**	**3.40 (1.06)**	**3.29 (1.11)**
Type D negative	with UWES	4.46	4.57

Regarding the relationship between Type D personality and burnout in emergency physicians, a strong positive correlation was observed (r =0.41, P<0.001). Job demands and burnout also showed a positive correlation (r =0.31, P<0.001), job control (r = -0.32, P<0.001), and social support of colleagues (r = -0.20, P<0.001). The UWES score had a strong negative correlation with Type D personality.

In addition to the vulnerability of type D personality, occupational factors such as job-related and organizational factors influenced the risk of burnout. As shown in Table 4, we found a strong positive correlation between Type D personality, job demands and work home interference. Job control, support of colleagues and job satisfaction had a strong negative correlation with Type D personality. (Table 4)

Table 4: Correlations measured in emergency physicians.

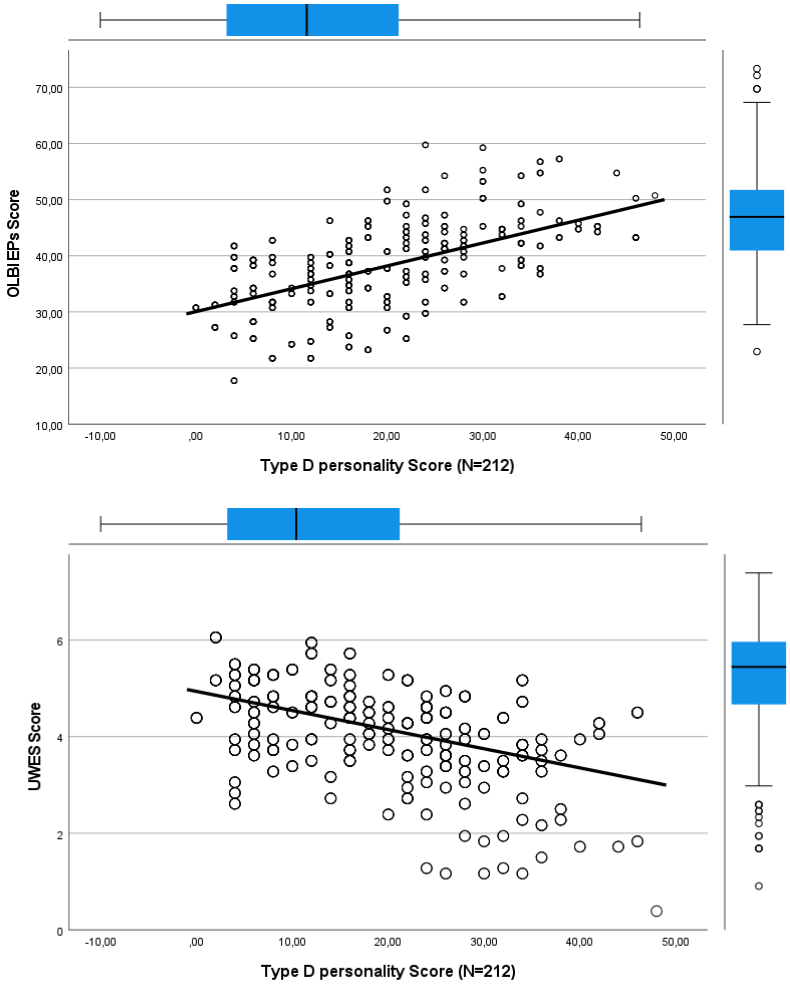
Measure	**α**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Age	-	-											
Seniority	-	,876**	-										
Job demands	0,79	,160*	,164*	-									
Job control	0,78	-0,141	-0,139	-,394**	-								
Support supervisor	0,93	-,202**	-,252**	-0,129	,389**	-							
Support colleagues	0,89	-0,126	-0,117	-0,089	,200**	,463**	-						
Job satisfaction	0,87	-0,098	-0,123	-,441**	,585**	,423**	,386**	-					
Turnover	0,88	-0,116	-0,058	,315**	-,450**	-,398**	-,259**	-,618**	-				
Work-home interference	0,77	-0,025	0,032	,541**	-,312**	-0,112	-0,105	-,397**	,349**	-			
UWES	0,91	-,177*	-,155*	-,231**	,443**	,400**	,330**	,587**	-,274**	-,216**	-		
OLBI Burnout	0,91	0,068	0,059	,314**	-,320**	-0,115	-,201**	-,333**	,228**	,264**	-,434**	-	
Type D personality	0,84	0,008	0,035	,216**	-,176*	-0,114	-,178*	-,264**	0,107	,259**	-,440**	,413**	-

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Abbreviations: **α =** Cronbach 's alpha coefficient

Figure 2. Correlation Burnout (OLBI) and Type D personality, UWES and Type D personality.



Therefore, a hierarchical logistic regression analysis was conducted (Table 5) to correct these factors.

In the first step we placed the sociodemographic elements as there are age, gender and workregime.

We added job demands and job control in step two.

We then added support of the supervisor and support of the colleagues in step 3.

Finally, we added the Type D positive Eps.

The relation to the risk of burnout of all the job-related and organizational predictors were calculated. Hence, we included these previously mentioned factors in the linear regression analysis in addition to the variable ones comparing emergency physicians with Type D personality to the remainder of emergency physicians of the study group. The regression analysis resulted in Type D, job demands and job control as remaining significant predictors.

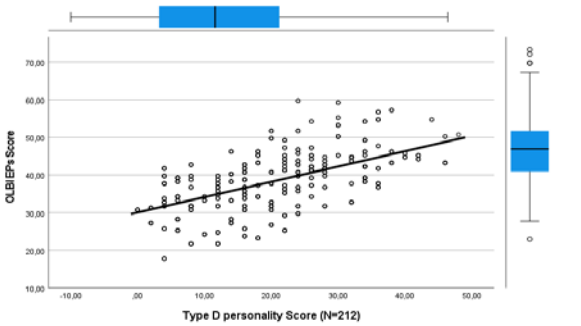
Most importantly, emergency physicians with Type D were seven times more likely to have a risk of burnout than physicians with non-Type D personalities (OR = 7.82; CI = 3.27 – 18.68). In addition, this aspect explained 23% of the variance in the risk of burnout.

Table 5. Odds ratios for burnout among emergency physicians (fully adjusted logistic regression, N=212)"

	OR	**CI**	**P**
Age (per 1 year)	0.63	0.58 – 0.70	0.75
Gender (male vs. female)	0.90	0.66 - 1.23	0.90
Work regime (full time vs. part time)	1.00	0.70 - 1.45	0.88
Job demand (per 1 point increase)	*3.29*	*1.76 - 6.16*	*0.01*
Job control (per 1 point increase)	*0.19*	*0.08 - 0.47*	*0.01*
Support supervisor (per 1 point increase)	0.67	0.36 - 1.27	0.52
Support colleagues (per 1 point increase)	0.56	0.30 - 1.02	0.21
Type D personality (positive vs. negative)	*7.82*	*3.27 - 18.68*	*0.00*

OR = Odds Ratio, CI = 95% confidence interval for OR, p = p-value

Figure 3. Regression OLBI and Type D Personality, OLBI and Job Demands, OLBI and Job Control.


OLBI EPs Score
70,00
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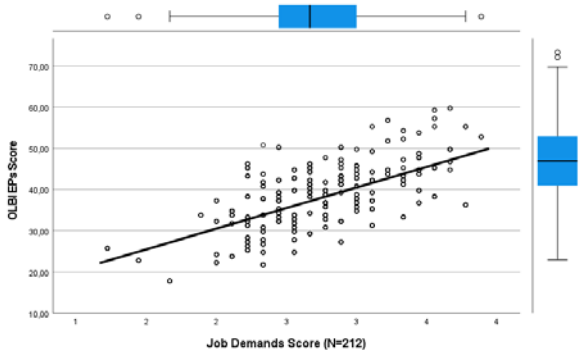
50,00
Type D personality Score (N=212)


OLBI EPs Score
70,00
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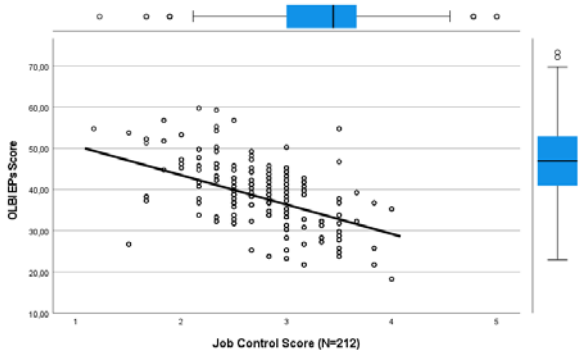
4
Job Demands Score (N=212)


OLBI EPs Score
70,00
60,00
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40,00
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1
2
3
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5
Job Control Score (N=212)

Discussion

Emergency physicians showed moderate to high levels of burnout. The study findings indicated difficult work conditions, including significant psychological demands, lack of resources, and poor support. Nevertheless, physicians reported high job satisfaction. [33] These findings suggest that not all physicians exposed to similar job-related and organizational determinants will develop burnout. Furthermore, individual determinants may play an essential role in the development of burnout. Physicians with a Type D personality are seven times more prone to burnout than physicians with another personality type. Type D personality alone explained 22.7% of the variance in the risk of developing burnout. An average of 28.3% to 29.1% of the emergency physicians and hospital specialists in our study showed Type D personality. In contrast, only 21% of the Belgian/Dutch population has been reported to have a Type D personality [15]. Additionally, the burnout rate was highest (61.6%) in emergency physicians and similar to observations in previous studies. [35, 36] The difference in prevalence in hospital physicians versus emergency physicians may be due to other additional determinants not assessed in this study. Personality types might also influence this variety, since an association was detected between the burnout dimensions and Type D personality. [16, 17, 37] As personality is a rather stable trait, it can be argued that Type D personality is risk factor for developing burnout. [15] The stability of Type D personality does not mean that a person's level of anxiety and risk of burnout may not be adjustable. [16] Persons with a Type D personality reported poor use of coping strategies, even at lower and average levels of stress, which likely explains their higher levels of perceived stress. [17, 18] In primary and secondary prevention, adjustment of both social inhibition and negative affectivity is preferred. Consequently, prevention could involve training coping strategies and using positive psychology. Supporting persons or groups can be beneficial in reducing feelings of burnout and tension, especially in emergency physicians with Type D personality. [37]

In recent years, emergency physicians have faced additional stress factors, e.g., global warming-associated natural disasters and terror threats, and the recent COVID-19 pandemic; therefore, preventive measures against burnout and sick leave will be crucial in maintaining ED operations.

Limitations

The number of emergency physicians with Type D personality among this group of physicians is relatively small. Additionally, the prevalence of burnout was calculated using cutoff scores based on Dutch study samples because of the lack of Belgian full scores. [38] Larger study samples of emergency physicians to confirm and expand our study results are warranted. Self-report questionnaires have limitations. However, the survey did provide noteworthy findings and led to the development of further hypotheses about how Type D personality physicians respond to their work in the ED. We would certainly like to emphasize the generalizability of the conclusions and the fact that the design does not support full causal inferences. Supplementary approaches will be required to entirely test these hypotheses. [39]

Conclusion

We recommend enhanced preventive measures and further coaching programs related to Type D personality to improve the professional well-being of emergency physicians, especially when emergency departments are overwhelmed due to the COVID-19 pandemic and are still facing terror threats. Consequently, we advise the use of preventive measures for emergency physicians who are vulnerable to burnout. A program that includes training coping strategies, aspects of positive psychology and a support group or person might increase individuals' resilience against a higher risk of burnout.

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CHAPTER 4

Work stress related problems in physicians in COVID-19 Times

Somville F, Vanspringel G, De Cauwer H, Franck E, Van Bogaert P. Work stress-related problems in physicians in the time of COVID-19. Int J Occup Med Environ Health. 2021 Jun 28;34(3):373-383. doi: 10.13075/ijomeh.1896.01674.

Abstract

Objectives:

Medical healthcare workers in the emergency department are exposed to a wide range of physical and psychosocial risks or hazards in the workplace.
The aim of this study was to investigate the impact of (a) Exposure to, the occurrence and perceived risk of the occupational hazards among emergency physicians and hospital physicians in COVID times and (b) The determinants of worry about occupational hazards among emergency physicians and hospital physicians in COVID times.

Material and methods:

Based on a review on occupational hazards in emergency physicians, a questionnaire already used and validated in another study in 2016 was constructed.
The questionnaire consisted of socio-demographic and questions on the exposure to, the occurrence of, risk perception of and worry about the following occupational hazards: infectious disease; COVID-19; physical hazards; violence at work; stressful work situations that can cause burnout. A total of 497 questionnaires were distributed to Belgian emergency and hospital physicians from April 20th till May 26th, 2020.

Results:

We received 319/497 responses of which 196 were eligible for statistical analysis. Of the respondents, 32% stated to be confronted with violence and 54 % to suffer from health problems related to their work.
The exposure to, the occurrence of and risk perception of occupational hazards and more specifically the exposure to Covid-19 (88%) and occurrence (10%), also the worry concerning these hazards, appear to be high in physicians working in the Emergency Department. Worry about each of these outcomes is predicted by supposed exposure, occurrence, and risk perception.

Conclusions:

Exposure to, the occurrence of and perceived risk of physical hazards, violence,

and burnout is high in physicians in COVID-19 times. Emergency and hospital physicians in Belgium worry the most about the impact of violence, burnout and COVID-19.

Introduction

In November 2019, a novel coronavirus disease (COVID-19) emerged in Wuhan, the capital city of Hubei Province of China [1]. The disease spread within a few months throughout China and elsewhere, becoming a global health emergency [2]. Early March, transmission within Belgium was confirmed and the pandemic rapidly evolved with its peak of infections in Belgium around the beginning of April 2020 resulting in 1661 new infections in one day. Because of the nature of their work, medical healthcare workers are exposed to a wide range of physical and psychosocial risks or hazards in the workplace [3]. Moreover, since medical and nursing healthcare staff are on the frontline of any epidemic, research on healthcare workers' mental wellbeing during earlier viral outbreaks such as the 2003 SARS outbreak indicates that there is a significant impact on medical staff members' mental health [4]. Although all healthcare workers are exposed to some risk of infection during a respiratory illness outbreak, some specialties are likely to be at higher risk than others. Emergency physicians and critical care staff are likely to be at higher risk than those in unrelated or non-acute specialties [5]. The combination of working completely dressed up for preventing infection, working in high-risk positions, the continuous increasing number of confirmed and suspected cases, depletion of personal protection equipment, overwhelming workload, having contact with infected people as well as the fact that healthcare workers risk their own lives in the line of duty may all contribute to the mental strain resulting in huge stress reactions with possible short and longer term psychological consequences [6, 7]. Also, emergency healthcare staff members also reported occasional exposures to blood borne pathogens [8] hepatitis B, hepatitis C, hepatitis non-A non-B, HIV [9], Mycobacterium tuberculosis, latex allergy, nitrous oxide and COVID-19, but also verbal aggression and physical violence during the COVID-19 outbreak [10, 8, 9,11] and psychological symptoms related to work stressfully situations [12, 13]. During the SARS 2003 outbreak, one in five cases were healthcare staff [14] and recent data from Italy indicated that almost 20% of healthcare workers were infected with COVID-19 [15].
Also, there is evidence that physical factors are one of the major sources of worry among emergency and hospital physicians especially during epidemic outbreaks, leading to some form of emotional turmoil such as burnout or

depression [16]. Job related stress is moreover a well-defined problem in health care workers [17, 18, 19, 20] and especially emergency care professionals, who are not only confronted with a constantly varying, hectic and irregular work environment but in addition with traumatic incidents with injured persons and choices about life and death [21].

Consequently, the aim of this study was to investigate the impact of (a) Exposure to, the occurrence and perceived risk of the occupational hazards among emergency physicians and hospital physicians in COVID times and (b) The determinants of worry about occupational hazards among emergency physicians and hospital physicians in COVID times.

We hypothesize that working on the frontline during the COVID-19 pandemic gets more worrying and severe mental sequels in relation to the exposure, occurrence, perceived risk to infectious diseases among emergency physicians and hospital physicians. Furthermore, we hypothesize a positive relationship between the determinants of worry about infectious diseases, violence, burnout and COVID-19 and these occupational hazards.

Methods

Ethics

Ethical approval from the local Bioethics Committee of AZ St. Dimpna Geel (EC number: OG 099; Bioethical number 709 conform Helsinki Declaration as revised in 2013) for this study was obtained. Confidentiality was guaranteed to all participants. Informed consent was signed by each respondent before data collection.

Study Data and Participants

Data was obtained from emergency and hospital physicians using a questionnaire, based on a review of occupational hazards in physicians [10,21]. Study participants were recruited via social media (from April 20th till May 26th 2020). The questionnaire was distributed via social media using a specific survey link to the participants (April and May 2020) to 497 physicians in 8 weeks of the lockdown, which was already installed on March 13th in Belgium. Of these 319 signed the informed consent form and returned the questionnaire, which resulted in 196 eligible questionnaires.

Survey configuration

The survey consisted of questions related to demographic (age, gender) and professional characteristics (seniority, occupation) as well as questions on the exposure, the occurrence, risk perception of, and worry about occupational hazards [10,21].
Concerning the exposure to, the occurrence of, risk perception of, and worry about *hazards* were explored *for the following 4 categories*: a) infectious disease (bloodborne pathogens; hepatitis B; hepatitis C; hepatitis non-A / non-B; COVID-19; human immunodeficiency virus (HIV); Mycobacterium tuberculosis); b) other physical hazards (latex allergy; radiation exposure; nitrous oxide); c) violence at work (verbal and non-verbal); d) burnout (type UBOS) due to work-related stress factors.

For each of these hazards ‘clusters and hazards’ items the following questions were asked:

a) *Exposure*: Have you ever been, in your function as a physician, exposed to one of the following infections/ work-related problems? Yes, No scale (1-0);
b) *Occurrence*: Have you ever, in your function as a physician, experienced one of the following infections/ work-related problems? Yes, No scale (1-0);
c) *Risk perception*: To what extent do you estimate the risk of contracting (getting) one of the following infections/ work-related problems? 10-point Likert scale, ranging from 1 = no risk to 10 = extremely high risk;
d) *Worry*: To what extent do you worry about contracting (getting) one of the following infections/work-related problems? 5-point Likert scale, ranging from 1 = never, 2 rarely, 3 sometimes, 4 most of the time, or 5 = almost always.

Data Statistical Analysis

The statistical software package for Windows, SPSS 26.0, was used to analyze the data. *Descriptive statistics* (means, standard deviations, percentages) were computed.
Pearson correlations were calculated between all possible predictors and outcomes.
Hierarchical regression analyses were performed to estimate the strength of the association between the predictors' demographic characteristics (block 1); exposure and occurrence to physical (infectious) hazards, COVID-19, violence, work-related stress factors that can cause burnout symptoms/occurrence of burnout symptoms (block 2) and risk perception due to these hazards(block 3) on the one hand and the outcome variables worry about physical (infectious) hazards, COVID-19, violence, burnout symptoms due to work-related stress factors on the other hand.

Results

Physicians' characteristics

More than half of emergency and hospital physicians were male (54 %) and 51% of the respondents were under forty. Forty-two percent of the physicians were emergency physicians. The average number of years respondents worked in the emergency department was 7 years (SD 6.8). Eighty-five percent of them worked full-time regimes in the hospital and 66% worked in a rotating shift work schedule.

Table 1. Exposure to, occurrence of, risk perception of, worry about occupational hazards in Emergency and Hospital Physicians (n = 196)

	Exposure 1-0 Yes n(***%***)	**Occurrence** 1-0 Yes n(**%**)	**Risk** 1-10 Mean(***SD***)	**Worry** 1-5 Mean(***SD***)
1. Infectious disease (physical hazards)				
blood borne pathogens	98(**50**)	5(**3**)	3.58(**2.56**)	1.99**(1.16)**
hepatitis B	138(**70)**	5(**3**)	3.08(**2.50**)	1.76**(1.09)**
hepatitis C	131(**67**)	3(**2**)	3.52**(2.27)**	2.02**(1.13)**
hepatitis non A - non B	89(**45**)	3(**2**)	3.31**(2.35)**	1.92**(1.16)**
COVID - 19	172(**88**)	20(**10**)	6,08(**2,50**)	3,17(**1,24**)
human immune deficiency virus (HIV)	142(**73**)	4(**2**)	3.21**(2.36)**	2.17**(1.22)**
mycobacterium tuberculosis	140(**72**)	11(**6**)	3.67**(2.38)**	2.19**(1.20)**
2. Non-Infectious (physical hazards)				
latex allergy	79(**41**)	11(**6**)	3.20(**2.69**)	1.72(**1.08**)
radiation	106(**54**)	25(**13**)	3.70**(2.79)**	2.06**(1.25)**
nitrous oxide inhalation	81(**42**)	22(**11**)	3.68**(2.57)**	1.92**(1.21)**
3. violence	126(**65**)	63(**32**)	5.73**(2.94)**	2.59**(1.35)**
4. burnout (due to work-related stress factors)	80(**41**)	47(**24**)	5.55**(2.63)**	2.80**(1.23)**

Exposure: Yes = I have been exposed to the hazard. (Answer: Yes/no=1-0);**Occurrence:** Yes = I have personally had experienced the hazard. (Answer: Yes/no=1-0);**Risk perception:** Likert scale 1-10. (Answer: 1 = no risk to 10 = extremely high risk);**Worry:** Likert scale 1-5. (Answer: 1 = never, 2 = rarely, 3 = sometimes, 4 = most of the time, 5 = almost always);**SD** = Standard Deviation.

Table 1 displays the exposure to, the occurrence of, risk perception of and worry about: 1. physical (infectious disease) hazards including COVID -19 (1), physical (non-infectious) hazards (2), violence (3) and burnout (4) in emergency physicians and hospital physicians (n=196). Two-third of the respondents stated to be exposed to infectious diseases, four-fifths reported being exposed to COVID-19, almost half to non-infectious diseases, sixty-five percent to violence, and 41% to situations that can cause burnout. The reported rate of occurrence of infectious diseases (bloodborne pathogens, hepatitis B, hepatitis C, hepatitis non-A / non-B, HIV) was low compared to the rate of occurrence of other physical hazards (mycobacterium tuberculosis, latex allergy, radiation, nitrous oxide, COVID-19). About one-third of the respondents reported the occurrence of violence and a quarter reported the occurrence of burnout symptoms. The risk for physical (infectious) hazards was seen as much lower than the risk to be confronted with violence or the risk to get a burnout because of stressful work situations. But the risk of getting COVID-19 was seven to ten. A similar trend was seen for the worry about all occupational hazards, especially concerning COVID-19.

Table 2 displays the correlations between predictors and outcomes in our study concerning the Age, Emergency Physician, Exposure Infectious disease, Exposure COVID-19, Exposure Violence, Exposure Burnout, Occurrence Infectious disease, Occurrence COVID-19, Occurrence Violence, Occurrence Burnout, Risk Infectious disease, Risk Covid-19, Risk Violence, Risk Burnout, Worry Infectious disease, Worry COVID-19, Worry Violence, Worry Burnout. Which have been reported by the emergency and hospital physicians. (n=196) We observed strong correlations between perceived risk violence, burnout, and COVID-19 and worry about violence, burnout, and specifically COVID-19.

Table 2. Pearson correlations for Age, Emergency Physician, Exposure Infectious disease, Exposure COVID-19, Exposure Violence, Exposure Burnout, Occurrence Infectious disease, Occurrence COVID-19, Occurrence Violence, Occurrence Burnout, Risk Infectious disease, Risk COVID-19, Risk Violence, Risk Burnout, Worry Infectious disease, Worry COVID-19, Worry Violence, Worry Burnout. (Emergency and hospital physicians n=196)

	Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Age	-																	
2	Emergency Physician	**-,245****	-																
3	Exposure Infectious disease	**,167***	**,149***	-															
4	Exposure COVID-19	-0,040	-0,066	**,487****	-														
5	Exposure Violence	**,274****	**,247****	**,474****	**,228****	-													
6	Exposure Burnout	**,168***	**0,115**	**,344****	**,176***	**,334****	-												
7	Occurrence Infectious disease	**,200****	**-,151***	-0,031	0,068	0,034	0,005	-											
8	Occurrence COVID-19	0,040	**-,174***	**-,150***	0,124	0,003	0,062	**,374****	-										
9	Occurrence Violence	**,174***	0,071	**,146***	0,117	**,465****	**,226****	**,210****	**,272****	-									
10	Occurrence Burnout	**,211****	0,085	0,114	0,020	**,191****	**,627****	0,106	**,205****	**,303****	-								
11	Risk Infectious disease	**,271****	0,047	**,221****	0,054	**,213****	0,037	**,176***	0,036	**,176***	0,129	-							
12	Risk COVID-19	-0,120	**,304****	0,075	0,065	0,073	0,061	-0,025	**,147***	0,134	0,118	**,223****	-						
13	Risk Violence	-0,115	**,422****	**,183***	-0,011	**,425****	**,195****	-0,031	-0,074	**,411****	0,141	**,320****	**,273****	-					
14	Risk Burnout	0,000	**,199****	0,042	-0,012	**,158***	**,313****	0,053	0,007	**,189****	**,458****	**,350****	**,278****	**,425****	-				
15	Worry Infectious disease	**,203****	0,062	**,196****	-0,002	**,197****	0,044	**,196****	0,008	**,259****	0,112	**,667****	**0,129**	**,282****	**,290****	-			
16	Worry COVID-19	-0,009	0,037	0,040	0,037	**,155***	0,093	0,020	0,078	**,224****	**,159***	**,222****	**,475****	**,253****	**,302****	**,383****	-		
17	Worry Violence	0,081	**,287****	**,215****	0,062	**,388****	0,129	0,076	-0,062	**,295****	0,128	**,450****	**,225****	**,700****	**,417****	**,563****	**,418****	-	
18	Worry Burnout	-0,027	0,138	**,177***	0,090	**,163***	,213**	0,129	0,027	**,157***	**,271****	**,374****	**,291****	**,337****	**,664****	**,476****	**,382****	**,568****	-
	M	*41,82*	*0,42*	***0,63***	*0,88*	***0,65***	*0,41*	*0,03*	*0,10*	***0,32***	***0,24***	***3,40***	***6,68***	***5,73***	***5,55***	***2,01***	***3,17***	***2,59***	*2,80*
	SD	*12,03*	*0,49*	***0,37***	*0,33*	***0,48***	*0,49*	*0,10*	*0,30*	***0,47***	***0,43***	***2,04***	***2,50***	***2,93***	***2,63***	***1,01***	***1,23***	***1,35***	*1,23*

Regression analyses

The results of the hierarchical regression analyses are reported in Table 3.

A. Worry about physical (infectious diseases) hazards: The regression model including the personal characteristics age, gender, and occupation (Block 1) explained 8% of the variance in worry about physical hazards. Exposure to and occurrence of (Block 2) physical hazards explained an additional 5% of the variance. Risk perception (Block 3) explained an extra 33% of the variance. All predictors were significantly related to the outcome. The final model explained 46% (adjusted 44%) of the variance in worry about physical hazards.

B. Worry violence: The personal characteristics age, gender, and occupation (Block 1) explained 11% in the worry about violence. Exposure to and occurrence of (Block 2) work-related violence explained 10% of the variance. Risk perception (Block 3) explained an extra 31% of the variance in worry about violence. All predictors were significantly related to the outcome The final model explained 52% (adjusted 51%) of the variance in worry about violence.

C. Worry about burnout: The personal characteristics age, gender, and occupation (Block 1) explained 2% of the variance in worry about burnout. Exposure to and occurrence of burnout (Block2) explained an additional 7% of the variance. Both burnout predictors were significantly related to the outcome. Risk perception (Block 3) explained an extra 35% of the variance in worry about burnout. This predictor was significantly related to the outcome The final model explained 44% (adjusted 43%) of the variance in the worry about burnout.

D. Worry about COVID-19: The personal characteristics age, gender, and occupation (Block 1) explained 2% of the variance in worry about Covid-19. Exposure to and occurrence of burnout (Block 2) explained an additional 8% of the variance. Both COVID-19 predictors were not significantly related to the outcome. Risk perception (Block 3) explained an extra 23% of the variance in worry about COVID-19. This predictor was significantly related to the outcome. The final model explained 24% (adjusted 22%) of the variance in the worry about COVID-19.

Table 3. Summary of hierarchical regression analysis.

Procedure	**Worry Physical *Infectious Diseases* Hazards**	**Worry Violence**	**Worry about Burnout (due to work-related stress factors)**	**Worry COVID-19**
	ΔR^2 *β*	ΔR^2 *β*	ΔR^2 *β*	ΔR^2 *β*
Block 1: Demographics	**0.08*** **	**0.11*** **	**0.02**	**0.02**
Age	0.00	0.19***	-0.11	0.05
Gender	0.05	-0.09*	-0.33	-0.04
Emergency Physician	0.04	0.02	-0.01	-0.11
Block 2: Exposure/ Occurrence	**0.05*** **	**0.10*** **	**0.07** ***	**0.08**
Exposure to Physical Hazards	0.05	0.07	-0.46	-0.01
Occurrence of Physical Hazards	0.09*	0.05	0.63	-0.02
Block 3: Risk Perception	**0.33*** **	**0.31*** **	**0.35*** **	**0.23*** **
Risk perception Physical Hazards	0.63***	0.71 ***	0.68***	0.52***
	R^2 0.46 *Adj.* R^2 **0.44*** **	R^2 0.52 *Adj.* R^2 **0.51*** **	R^2 0.44 *Adj.* R^2 **0.43*** **	R^2 0.24 *Adj.* R^2 **0.22*** **
	model	*model*	*model*	*model*

Abbreviations: ΔR^2 = change in R2 values from one model to another, R^2 model= R^2 values in one model, Adj R^2 model= adjusted R2 values in one model ,β= beta resulting standardized regression coefficients, * Correlation is significant at the 0.05 level, ** Correlation is significant at the 0.01 level,*** Correlation is significant at the 0.001 level

Discussion

The purpose of this study was to examine (a) the exposure to, the occurrence of, risk perception of and worry about occupational hazards (physical hazards, violence and work-related stressors that can cause burnout in emergency and hospital physicians as well as (b) the impact of perceived exposure, occurrence and risk perception on worry about these hazards during the COVID-19 outbreak in Belgium.

The perceived exposure rate to infectious diseases ranges from 45 % to 73 %, which is similar to other studies that showed however more variance in exposure rates from 31 % to 80% [1,2, 5, 10]. In our study the perceived exposure rate to COVID-19 is even higher (88%).

Earlier studies stated an occurrence of infectious diseases ranging from 1% to 3% which is comparable to our findings concerning the occurrence of bloodborne pathogens, hepatitis B, hepatitis C, hepatitis non-A / non-B, and HIV (2% to 3%) and Mycobacterium tuberculosis (6 %) but is in contrast to our findings of the higher occurrence of COVID-19 (10%) in our sample. The perceived exposure to noninfectious hazards for latex allergy, radiation, and nitrous oxide inhalation ranges from 41 % to 54 %. As in previous studies, the perceived exposure is higher in ED-physicians [10, 22, 23, 24].

The occurrence of noninfectious hazards in these studies varies from 6 % to 17%. In our study, an occurrence of 6% is reported to latex allergy, which is moderate compared to a Canadian study (10%) [22]. An occurrence of 13% of radiation was found in our study, which is higher in comparison to a US study (10%) [23]. The occurrence of nitrous oxide inhalation described in our study (11 %) is also lower than the 25 % reported in a US study [24].

The perceived risk perception mentioned by the emergency and hospital physicians in our study varies from a lower 3.20 (SD 2.69) for latex allergy to a moderate 3.68 (SD 2.57) for nitrous oxide inhalation.

The emergency and hospital physicians in our study reported high perceived exposure to violence during the COVID-19 outbreak. This is not surprising since physicians working in the ED are frequently confronted with violent patients such as intoxicated people, wrongdoers, committers of violence and their victims [10, 3, 17]. The reported occurrence of violence in our study is 32 %, which is similar

to another studies [17]. The perceived risk perception for violence is much higher than for physical hazards, and also comparable to other studies [15, 16, 25]. But the perceived risk perception for COVID -19 is much higher during a lockdown period. For stressfully work-related situations that can cause burnout, we observed a high rate of perceived exposure in almost two-fifth of the emergency and hospital physicians (41%). The perceived exposure to situations that can cause burnout is similarly high in other studies in non-COVID-19 times [26]. Twenty four percent of the emergency and hospital physicians reported the occurrence of burnout symptoms in our study, as in other studies [11, 27]. The perceived risk perception of burnout is high, although lower than the risk perception for violence. This was also observed in another study [28]. We observed that the perceived risk perception for COVID -19 is also higher than for both other risk perceptions.

Our study indicated that physical hazards and especially violence and burnout are prevalent in physicians. Worries about physical hazards, violence, and burnout may lead to adverse consequences in terms of quality of care, lifestyle, and job satisfaction [27, 29]. The worry about COVID-19 was two-third and could have probably led to an adverse attitude towards the way of coping with these consequences. The high worry about violence indicates that physicians in ED are concerned about verbal and physical consequences of violence as also described by other authors [17, 29]. The high levels of worry about burnout in our study were also found in other studies in physicians [26, 30]. The very high worry about COVID-19 show that we should be concerned that physicians working in a clinical workplace, where such concerns and perceived risks are present, should not be neglected in an area where potential contamination is present. As is the case in the emergency room.

Limitations and strengths

The majority of physicians that participated in the study were working in large, non-academic emergency care departments. This could be a source of bias because exposure to occupational hazards may be different in academic hospitals. Besides, this is a cross-sectional study. A longitudinal study could investigate the stability of our findings. Finally, all participants were recruited via social media during the lockdown period. And so, these participants who are recruited buy social media can arise a self-selection bias (or volunteer bias) when they decide entirely for themselves whether or not they want to participate in the study. Due to this, participants may differ from those who don't in terms of motivation. This may have led to a rather conservative estimate of occupational hazards and the impact of COVID-19.

The participants could have little influence over the answers of other physicians who have answered the questionnaire. The fact that so many physicians working in the field reported the same problems and hazards proves that this is an important problem.

Conclusions

Exposure to, the occurrence of and perceived risk of physical hazards, and even more violence, burnout, and especially COVID-19 are high in physicians working in ED. These occupational hazards are indeed in COVID-19 times a substantial worry for the physicians. Further studies about the consequences of worry in this group of physicians are important to explore the relationship with job demands, job control, satisfaction, absenteeism, work turnover, and physical and psychological health.

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CHAPTER 5

The Impact of Perceived Work Stress on Burnout among Belgian Emergency Physicians: The moderation role of resilience.

Somville F, Van Bogaert P, De Cauwer H, Filip Haegdorens, Franck E. The Impact of Perceived Work Stress on Burnout among Belgian Emergency Physicians: The moderation role of resilience. Submitted to Submitted to Acta Clinica Belgica: International Journal of Clinical and Laboratory Medicine. 31/03/2024 (YACB-245249439).

Abstract

Aims:

Emergency room work and prehospital deployment (e.g., Mobile Urgency Group (MUG)) can be satisfying as well as stressful for emergency physicians. High workload, long working days, occupational hazards, highly emotionally charged patient interactions, exposure to human suffering, and MUG/prehospital interventions put emergency physicians under high emotional pressure. Moreover, losing compassion and humanity might influence the professional quality of life and can eventually lead to burnout. This study investigated the relationship between perceived work stress, burnout, and resilience and whether resilience moderates the relationship between perceived work stress and burnout.

Methods:

The present study was a cross-sectional study and part of an intervention study called the Stress Management and Resilience (SMART-EM) Study that explored the effects of an online intervention on stress, resilience, and burnout in a pre-post study design. A baseline survey study measured demographics and studied concepts based on validated questionnaires for all outcomes. 91 emergency physicians responded to the first part of the study and completed the baseline survey and informed consent, which was conducted from February to June 2022. Hierarchical regression analyses investigated the relations between demographics, stress, burnout, and resilience. The data were analyzed using mean scores and regression analysis process model 4.2 for the moderation effect of resilience.

Results:

31.9% of the study participants reported high burnout levels. Personal factors, age, perceived stress, and resilience predicted three-quarters of the variances in burnout. There were significant relationships between perceived work stress, burnout, and resilience. Hierarchical regression analyses showed that perceived stress was related to the degree of burnout in persons with low resilience. Furthermore, perceived stress was inversely related to burnout in highly resilient persons. The study demonstrated the moderation effect of resilience between perceived work stress and burnout.

Conclusions:

This study suggests that personal characteristics, work conditions, perceived stress, and resilience play an essential role in the impact of burnout risk in emergency physicians. Moreover, resilience moderated the effect of perceived work stress on burnout. Consequently, this study emphasizes the importance of focusing on individual (and team) resilience to promote the well-being of emergency physicians, and thus to guarantee the quality of emergency care.

Introduction

Stress and burnout are syndromes experienced by many professionals involved in highly demanding professions. Healthcare workers show an increased risk for this syndrome [1,2].

In a previous study in emergency physicians, we found that 75% indicated that they had experienced one or more traumatic related events in the last six months. A survey of ambulance personnel, consisting of emergency physicians and paramedics, found that 82% of respondents had experienced a traumatic event in the past six months. However, the syndrome often occurs only after prolonged exposure to traumatic events [1,2].

The emotional distress of physicians with burnout is supposed to be the prologue to other physical and psychological sequelae [3]. Cynicism towards work, detachment from work-related interactions, the perception of inefficient functioning, and aversive coping strategies are associated with high emotional exhaustion [4,5]. Emergency physicians usually choose this specialty because they pursue patient care and want to alleviate the suffering of patients and save their lives. There are circumstances in which this is not possible or feasible, which can be very confrontational for them.

Burnout is caused by cumulative exposure to work-related stressors [6]. In professional quality of life, burnout is associated with feeling overwhelmed, disconnected, and emotionally exhausted. In other work contexts, compassion fatigue is linked to turnover intentions and suboptimal care for the patient [7]. Therefore, it is essential to identify the protective and risk factors and to assess how these relate to professional quality of life.

High work pressure, highly emotionally charged interactions with patients and families, and exposure to specific occupational risks increase the risk of occupational stress and burnout in emergency physicians. As shown in previous studies, emergency physicians indicated that despite the high work demands and stress reactions, they still reported high job satisfaction [8]. Based on the determinants and impact of traumatic events, we gained insight into the factors that influence perceived

stress and burnout [8,9]. Recent studies looked at more efficient ways of assessing this aspect, such as Schaufeli *and colleagues*' multidimensional model, to evaluate more underlying factors, including emotional and cognitive impairments [1,10,11].

Some authors described resilience as a capacity and reflection of abilities and methods used by a person in response to stressors that can induce burnout [12]. Resilience creates self-help, insight, and own values. Resilience can be designed into an interventional program and can be trained [13,14]. The risk for burnout is increased in physicians who are not resilient and having multiple tasks such as clinical activity and pure technical acts [15]. There are various pathways to strengthen resilience, such as behavior and prospects, stability and resilience, a ranking of importance of couple activities, practice management scale and support measures. Resilience is an ability which can be improved [12].

For example, the emergency department may play an antagonistic role in resilience, as a result of conflicts in workload and standards, lack of efficient communication and the lack thereof opportunities to develop themselves sufficiently [12].
Crucial interventions are required to significantly reduce work stress, efficiently increase resilience and strengthen the well-being of healthcare professionals and the competence of healthcare organizations themselves. [16]. *S*upervisors should provide a transparent supportive environment to reduce burnout and improve resilience [17].
This study examined the connection between perceived stress, burnout and the influence of resilience in emergency physicians. We assumed that resilience might increase moderating the relationship between perceived stress and burnout.

Methods

The current study was a cross-sectional baseline study and part of a larger intervention study on the effects of an online intervention on stress, burnout, and resilience.

Data performing instruments

A survey measured demographics and studied concepts using validated questionnaires.

• Demographic questionnaire: The participants' data were recorded as follows: gender, age, specialism, marital status, and number of children living at home, workschedule, workregime.

• Perceived Stress Scale (PSS): [18] This scale consists of a 10 items questionnaire that measures the extent to which participants' lives are “unpredictable”, cannot be controlled and is “experiencing an overload”. The questions are scored on a 5-point Likert scale from 1 (never) to 5 (very often), with a total score ranging from 0 to 40. High scores are associated with high level of perceived stress.

• Connor Davidson's Short Resilience Scale (CD-RISC-10): [19] We used the 10-item questionnaire. The scale scores per item range from 0 (not at all true) to 4 (very true), and the total score on the list is calculated by adding the scores per item. The maximum score on the 10-item version of the CD-Risc is thus 40. The higher the score, the higher the degree of resilience.

• The Burnout Assessment Tool (BAT): [11] This self-evaluation questionnaire measures Burnout; the shortened list of 12 items was used.

Data analysis

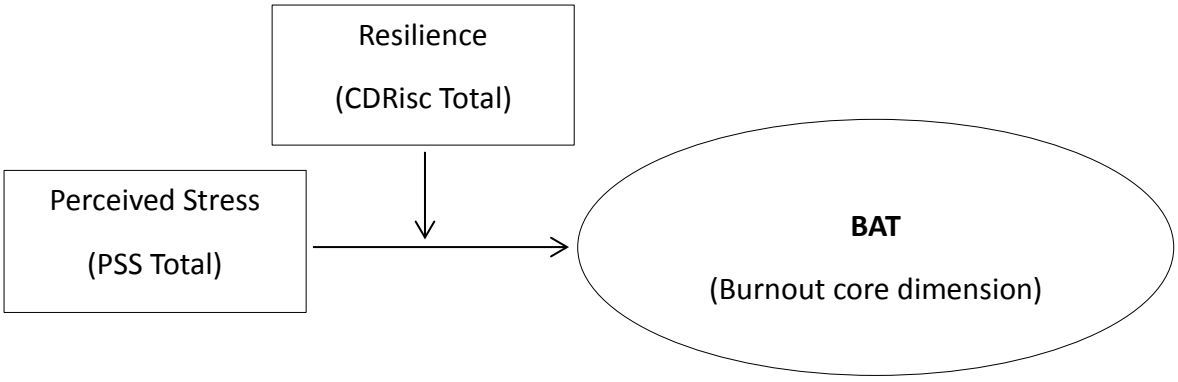
SPSS Statistics program version 28.0 was used with a statistical significance level of $p<.05$ and 95% confidence interval. Means, frequencies, and percentages were used to report study variables. Sociodemographic characteristics were examined using descriptive values (their number, percentage, mean, and classical standard deviation).

The data obtained were examined using their average scores and regression analysis with the process model type 4.2.

Differences in perceived stress, resilience, BAT were examined with independent samples T-tests. To explain the differences perceived stress, resilience, BAT and respectively work schedule, work regime in emergency physicians and residents, the Mann-Whitney U-tests were used. [20].
Pearson correlations and multiple regression analyzes were used to determine relationships between personal factors, perceived stress, resilience, and BAT.

We considered an $\alpha = 0.10$ in some calculations to avoid losing any trends in effects on outcomes.
According to the moderation effect model presented in Figure 1, the mediating factor was resilience; the predictive factor was perceived stress; the outcome variable was burnout.
For this purpose, the analysis was carried out with the model type 4.2 Multiple Moderation, developed by Hayes to obtain more useful and targeted results for moderation analysis models. [21], testing the hypothesis that resilience among emergency physicians moderated the association between perceived stress and burnout..

Figure 1 provides the investigated relationships of the model of moderation effect.



ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

This study has been approved by the UZA Ethics Committee (Belgium) Project ID 2021 – 0238 / B3002021000138.

Results

Design and Participants

Emergency physicians were invited to be enrolled on a voluntarily basis. A baseline survey was conducted from February to June 2022.

The target group was informed through their departments and MUG intervention groups, (https://www.doctors4doctors.be), and via social media (LinkedIn). A total sample of 91 emergency physicians were registered in the first part of our study and completed the standard survey and informed consent..

Demographics

One out of five of the sample were residents. Most participants were male (59.3%). The majority of them were middle - aged (between thirty and fifty years old) (58.3%), were cohabiting (85.7%), and had children at home (70.3%). The majority worked full-time (74.7%) in a variable work schedule (86.8%)

Burnout Assessment Tool (BAT)

Table 1 presents a more detailed view of burnout using the internationally validated BAT scoring system with the four dimensions of the BAT, means, and standard deviations for emergency physicians. Regarding the BAT core score, about a fifth (19.2%) had a medium to high-risk score for burnout, while a quarter (25.3%) reported low levels. In the first subscale describing emotional exhaustion, a quarter (24.2%) reported a medium to high score and were at risk for burnout, while nearly half (47.3%) reported low levels. In the second subscale, which represents mental distance, nearly half (43.0%) of the sample reported a medium to high risk for burnout, and almost a tenth (8.8%) reported low levels. In the third subscale describing emotional dysregulation, about a quarter (23.1%) reported a moderate to high score at risk for burnout, while a tenth (11.0%) reported low levels. On the fourth subscale representing cognitive dysregulation, a tenth (11.0%) of the physicians reported a medium to high-risk score for burnout, and a quarter (25.3%) reported low levels.

Table 1: BAT in the participating physicians using 4 dimensions, means, and standard deviations

BAT	Very Low	Low	Average	High	Median	SD
	N (%)	N (%)	N (%)	N (%)		
Core Dimension of risk of burnout	52(55.5)	22(25.3)	16(18.1)	1(1.1)		
Dimension1 Exhaustion	26(28.5)	43(47.3)	17(18.7)	5(5.5)	1.34	0.75
Dimension 2 Mental Distance	55(48.2)	8(8.8)	27(41.9)	1(1.1)	0.84	0.66
Dimension 3 Emotional Disorder	60(65.9)	10(11.0)	15(16.5)	6(6.6)	0.65	0.61
Dimension 4 Cognitive Disorder	59(63.7)	22(25.3)	6(6.6)	4(4.4)	0.84	0.67

BAT: Burnout Assessment Tool; SD: standard deviation

Correlations between work stress, burnout, and resilience levels

Concerning the correlations among work stress, burnout, and resilience levels, we found significant positive correlation between work stress and burnout ($r = .681$, with a $p = < .001$); work stress and resilience ($r = -.619$, $p = < .001$), as well as burnout and resilience ($r = -.613$, $p = < .001$), were negatively correlated.

Differences of personal characteristics on perceived stress, resilience, and burnout

Table 2 presents the differences of personal characteristics on perceived stress, resilience, and burnout. Mann-Whitney U-tests showed the differences in perceived stress, resilience, BAT and respectively workschedule, workregime in emergency physicians and residents [20]. No significant differences for PSS, CDRisc, and burnout (BAT core) were reported: Emergency Consultants vs Emergency Residents, age, gender, marital status, kids. Emergency physicians as compared to consultants, demonstrated a significant ($\alpha \leq 0.10$) higher/lower score. Moreover, we found that a trend that Emergency Residents experiencing more stress than Emergency Consultants. It was taken into account that it was a limited group and therefore the $\alpha \leq 0.10$ rule was used. We also noted that the part-time workers and those who only worked day or night experienced a significant effect in terms of developing burnout.

Table 2 Relationships of personal characteristics and perceived stress, resilience.

Demographics			**Perceived stress scale**		**Connor–Davis Resilience scale**		**Burnout Assessment Tool scale**	
	N=91	%	Mean(SD)	Δ	Mean(SD)	Δ	Mean(SD)	Δ
Specialization				**.091°**		.949		.493
Emergency Consultants	76	83.5	13.99 ± (7.20)		20.55 ± (5.88)		0.99 ± (0.61)	
Emergency Residents	15	16.5	16.80 ± (5.99)		20.87 ± (5.25)		0.86 ± (0.50)	
Age				.621		.912		.969
20 till 29	14	15.4	16.00 ± (6.05)		21.21 ± (4.94)		0.87 ± (0.52)	
30 till 39	27	29.7	13.89 ± (6.25)		19.89 ± (5.97)		0.95 ± (0.52)	
40 till 49	26	28.6	14.92 ± (7.69)		20.46 ± (6.11)		1.00 ± (0.65)	
50 till 59	16	17.6	14.50 ± (8.60)		21.44± (5.53)		1.06 ± (0.74)	
³ 60	8	8.8	12.00± (6.63)		20.75 ± (6.60)		0.91 ± (0.50)	
Gender				.461		.313		.768
male	54	59.3	14.00 ± (6.99)		21.22 ± (5.23)		0.94 ± (0.56)	
female	37	40.7	15.11 ± (7.21)		19.70± (6.40)		1.01 ± (0.63)	
Martial status				.430		.551		.746
cohabiting	78	85.7	14.38± (7.42)		20.71 ± (5.76)		0.96 ± (0.59)	
single	13	14.3	14.85± (4.58)		20.00 ± (5.88)		0.99 ± (0.62)	
Kids				.423		.708		.828
kids	64	70,3	14.22 ± (7.62)		20.59 ± (5.98)		0.98 ± (0.63)	
no kids	27	29.7	15.00± (5.60)		20.63 ± (5.25)		0.95 ± (0.56)	
Workschedule				.128		.613		**.010****
Alternating schedule	79	86.8	14.18± (7.38)		20.70 ± (5.82)		0.92 ± (0.59)	
Day or Night	12	13.2	16.25 ± (4.27)		20.00 ± (5.51)		1.30 ± (0.47)	
Workregime				.674		.130		**.020***
Full Time	68	74.7	14.03 ± (6.35)		21.21 ± (5.52)		0.87 ± (0.52)	
Part Time	23	25.3	15.70 ± (8.90)		18.83 ± (6.18)		1.26 ± (0.71)	

°$\alpha \leq 0.10$; PSS : perceived stress score; CDRisc: Connor Davidson's Resilience Scale; BAT core: BAT total score; *: significant at <.05; **: significant at <.01.

Predicting BAT concept

In order to answer the question whether personal factors, perceived stress, and resilience explains a significant proportion of the variance in burnout we used an univariate regression analyses of these factors predicting burnout as presented in table 3. Personal factors predicted 59.6% of the variance in BAT total score, but of the nine variables entered into the model, only work schedule (β = -0.142, p = .054), work regime (β = -0.139, p = .077 when □ ≤ 0.10) and also perceived stress (β = 0.508, with p = < .001) and resilience (β = -0.273, with p = < .001) explained a significant fraction of the variance in BAT core scores. Personal factors predicted 53.6 % of the variance in Exhaustion, but only perceived stress (β = 0.549, with p = < .001) and resilience (β = -0.199, with p = .048) explained a significant proportion of the variance in Exhaustion scores. Similarly, personal factors predicted 35.6 % of the variance in Mental Distance but of the nine variables entered in the model, only gender (β = 0.177, with p = .060 when □= 0.10), work schedule (β = 0.233, with p = .013) and also perceived stress (β = 0.308, with p = .011) and resilience (β = -0.242, with p = .041) explained a significant proportion of the variance in Mental Distance scores.

Furthermore, personal factors predicted 54.8 % of the variance in Emotional Disorder. Yet, of the nine variables entered in the model, only gender (β = 0.147, with p = .067 when $\alpha \leq 0.10$), work schedule (β = 0.255, with p = .001), perceived stress (β = 0.344, with p = < .001), and resilience (β = -0.364, with p = < .001) explained a significant proportion of the variance in Emotional Disorder scores. Finally, while personal factors similarly predicted 44.9 % of the variance in Cognitive Disorder scores, of the nine variables entered in the model, only age (β = 0.176, with p = .082 when α= 0.10), work regime (β = -0.230, with p = .013) and also perceived stress (β = 0.456, with p = < .001) and resilience (β = -0.180, with p = < .001 when α= 0.10) clarified a significant part of the variance in Cognitive Disorder scores.

Table 3 : Univariate regression analyses of factors predicting burnout concept

	Unstandardized coefficients		**Standardized coefficients**			
	β	SE	β	p	R2	Adjusted R2
BAT core					0.596	0.551
Speciality	-0.176	0.188	-0.111	0.352		
Age	0.039	0.043	0.078	0.369		
Gender	0.074	0.088	0.061	0.408		
Marital Status	-0.119	0.143	-0.071	0.407		
Kids	-0.032	0.143	-0.025	0.825		
Workschedule	0.247	0.126	0.142	0.054*		
Workregime	-0.188	0.105	-0.139	*0.077*°		
PSS	0.043	0.008	0.508	<.001**		
CDRisc	-0.028	0.,01	-0.273	0.004**		
Dimension 1 Exhaustion					0.536**	0.484
Speciality	-0.306	0.258	-0.150	0.239		
Age	-0.011	0.059	-0.017	0.858		
Gender	-0.116	0.121	-0.075	0.342		
Marital Status	-0.065	0.196	-0.030	0.742		
Kids	0.001	0.196	0.001	0.996		
Workschedule	0.084	0.173	0.038	0.630		
Workregime	-0.163	0.144	-0.094	0.261		
PSS	0.059	0.011	0.549	<.001**		
CDRisc	-0.,026	0.013	-0.199	0.048*		
Dimension 2 Mental Distance					0.356**	0.284
Speciality	-0.341	0.264	-0.193	0.200		
Age	0.005	0.061	0.009	0.937		
Gender	0.237	0.124	0.177	*0.060*°		
Marital Status	-0.196	0.201	-0.105	0.332		
Kids	-0.083	0.201	-0.057	0.682		
Workschedule	0.453	0.178	0.233	0.013**		
Workregime	-0.08	0.148	-0.053	0.591		
PSS	0.029	0.011	0.308	0.011**		
CDRisc	-0.028	0.013	-0.242	0.041*		
Dimension 3 Emotional Disorder					0.548**	0.498
Speciality	-0.019	0.204	-0.012	0.925		
Age	0.091	0.047	0.176	0.056		
Gender	0.181	0.096	0.147	*0.062*°		
Marital Status	-0.116	0.155	-0.067	0.457		
Kids	-0.022	0.155	-0.017	0.885		

Workschedule	0.457	0.137	0.255	0.001**		
Workregime	-0.172	0.114	-0.124	0.135		
PSS	0.03	0.008	0.344	<.001**		
CDRisc	-0.038	0.01	-0.364	<.001**		
Dimension 4 Cognitive Disorder					0.449**	0.388
Speciality	0.041	0.,248	0.023	0.868		
Age	0.101	0.057	0.176	*0.082*°		
Gender	0.106	0.117	0.078	0.367		
Marital Status	-0.132	0.189	-0.069	0.486		
Kids	-0.042	0.189	-0.029	0.824		
Workschedule	0.093	0.167	0.047	0.579		
Workregime	-0.353	0.139	-0.230	0.013**		
PSS	0.043	0.01	0.456	<.001**		
CDRisc	-0.021	0.013	-0.180	*0.099*°		

°significant: when α= 0.10; PSS : perceived stress score; CDRisc: Connor Davidson's Resilience Scale; BAT: Burnout Assessment Tool; BAT core: BAT total score; *: significant at <.05; **: significant at **<.01.

Results of regression analysis regarding the moderating effect of noted resilience.

We tested the hypothesis that resilience among Belgian emergency physicians moderated the association between perceived stress and burnout as presented in table 4 and figure 2.

Resilience negatively affected BAT (β = -0.0254*, SE = 0.009, and 95% bias-corrected and enhanced bootstrap (BCa) CI = [-0.044, -0.006], with p < 0.001), Resilience has a moderating effect between stress and burnout.

We noticed that the higher the resilience was (or lower), the stronger (or less strong) the relationship between stress and burnout manifested itself. Regression analysis indicated that resilience negatively impacted BAT (β = −0.0254, SE = 0.0096, and 95% BCa CI = [−0.0424, −0.0047], with a p < 0.01). In addition, the BAT decreases as we see an increase in resilience.
Resilience had an immediate and significant effect on BAT (β = 0.0387, SE =0.0077, and 95% BCa CI = [0.0234, 0.0540], with a p < 0.001). Finally, the indirect impact of

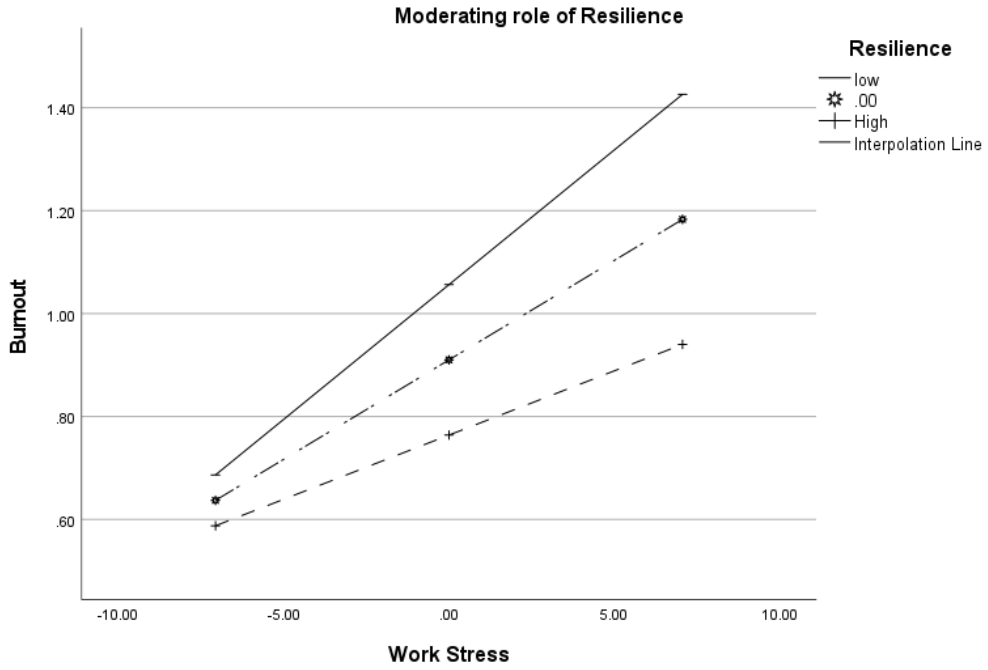
PSS Total on BAT due to resilience was checked using a bootstrapping method: it was found to be significant (β = −0.0024, SE = 0.0010, with 95% BCa CI = [−0.0041, −0.0003]).

Work stress and resilience together roughly explained 55% of the variation in burnout (R-squared moderation model = 0.554, F = 36.05, with p = <0.001). The interaction between work stress and resilience explained 3% of the variation in burnout (R-squared unconditional interaction PSSTotal x CDRisc Total = 0.031). These results indicated that resilience effectively moderates the association between work stress and burnout. Consistent with these results, we note that our second hypothesis was supported.

Table 4 shows the results of the regression analysis to determine the moderating role of resilience (CDRisc Total in the effect of work stress (PSS Total) on burnout (BAT).

Resilience (mediator Variable W= CDRisc Total)					**Burnout (Variable Y=BAT)**			
β	**SE**	**95% BCa confidence interval**			***β***	**SE**	**95% BCa confidence interval**	
		LLCI	**ULCI**				**LLCI**	**ULCI**
Work stress (Variable X=PSS Total) p = <0.001					0.038	0.007	0.026	0.055
Resilience (Mediator Variable W= CDRisc Total) p = <0.01					−0.025	0.009	−0.042	−0.004
Work stress x Resilience (Interaction) p = <0.01					−0.002	0.001	−0.004	−0.003

Figure 2. provides the moderating role of resilience in the effect of work stress on burnout.



Perceived stress score; CDRisc: Connor Davidson's Resilience Scale; BAT core: BAT total score

Discussion

Work stress is an essential factor related to job satisfaction, quality of life, and well-being (both physically and mentally) of emergency physicians [22]. The factors that influence stress can give negative outcomes. This study examined the extent to which resilience plays a mediating role as its influence on perceived work stress on burnout. It mainly looked at the relationships between the variables. Correlation analysis proved significant relationships between work stress, burnout, and resilience. Accordingly, work stress and burnout decrease, as, inversely, the level of resilience increases. These findings demonstrate that work stress is positively associated with burnout.

In this study, resilience was adversely related to work stress consistent with what Yu and colleagues reported in his review [23]. These findings are essential to understand the concept how resilience influences work stress among healthcare professionals. These findings demonstrate that resilience is significantly associated with work stress and burnout, which provides a transparent insight into the relationship between the three factors. More specifically, it is assumed and confirmed that practices that increase the resilience of health workers will reduce work stress. Similarly, Ng and Colleagues have stated that management methods, such as mental repetition, promote stress reduction. He indicates that resilience protects against burnout and stress and that resilience management training is favorable for stress reduction and mental health improvement in physicians [24]. O'Dowd and his colleagues determined that resilience strategies, more specific attitudes which protected against stress and burnout, can be provided to improve resilience [25].

Franck and co-workers reported a link between effective coping behavior, anxiety and its somatization in healthcare workers during the very first peak of the Covid-19 pandemic crisis. Their findings reveal important and complementary insights to improve and researching interventions in areas such as personal leadership and

resilience [26]. This study evenly confirmed the moderating character of resilience in association between work stress and burnout. A previous study reported that the level of resilience distinguishes between the direct and indirect influence of stress on depression [27].

Resilience was most often reported with positive correlations with job satisfaction, and negative correlations with depression and burnout. Cooper-Bribiesca and colleagues also suggests that preventative measures to avoid infection by physicians, as well as reinforcement their resilience and team spirit, can be useful to prevent permanent mental injury after contact with COVID-19 during the famous pandemic [28].

Already during the COVID 19 crisis, Unjai and colleagues proposed to further investigate both psychological well-being and quality of life in the professional field, and the usefulness of interventions to support the well-being of medical staff [29].

A resilience program improved the healthcare worker's self-reliance and ability to regulate thoughts and emotions and developed their resilience. Foster and colleagues marked the start of investigating the moderating role of resilience in the impact of perceived work stress on burnout, and this also confirms our hypothesis [30].

Limitations

The small sample size limits the generalizability of the study results. Moreover, the findings are focused on the participants' self-reports of Belgian Emergency physicians. Further studies are recommended to examine the management of stress and resilience training of emergency physicians.

Conclusions

This study demonstrated that work stress and resilience affect burnout in emergency physicians. This study indicated that stress reduction and improvement of resilience are able to limit the degree of burnout. Resilience completely moderates the result of work stress on burnout. This study provides essential and useful information as well as tools to emergency department managers who are looking for the best approach to intensify resilience in emergency physicians. It is essential for supervisors to create how to develop effective endorsing interventions focusing on reducing the causes that also influence burnout. Establishing coping skills in order to improve resilience and refining models for stress reduction, are works in progress.

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CHAPTER 6

Stress Management and Resiliency Training (SMART-EM) among Emergency Physicians: A Pilot Intervention Study

Somville F, Van Bogaert P, De Cauwer H, Filip Haegdorens, Franck E. A Stress Management and Resiliency Training (SMART-EM) among emergency physicians: a pilot interventions study. Submitted to Internal and Emergency Medicine journal 04/02/2024 (IAEM-D-24-00141)

Abstract

Aim:

The aim was to test the effectiveness of a pilot study program, called the Stress Management and Resiliency Training (SMART-EM) program, in decreasing stress and burnout and improving resiliency and quality of life among emergency physicians.

Methods:

With ethics committee approval. A total of 42 emergency physicians agreed, after informed consent, to participate in this study and were included in the intervention group that received the SMART-EM program or the nonintervention group for 3 three months. Participation was voluntary. They all completed the pre- and post-intervention surveys. The SMART-EM program involved a total of 4 hours of group sessions, with one follow-up presentation and a survey at the beginning of the intervention and another survey at the end of the 3-month intervention. Surveys, including the Perceived Stress Scale, Connor–Davidson Resilience Scale, ProQOL Scale, and Burnout Assessment Tool Scale, were used for both groups before and after 3 months of the SMART-EM intervention.

Results:

A total of 37 emergency physicians completed both surveys in this study. No significant improvements in perceived stress, quality of life, or burnout at 3 months were observed in the SMART-EM intervention group compared to the nonintervention control group; however, resilience improved in the SMART-EM intervention group, but these changes were not significant compared to those in the nonintervention group.

Conclusion:

The use of two sessions to decrease stress among emergency physicians via the SMART-EM program could be valuable. However, our intervention did not significantly or clinically improve perceived stress, quality of life, or well-being.

Introduction

The workload of emergency physicians is continuously increasing in emergency departments. However, the distress they experience is also increasing [1]. Emergency physicians indicate that workload, overcrowding of patients in emergency departments, the fluctuating influx of patients, and multitasking contribute to their distress [2]. Other factors contributing to excessive distress include problems with colleagues and supervisors; immediate environmental factors; increased aggression towards caregivers; limited self-care; and coping skills [3, 4]. Stress among emergency physicians possibly harms their ability of capacity to perform their activities on the work floor and resiliency and increases their risk of burnout [5-8]. The quality of life and resilience of emergency physicians in tertiary teaching hospitals were extremely low during the COVID-19 pandemic. Therefore, supportive measures were considered to improve resilience in relation to personal experiences related to the COVID-19 pandemic and thus prevent burnout among emergency physicians [9]. Previous intervention studies have investigated the reduction in distress [10-15]. In 2011, Sood et al. [12] showed that a short training program to increase resilience and reduce stress in physicians using the SMART program was feasible. In addition, the intervention resulted in a statistically significant improvement in stress, resilience, anxiety and overall quality of life. Academic physicians who participated in a SMART program during the application of a new hospital-wide approach, the Health Information System (HIS), showed increased resilience and reduced stress and anxiety. However, the scores after the intervention were not significantly different from the baseline scores. Nevertheless, there was a positive trend that the SMART intervention may be useful for proactively improving physicians' well-being during the start-up of new hospital information processing systems [13]. Several of these interventions are demanding in terms of long training periods, high effort, and impacts on emergency rooms and personal life activities. In the study by McKinley et al. [14], emergency physicians and general practitioners appeared to be in the worst condition in terms of burnout and secondary traumatic stress. The most frequently described coping mechanism among these physicians was the maladaptive self-distraction strategy [14]. There was a strong association between coping behaviour and anxiety and between coping behaviour and the somatization effect in health care

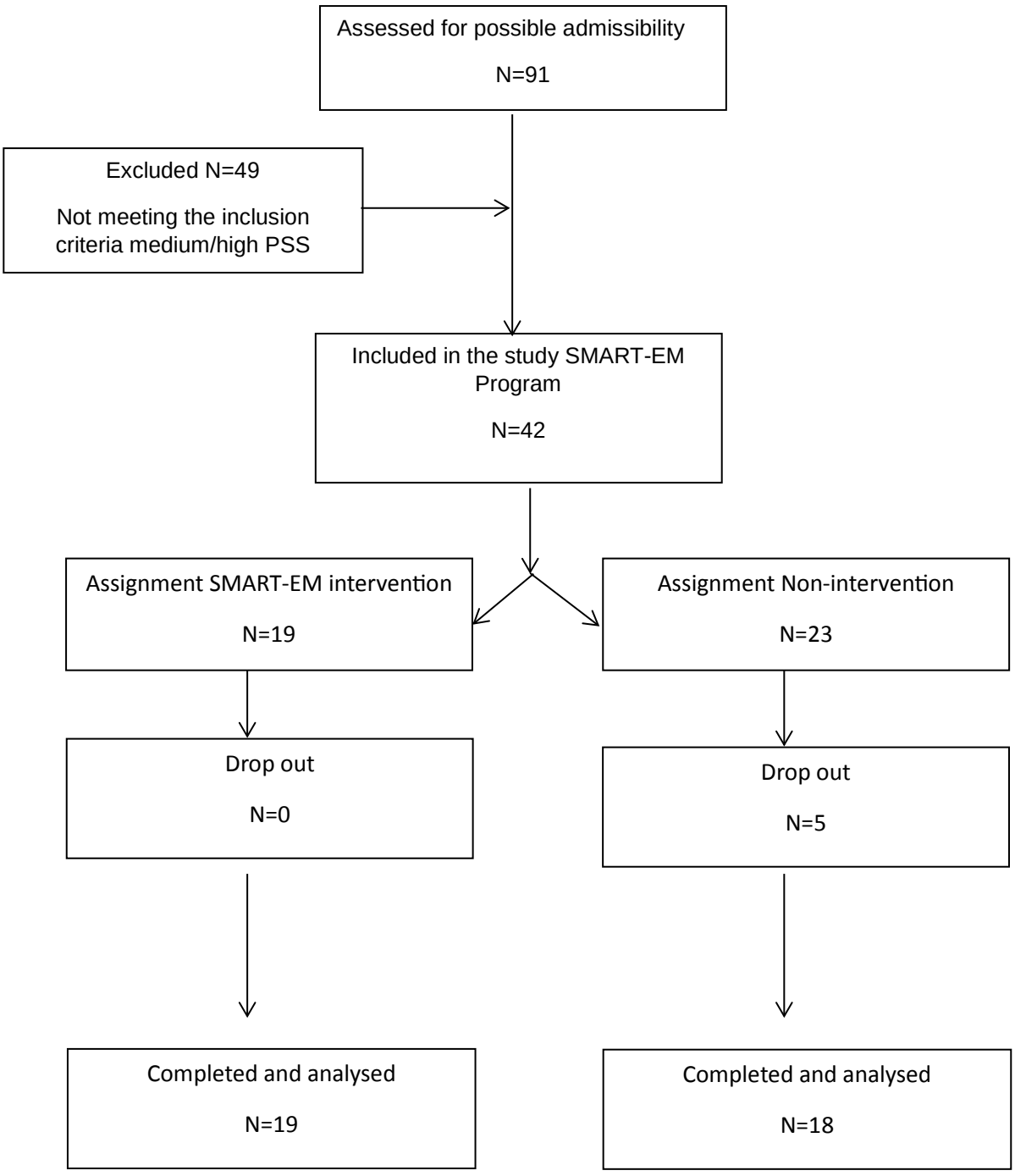
workers during the first peak of the COVID-19 pandemic. The study by Franck et al. [15] showed relevant and additional considerations for developing interventions for personal leadership and resilience, among others. Because there is limited time available for emergency physicians to perform these tasks, we tested a new program (the Stress Management and Resistance Training program (SMART-EM)) to promote coping mechanisms and self-care in two sessions. The present pilot study aimed to determine the effectiveness of the SMART-EM program in reducing stress and burnout and improving quality of life and resilience among emergency physicians.

Methods

Study Design and Participants

The study was approved by the ethical board of the Antwerp University Hospital Ethics Committee (Belgium) (Project ID 2021-0238/B3002021000138). The Stress Management and Resilience Study investigated the effects of an online intervention on stress, burnout, and professional quality of life using a pre-post study design. Emergency physicians were invited to participate voluntarily. A baseline survey was conducted from February to June 2022. The target group was informed through their departments and mobile urgency group (MUG) intervention groups (https://www.doctors4doctors.be) and via social media (LinkedIn). A total of 91 emergency physicians responded to the first part of the study, completed the first survey and provided informed consent. The SMART-EM program was designed as a pilot program that included 42 Belgian emergency physicians who had a medium to high perceived stress level. Participants were included if they met the following criteria: a) were emergency physicians working in the emergency department and/or involved in prehospital deployment, b) were able to complete and prepare to take part in all periods of the study on a voluntary basis, c) were able to comprehend and agree to provide written informed consent, and d) had an average to high Perceived Stress Score. Candidates who had not worked as emergency physicians in the emergency department for at least one year and those who had a low Perceived Stress Score were not included. The cut-off scores for the Perceived Stress Scale were as follows: low, 0-13 points; moderate, 14-16 points; and high, 27-40 points [16]. To quantify between-group variance with two-sided significance at the 5% level and a power of 85% using continuous outcomes, a sample size of 20 subjects per group was needed. However, in the nonintervention group, five physicians did not complete the post-study survey.

Fig. 1. Flow diagram of the development of the program to evaluate the influence of the pilot SMART-EM program on emergency physicians..



The participants were referred to the study coordinator who evaluated whether the physicians met the study criteria. After the participants provided informed consent, they were divided into two groups: a group that completed the full SMART-EM

program during the training and a nonintervention group that completed only the first and second surveys after 3 months. Of these physicians, 49 did not meet the inclusion criteria: medium/high perceived stress score. A total of 42 emergency physicians agreed to participate in this study and were included in either the intervention group that received the SMART-EM program or the nonintervention group for 3 months. Participation in both groups was voluntary, and informed consent was obtained from each of the participants. The final allocation was only available to the study coordinator. Participants were pseudonymized using a specific identification number. This specific number was kept by the study statistician and was not available to the other researchers, who were blinded to the results. The study ran from February 2022 to June 2022.

Prior to joining the smaller group sessions, participants provided their individual informed consent document and completed the additional scales: demographic questionnaire, Perceived Stress Scale (PSS), Burnout Assessment Tool (BAT), Connor Davidson's Short Resilience Scale (CD-RISC) and Professional Quality of Life (ProQOL) scale. The Perceived Stress Scale (PSS) is a 10-item reporting tool that provides an overall measure of perceived stress. The items are scored on a 5-point Likert scale ranging from 1 (never) to 5 (very often). The higher the score was, the more stress a physician experienced. The PSS scoring system fits very well with stress measurements during life events and is sufficiently reliable [16]. The Connor Davidson's Short Resilience Scale (CD-RISC-10) is a scale with 10 items scored using a Likert scale ranging from 0 (not at all true) to 4 (very true). The higher the score is, the greater an individual’s resilience. The CD-RISC scoring system is validated and reliable, has good psychometric characteristics and is able to distinguish between people with low and high resilience [17, 18]. The Professional Quality of Life Scale is a self-report measure with 30 items that measure the negative and positive consequences of working with people who experience exceptionally stressful events. The ProQol scale has three subscales that measure compassion fatigue (CF), burnout (BO) and compassion satisfaction (CS). This scale measures risk levels for CF (the sum of secondary traumatic stress and burnout scores) and CS. Each subscale consists of 10 items scored on a 5-point Likert scale ranging from 1 (never) to 5 (very common). High scores on this scale indicate a high risk of CF and high CS. The ProQOL scale has excellent to good internal reliability [19]. The Burnout

Assessment Tool (BAT) is a self-assessment questionnaire used to evaluate the degree of burnout. The BAT was developed based on both deductive and inductive approaches. In addition to a full version of the BAT with 23 items, a shortened version with 12 items is available. The parts of the shortened version used were chosen based on Rasch analysis. The psychometric components of the BAT-12 are comparable to those of the full version, and the scale has good internal reliability [20].

The survey was completed by both groups at the start of the study (baseline) and after 3 months (follow-up).

Study Intervention

The use of the SMART-EM method ensures the effectiveness of the intervention described above. A similar concept was already successfully applied in an American pilot study with a small group of physicians [13]. Insight in the intervention was created for the participants by providing training for 3 coping skills [4, 21, 22]. The selection of the coping skills offered

1) Guided abdominal breathing: This procedure relaxes the autonomic nervous system, boosts mood, improves concentration, lowers heart rate and blood pressure, and distracts attention. Guided abdominal breathing was implemented for 15 min/day, 5 days/week during the intervention period [23]

2) Nature walking: Walking [low-intensity exercise (40%)] results in an active reduction in blood cortisol levels. It has a calming effect: the pace of nature is much slower than that of technology. It distracts attention and helps an individual focus on the here and now. It broadens and helps put things into perspective. Exercise has an immediate effect on the prefrontal cortex and hippocampus.

Nature walking [24]: Effects of nature walking were observed in the intervention group after 10 minutes. Nature walking was implemented for three 30-min sessions/week; participants tracked pre-post tension in a workbook. The Eriksonian Relaxation Exercise was used while walking (Betty Erickson) [24, 25]

3) Professional Internal Compass: Professional identity has been worked out in the last 10 years [26] and is based on Acceptance and Commitment Therapy

(ACT) [27]. In addition, staying in touch with one's (core) values is promoted as a way to deal with a changing environment.

Professional identity was promoted in the intervention group by asking and answering the following questions: What are my core values? What makes me do what I do [14, 28]? Therefore, based on the literature, intervention strategies aimed at the person of the physician and physiological process measures were used.

The SMART-EM program involves physicians directing their attention, through brief, structured relaxation interventions such as deep diaphragmatic breathing, walking in the natural environment and staying in touch with one's own (core) values to cope with a changing environment. The sessions were delivered in small groups under the guidance and supervision of a clinical psychologist. Additionally, the intervention group received additional materials such as a workbook and instruction on coping skills.

Statistical Analyses

The study outcomes involved changes in stress levels (PSS scores), resilience levels (CD-RISC scores), professional quality of life scale (ProQOL) scores and Burnout Assessment Tool (BAT) scores. These assessments were completed at the start of the study (baseline) and after 3 months (follow-up) for each group. For each group, the measurements were likened to the starting point using a one-sample t test, and the starting point was compared between groups using a two-sample t test. For the physicians who did not complete the three-month evaluations, the baseline values were transferred to the third month to determine the most conventional estimation of usefulness.

Results

Demographics

A total of 42 emergency physicians with medium to high perceived stress levels were included in the study (19 in the SMART-EM group and 23 in the nonintervention group) (Table 1). Five participants from the nonintervention group completed the first questionnaires but did not complete the follow-up questionnaires (Fig. 1). All participants in the SMART-EM intervention group completed a total of 4 hours of group sessions, a 2.5-hour group training session at the start of the intervention and an additional 1.5-hour 100-minute follow-up session and both surveys (baseline and follow-up).

Table 1. First survey: Demographics

Characteristics	SMART-EM intervention group (n 19)	Non-intervention group (n 23)
Age		
20-29	2 (10.5%)	6 (26.1%)
30-39	8 (42.1%)	4 (17.4%)
40-49	7 (36.8%)	6 (26.1%)
50-59	2 (10.5%)	5 (21.7%)
≥ 60	0 (0.0%)	2 (8.7%)
Gender		
female	12 (63,2%)	7 (30.4%)
male	7 (36,8%)	16 (69.6%)

Outcome Results

The overall stress score (PSS score) decreased from 20.0 ± 4.9 at baseline to 16.4 ± 5 at follow-up in the Intervention group; the resilience (CD-RISC) score decreased slightly from 18.1 ± 6.6 at baseline to 17.9 ± 6.0 at follow-up; the level of burnout (BAT core dimension) improved from 1.3 ± 0.5 at baseline to 1.2 ± 0.3 at follow-up; the quality of life score (ProQOL score) improved from 21.8 ± 4.9 at baseline to 20.5 ± 4.8 at follow-up; and the quality of life score (ProQOL CF score) improved slightly from 22.8 ± 3.9 at baseline to 21.8 ± 4.0 at follow-up. In the nonintervention group, the scores at baseline and follow-up demonstrated a similar pattern and were also

not significantly different for the PSS, CD-RISC, ProQOL STS, ProQOL CF or BAT. We also performed an analysis controlling for the confounding factor sex; however, no significant differences were observed between the intervention group and the nonintervention group.

Table 2. Pilot study outcome results for assessing the effect of the SMART-EM program for emergency physicians

	Intervention Group (n=19)			*Non-intervention group* (n= 23-5=18)				
Outcomes	First survey	3 Months	Δ	First survey	3 Months	Δ	Mann-Whitney U	*P* value
Perceived stress scale	20.0 ± 4.9	16.4 ± 5.8	-3.6 ± 7.3	21.0 ± 3.6	18.9 ± 4.8	-2.4 ± 6.4	158.5	0.70
Connor–Davis Resilience scale	18.1 ± 6.6	17.9 ± 6.0	-0.2 ± 6.1	17.0 ± 5.4	17.8 ± 5.2	1.7 ± 5.4	145.5	0.44
Burnout Assessment Tool scale (core dim)	1.3 ± 0.5	1.2 ± 0.3	-0.1 ± 0.4	1.3 ± 0.7	1.0 ± 0.6	-0.3 ± 0.8	131.0	0.98
ProQol Quality of life scale (STS)	21.8 ± 4.9	20.5 ± 4.8	-1.3 ± 3.7	24.3 ± 5.6	24.0 ± 3.1	-1.1 ± 6.4	170.0	0.99
ProQol Quality of life scale (CF)	22.8 ± 3.9	21.8 ± 4.0	-1.0 ± 3.1	25.2 ± 5.1	25.2 ± 3.7	-0.8 ± 5.7	170.0	0.99

The impact of the intervention on the emergency physicians who participated in the SMART-EM group was consistent, as the intervention was acceptable and feasible. The physicians appreciated the fact that there were two sessions that could be completed at acceptable times and were not too long. Additionally, everyone could express his or her feelings and problems very well. Additionally, the support and tools used were well explained. Using these tools was also easy. None of these tools were too complicated, and they were very efficient to use. A walk in nature (60%) was preferred. This was followed by the classic abdominal breathing exercise (31%) and the use of one's internal compass (9%). In addition, several participants indicated that their perspective of work had changed, and some of them had changed their work situation within the hospital where they worked. There were some participants who took a more drastic approach and went to another hospital to perform a different function.

Discussion

This pilot study indicated that a short specific stress management training program for emergency physicians, called the SMART-EM program, is reasonable; however, in our study, the intervention had no statistically significant effects on reducing stress, increasing quality of life, or, to some extent, increasing resilience. The short time span of this mode of specific training is an acceptable concept for an intervention for physicians who have less time available outside their clinical activity in the emergency department.

Stress management is crucial for the well-being of emergency physicians, who face increasing distress, with burnout rates reaching alarming levels globally [7, 29-31]. Excessive stress not only jeopardizes mental health but also compromises the quality of patient care [32-37]. Resilience is also compromised by the repetitive occurrence of high stress [38, 39]. Burnout is estimated to affect 25 to 60% of physicians and is increasingly recognized as a problem that also affects physicians in the workplace [40]. This pilot study investigated the feasibility of a brief stress management training program, the SMART-EM program, tailored for emergency physicians, given their limited availability due to constrained working schedules. While the study revealed the acceptability and practicability of the SMART-EM program, it did not show a significant influence on stress reduction, quality of life, or resilience [1].

Emergency physicians, who experience higher burnout rates than their counterparts, require effective coping tools[41, 42]. Traditional methods, such as physical exercise, travel, hobbies, and mindfulness, have been indicated to be insufficient, necessitating innovative interventions [43, 44]. The SMART-EM program adds a unique dimension by addressing burnout specifically in emergency physicians [13]. This study underscores the need for tailored interventions in this high-stress medical field, emphasizing the potential of the SMART-EM program as an effective intervention [45].

Physician burnout not only affects personal well-being but also has a potential negative impact on patient care quality. The consequences are an increased risk of medical errors, a stressful workplace, and low patient satisfaction [46-48]. Despite

these challenges, addressing burnout is crucial, and the SMART-EM program has emerged as a viable option for intervention in emergency physicians with busy work schedules [48].

Various coping tools, including physical exercise, travel, hobbies, and mindfulness, have been extensively researched. However, emergency physicians continue to struggle with burnout symptoms in their work [43, 44]. Individuals who resort to unhealthy, poor coping strategies, such as alcohol and drug abuse, avoidance, aggression, and eating disorders, are at a higher risk of burnout and job loss [49, 50].

Several stress reduction programmes for medical students, nurses, and surgeons have shown positive effects, but their applicability for emergency physicians is limited. The SMART-EM program, a short, single-session program, provides a feasible and effective alternative for this specific medical specialty [10, 11]. We also performed an analysis controlling for the confounding factor sex; however, no significant differences were detected between the intervention group and the nonintervention group. This was likely due to the small sample size. Unlike some interventions with small effect sizes and extensive training requirements, the SMART-EM program offers a practical solution within a short time span [12, 13].

While a previous SMART-EM study of radiologists focused on stress reduction, anxiety, and quality of life, this pilot study explored the specific effects of burnout, adding additional dimensions regarding its effectiveness [12]. The results indicate that the SMART-EM program can be an effective coping tool for emergency physicians, reducing stress and improving well-being in this high-stakes medical environment [13].

This pilot study highlights the possibility of implementing the SMART-EM program, a brief stress management program, within the busy schedules of emergency physicians. While the study did not show a significant effect on stress reduction, quality of life, or resilience, the SMART-EM program represents a promising avenue for addressing burnout specifically in emergency physicians. Further research and refinement of the program may enhance its effectiveness and contribute to the well-being of emergency physicians, ultimately improving the quality of patient care in this critical medical field [45].

Limitations

This study had a small sample size, with selection bias due to the possible recruitment of more interested physicians and partially-finished surveys at follow-up. The use of a nonintervention group for comparison prevents us from excluding the probability that the effectiveness of the intervention was determined by the attention given by physicians in the SMART-EM group. The limited research burden of the intervention for the participants leads to this less obvious phenomenon and favours the use of this method and greater availability. Moreover, this study was directed towards emergency physicians in a demanding work environment, and generalization of the results to emergency physicians in all academic settings or in nonacademic hospitals is not possible. The results of this study provide only preliminary evidence of the efficiency of the SMART-EM program in this sample of emergency physicians. Verification of these results in a larger clinical sample with supplementary SMART-EM group interventions and extended follow-up phases are needed.

Conclusions

Two SMART-EM program sessions were investigated as a possible method for reducing stress and burnout and improving the quality of life and resilience of emergency physicians. The short style of this intervention program is interesting. However, our study intervention had no significant effects. Nevertheless, the concept of intervention was considered highly acceptable and feasible by the emergency physicians in the SMART-EM group. Therefore, our results encourage further research in a larger study sample with an extended follow-up period, and if demonstrated to have a reliable effect, further study of this method is needed.

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CHAPTER 7

General discussion

Introduction

This thesis demonstrates that there is a critical need for a more comprehensive approach to the well-being of emergency physicians and healthcare providers. Strategies should include comprehensive support systems, tailored interventions and an understanding of the complex interplay between individual personality traits, work-related factors and the development of burnout. The findings call for continued research and the development of targeted programs to maintain the physical and mental well-being of those working to save lives in emergency departments.

Main Results

Study results of the review showed **(**chapter 2**)** that emergency physicians scored significantly higher in all dimensions of burnout compared to other healthcare professions, indicating a critical issue within this specialty. Significant correlations were found between burnout and work characteristics and organizational factors. Critical incidents and aggression emerged as the most influential acute work-related factors impacting the mental well-being of emergency physicians, contributing to the development of posttraumatic stress disorder. Personal factors such as age, personality, and coping strategies were identified as important determinants in the development of burnout among emergency physicians.

Furthermore, our study results in (chapter 3) showed that Type D personality was found in approximately 28.5% to 29.1% of emergency physicians and other hospital physicians. Even after adjusting for job-related and organizational factors, emergency physicians with Type D personality were seven times more likely to be at high risk for burnout. A substantial proportion of physicians in the Emergency Department reported exposure to violence (32%) and health problems related to their work (54%).

High levels of exposure to COVID-19 (88%) and occurrence (10%) were noted (chapter 4), with significant worries about these hazards, which were predicted by perceived exposure, occurrence, and risk perception. Nearly 32% of the study participants reported high burnout levels. Personal factors, age, perceived stress, and resilience collectively predicted a significant portion of the variances in burnout.

Hierarchical regression analyses revealed a significant relationship between perceived work stress, burnout, and resilience.

The study in (chapter 5) demonstrated that the level of resilience moderates the impact of perceived work stress on burnout.

(Chapter 6) presented the results of the SMART-EM pilot intervention study, focusing on stress reduction and well-being. The primary findings are. The intervention did not lead to statistically significant improvements in perceived stress, quality of life, and burnout at the 3-month follow-up. Resilience showed some improvement in the SMART-EM intervention group, although these changes were not statistically significant when compared to the non-intervention group.

Discussion

Our study results highlight the complexity of addressing burnout and stress among emergency physicians and underscore the need for further research and tailored interventions to enhance their well-being. The discussion highlights several important aspects:

To understand the prevalence and determinants of burnout: The study on stress and burnout among emergency physicians and residents reveals wide demographic characteristics across studies, impacting the interpretation of results [1]. Gender distribution in emergency departments ranged widely (0%-91%), with a higher percentage among emergency physicians [1]. Age variance (20-67 years) correlates with diverse emergency responder populations [1]. Most physicians were under 45, reflecting a trend in specialized emergency care staffing [1]. Emergency physicians demonstrated differences in burnout dimensions compared to paramedics[2,3]. Stress factors identified include violent work environments, contact intensity, and verbal aggression[4,5-8,9,10,11,12-19,20-22]. Individual factors like age, gender, and personality structure play a role [23,24]. The findings emphasize the need for targeted interventions to address burnout and stressors among emergency physicians[1,4,5,25,19,20]. Further research should explore the impact on overall well-being and potential causes for increased absenteeism and career changes [5,25,19,20].

To examine the role of Type D personality: Emergency physicians face significant burnout risks due to challenging work conditions, limited resources, and poor support, with 61.6% experiencing burnout [25,26,27]. Individual determinants, particularly Type D personality, increase the risk of burnout, explaining 22.7% of the variance [28]. Personality stability suggests Type D personality as a consistent burnout risk factor [28]. Despite global stressors like natural disasters and COVID-19, physicians' job satisfaction remains high [25,29, 30]. Coping strategies and positive psychology, especially for Type D personalities, are crucial in preventing burnout [31, 32, 33]. The stability of Type D personality, associated with poor coping at lower stress levels, emphasizes the need for tailored prevention [28, 31, 32, 34]. As emergency

physicians confront additional stress factors, preventive measures become crucial for sustained operations [29, 30]. Recognizing and addressing burnout is vital for physician well-being and quality emergency care [35, 36].

To investigate the impact of COVID-19 on work stress in emergency physicians: The study of the impact of COVID-19 investigates the impact of occupational hazards on emergency and hospital physicians during the COVID-19 outbreak in Belgium [36, 37, 38, 39]. Notably, physicians exhibit a high perceived exposure rate to infectious diseases, especially COVID-19 (88%) [36, 37]. The occurrence of noninfectious hazards, such as latex allergy and radiation, was comparable to previous studies, but COVID-19 occurrence was higher (10%) [40, 41, 42]. Physicians report moderate perceived risk for noninfectious hazards, with violence having a higher risk perception than physical hazards [43, 44, 45]. During the COVID-19 lockdown, risk perception for COVID-19 was significantly higher than for other hazards. The study reveals high perceived exposure to stressors causing burnout (41%) [46]. Worry about COVID-19 is substantial (two-thirds), influencing physicians' coping attitudes. Concerns about violence (32%) and burnout (24%) are noteworthy, impacting healthcare quality and physician well-being [47, 48, 49]. Addressing these worries is crucial, particularly in the emergency department where potential contamination is present [48].

To highlight the role of resilience: Work stress significantly impacts the quality of life, job satisfaction, and overall well-being of emergency physicians [50]. Understanding the factors influencing job stress is crucial for preventing its negative outcomes. This study delves into the mediating role of resilience in the association between perceived work stress and burnout among emergency physicians, focusing on the interplay of these variables.

Correlation analysis revealed significant relationships among work stress, burnout, and resilience. As resilience increased, work stress and burnout decreased, highlighting the positive association between work stress and burnout [50]. The negative association between resilience and work stress aligns with previous research findings [51], emphasizing the importance of enhancing health workers' resilience to mitigate work stress.

The study findings emphasize the pivotal role of resilience in influencing work stress and burnout among healthcare professionals. Strategies that boost resilience are likely to reduce work stress, aligning with Ng and colleagues' assertion that resilience training is beneficial for mental health in physicians [52]. O'Dowd et al. [53] further support this, advocating for resilience strategies to protect against stress and burnout. Franck and colleagues reported a relationship between concrete coping behaviors and anxiety and somatization in healthcare workers during the first peak of the COVID-19 pandemic. His findings reveal important and complementary insights to improve and researching interventions in areas such as personal leadership and resilience [54].

The study confirms the moderating role of resilience in the relationship between work stress and burnout. Resilience not only differentiates the effects of stress on depression [55] but is consistently correlated with job satisfaction and negatively correlated with depression and burnout [56]. Unjai et al. [57] recommend tailored interventions to support intensive care staff well-being, reinforcing the need to consider resilience in such programs.

Interventions, such as resilience programs, have shown promise in improving healthcare workers' self-reliance and emotional regulation [58]. Evaluating the moderating role of resilience in the impact of work stress on burnout aligns with ongoing efforts to enhance healthcare professionals' well-being [59].

The study of the moderation role of resilience highlights the complex interplay between work stress, burnout, and resilience among emergency physicians. By acknowledging the mediating role of resilience, healthcare organizations can design targeted interventions to enhance resilience and reduce work-related stress, ultimately fostering a healthier and more resilient workforce.

To develop and test an intervention for stress reduction: The pilot study assesses the feasibility of a brief stress management training program, SMART-EM, for emergency physicians, revealing its viability within their constrained schedules. However, despite its acceptability, the study did not observe a significant impact on stress reduction, quality of life, and resilience [60]. Physicians today face increasing distress, with burnout rates reaching alarming levels globally [61, 62, 63, 64]. While moderate

stress can enhance motivation and productivity, excessive stress leads to burnout, jeopardizing mental health and patient care quality [65, 66, 67, 68, 69, 70]. Emergency physicians, in particular, exhibit higher burnout rates [71, 72].

Effective coping tools are essential; however, traditional methods prove insufficient for emergency physicians, necessitating innovative interventions [73, 74]. This study adds an unique dimension by investigating the effects of SMART-EM on burnout, differentiating it from prior studies [75]

Addressing physician burnout is crucial for personal well-being and patient care quality [76, 77, 78]. The study underscores the need for tailored interventions in this high-stress medical field, emphasizing the potential of SMART-EM as an effective coping tool [79].

Strengths and Limitations

In our comprehensive review spanning the past decade, all the included studies utilized robust, evidence-based models focusing on perceived stress, resilience, personality, stress management, and resilience training. Chapter two, in particular, incorporated a significant number of studies (33 out of 35) with a cross-sectional design. This approach allowed for an extensive exploration of burnout and its correlated factors, emphasizing the impact of diverse stressors on various dimensions of the burnout syndrome. We underscored the recognition of burnout's multifactorial nature and its susceptibility to a range of stressors and environmental influences.

The review advocated for the use of validated surveys to minimize the impact of unmeasured dimensions on study outcomes. Furthermore, it addressed the potential influence of non-respondents, such as individuals with significant burnout or Type-D personalities, on the results. An perspicacious examination of Type-D personality among emergency physicians shed light on this specific trait in a healthcare context, offering hypotheses on how it might influence their responses to work in the emergency department (ED).

Our analysis extended beyond academic EDs, encompassing physicians from non-academic emergency care departments. This inclusion provided valuable insights into a specific subgroup. The recognition of the significance of cross-sectional data in assessing occupational hazards, especially in the context of the COVID-19 pandemic, was a noteworthy aspect.

The review also initiated the exploration of the role of resilience in stress management among emergency physicians, presenting hypotheses about stress and resilience within this occupational group. The introduction of the SMART-EM program in a demanding work environment showed promising preliminary evidence of its efficacy in improving well-being.

However, it is crucial to acknowledge certain limitations in the reviewed studies. Some selected studies lacked effective randomization, potentially impacting the generalizability of findings. Variation in the status, education level, job activity, and

tasks of care providers across different countries posed challenges in making international Maslach Burnout Inventory (MBI) score comparisons.

Potential interference in survey data due to personal or environmental factors was noted, emphasizing the need for further validation through diverse studies involving emergency department professionals. A relatively small number of emergency physicians with Type-D personality in the study could impact the generalizability of findings.

Other limitations included the use of Dutch study samples for cutoff scores due to the lack of Belgian data, reliance on self-report questionnaires, and the inherent limitations of such instruments. The review also highlighted the need for caution in making full causal inferences, urging further approaches to test hypotheses. Possible biases were noted due to the inclusion of physicians from non-academic hospitals, and the lack of longitudinal data limited the assessment of stability over time.

Recruitment of participants via social media during the lockdown period may have led to conservative estimates of occupational hazards, and reliance on self-reporting raised potential issues of response bias. The small sample size in some studies could lead to selection bias, as well as incomplete data at follow-up limited the assessment of long-term effects. The absence of a non-intervention group in certain studies raised the risk of intervention bias, limiting generalizability.

In conclusion, while the reviewed studies provide valuable insights into stress, burnout, and resilience among emergency physicians, it is essential to address these limitations and advocate for further research with larger and more diverse samples, extended follow-up phases, and rigorous exploration of stress management and resilience training in different settings.

Considerations and Recommendations

This thesis serves as a validation of the methodological considerations outlined in the preceding sections, providing a comprehensive understanding of a myriad of occupational predictors and outcomes. The studies conducted within this framework contribute substantially to evidence-based knowledge regarding the development of occupational stress and well-being among emergency physicians.

The impact of burnout on emergency physicians is profound, affecting both their psycho-social and physical well-being, as well as influencing work characteristics and organizational factors. The economic implications cannot be underestimated. Across the 35 studies examined in the systematic review, it becomes evident that various stress factors significantly contribute to burnout, with emergency physicians scoring lower on personal accomplishment and higher on emotional exhaustion and depersonalization compared to other occupational groups.

The combination of personal factors, particularly exposure to work-related traumatic events, emerges as a critical determinant of burnout. To address this, the thesis recommends the implementation of coaching and psychological support programs as preventive measures. Protective factors include self-control over work-life balance, support from work environments and supervisors, and peer support, along with job satisfaction.

Recognizing the complexity of stressors, a multi-level approach is advocated to manage work stress effectively in emergency departments. This involves policies focused on the professional well-being of emergency physicians and the quality of patient care. The thesis also calls for further research to explore the multifaceted factors contributing to work stress and burnout among emergency physicians.

Considering the unique challenges faced during overwhelming periods such as the COVID-19 pandemic and terror threats, the thesis recommends enhanced preventive measures and coaching programs targeting individuals with Type D personalities to improve the well-being of emergency physicians.

Occupational hazards, ranging from physical hazards and violence to burnout and the challenges presented by COVID-19, are of substantial concern for emergency

physicians. The thesis underscores the importance of further studying the consequences of these hazards and their relationship with various job-related aspects, including demands, control, satisfaction, absenteeism, turnover, and both physical and psychological health.

In addressing the specific stressors faced by physicians, the thesis advocates for a comprehensive assessment, considering factors like long working hours, fear of virus contraction, emotional toll of patient care, and impacts on personal lives. It further emphasizes the need for healthcare organizations to provide a supportive environment, clear communication, access to personal protective equipment, and mental health support. Training on stress management, resilience, and coping strategies is recommended, along with the implementation of flexible scheduling options.

Resilience is emerging as a critical factor in reducing burnout among emergency physicians, with the study demonstrating the interaction of work stress and resilience. The thesis suggests that supervisors should develop effective programs to reduce burnout-contributing factors and enhance resilience and coping skills among emergency physicians.

The SMART-EM program, with its concise style, looks promising in reducing stress and burnout while improving the quality of life and resilience among emergency physicians. However, further research with larger study samples and extended follow-up periods is recommended to validate its effectiveness for broader implementation.

Finally, these recommendations underscore the necessity for a comprehensive and personalized approach to address burnout and work stress among emergency physicians. Also, to encourage for the implementation of comprehensive support systems that consider the complexity of factors contributing to burnout among healthcare professionals. These support systems should be tailored to meet the unique needs of emergency physicians and aim to promote their physical and mental well-being. Recognizing the unique challenges they face and the potential benefits of interventions and support programs in larger groups is emphasized, along with the imperative of destigmatizing the issue. The call for continuous monitoring and follow-

up interventions, encompassing pre-, per-, and post-intervention evaluations, solidifies the commitment to long-term physician well-being.

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Summary

This thesis compiles and analyzes five distinct chapters, each shedding light on the multifaceted challenges faced by healthcare professionals, particularly emergency physicians, in their honorable pursuit of saving lives and preserving the well-being of patients. Collectively, these chapters emphasize the critical importance of addressing the issues of work stress, burnout, and psychological well-being in the emergency medicine field.

The first chapter provides a background to the issues addressed in this dissertation. The objective to investigate the occupational well-being; personality Type D; association of perceived stress, resilience, burnout and an intervention SMART-EM study of emergency physicians that is intended. With a brief overview of the various chapters and a table showing the various predictors and outcomes used in the research chapters.

The second chapter presents a comprehensive review of the past decade's research, revealing the consistently higher levels of burnout experienced by emergency physicians compared to their peers in healthcare. It highlights the intricate interplay between work-related factors, personal characteristics, and the development of burnout, underscoring the importance of addressing these challenges to preserve the quality of care provided.

The third chapter delves into the influence of Type D personality traits on burnout among hospital and emergency physicians. It suggests that Type D personality may serve as a personality-related risk factor for burnout, particularly among emergency physicians. This underscores the imperative of integrating personalized prevention measures into support systems for healthcare professionals.

The fourth chapter unveils the profound impact of the COVID-19 pandemic on physicians working in emergency departments. It underscores the prevalence of occupational hazards, including infectious diseases, physical risks, workplace violence, and the threat of burnout, with an acute focus on the added burden of COVID-19. The findings underscore the urgent need for comprehensive strategies

and support systems to safeguard the physical and mental well-being of these dedicated healthcare professionals.

The fourth chapter introduces the "Stress Management and Resiliency Training (SMART-EM) program," offering a promising tool to mitigate stress, burnout, and enhance resiliency and quality of life among emergency physicians. The study reveals statistically significant improvements in perceived stress, quality of life, and burnout among participants in the SMART-EM program, further emphasizing the need for tailored interventions to address the well-being of healthcare providers.

The sixth chapter presents findings from a pilot intervention study that examined the effectiveness of the SMART-EM program in reducing stress and burnout while promoting resilience. The study demonstrates the program's potential to improve perceived stress, quality of life, and well-being, providing a valuable tool for mitigating stress among emergency physicians.

Finally, the seventh chapter provides a look at the second through sixth chapters that together reflect the critical need for a comprehensive approach to addressing the well-being of emergency physicians. Strategies should include comprehensive support systems, tailored interventions, and an understanding of the complex interplay between individual personality traits, work-related factors, and the development of burnout. The findings call for ongoing research and the development of targeted programs to preserve the physical and mental well-being of those dedicated to saving lives in high-pressure emergency departments.

Samenvatting

Dit proefschrift bevat en geeft een analyse van zeven afzonderlijke hoofdstukken, die elk een licht werpen op de veelzijdige uitdagingen waarmee gezondheidszorg professionals, met name spoedgevallenartsen, worden geconfronteerd in hun eervol streven om levens te redden en het welzijn van patiënten te behouden. Deze hoofdstukken benadrukken gezamenlijk het cruciale belang van het aanpakken van de problemen van werkstress, burn-out en psychologisch welzijn op medisch gebied van spoedgevallenartsen.

Het eerste hoofdstuk biedt een achtergrond voor de vraagstukken die in dit proefschrift aan de orde komen. De doelstelling van deze thesis is om het welzijn op het werk te onderzoeken; persoonlijkheidstype D; associatie van waargenomen stress, veerkracht, burn-out en een interventie-SMART-EM-onderzoek van spoedgevallenartsen. Met een kort overzicht van de verscheidene hoofdstukken en een tabel waarin wordt weergegeven welke voorspellende factoren en uitkomsten er gebruikt zijn in de research hoofdstukken.

Het tweede hoofdstuk presenteert een uitgebreid overzicht van het onderzoek van de afgelopen tien jaar, waarbij de consistent hogere niveaus van burn-out worden onthuld die spoedgevallen artsen ervaren in vergelijking met hun collega's in de gezondheidszorg. Het benadrukt de ingewikkelde wisselwerking tussen werk gerelateerde factoren, persoonlijke kenmerken en de ontwikkeling van burn-out, en onderstreept het belang van het aanpakken van deze uitdagingen om de kwaliteit van de geboden zorg te behouden.

Het derde hoofdstuk gaat in op de invloed van Type D-persoonlijkheidskenmerken op burn-out onder ziekenhuis- en spoedeisende hulpartsen. Het suggereert dat Type D-persoonlijkheid kan dienen als een persoonlijkheid gerelateerde risicofactor voor burn-out, vooral onder spoedgevallen artsen. Dit onderstreept de noodzaak om gepersonaliseerde preventiemaatregelen te integreren in de ondersteuningssystemen voor gezondheidszorgprofessionals.

Het vierde hoofdstuk onthult de diepgaande impact van de COVID-19-pandemie op artsen die op spoedgevallen afdelingen werken. Het onderstreept de prevalentie van beroepsrisico’s, waaronder infectieziekten, fysieke risico’s, geweld op de werkplek en

het schrikbeeld van burn-out, met een acute nadruk op de extra last van COVID-19. De bevindingen onderstrepen de dringende behoefte aan alomvattende strategieën en ondersteuningssystemen om het fysieke en mentale welzijn van deze toegewijde gezondheidszorgprofessionals te beschermen.

Het vijfde hoofdstuk introduceert het ‘Stress Management and Resiliency Training (SMART-EM)-programma’, dat een veelbelovend hulpmiddel biedt om stress en burn-out te verminderen en de veerkracht en kwaliteit van leven van spoedgevallen artsen te verbeteren. De studie onthult statistisch significante verbeteringen in waargenomen stress, kwaliteit van leven en burn-out onder deelnemers aan het SMART-EM-programma, wat de noodzaak van op maat gemaakte interventies om het welzijn van zorgverleners aan te pakken verder benadrukt.

Het zesde hoofdstuk presenteert bevindingen uit een pilot-interventiestudie waarin de effectiviteit van het SMART-EM-programma werd onderzocht bij het verminderen van stress en burn-out en het bevorderen van veerkracht. De studie toont het potentieel van het programma aan om waargenomen stress, kwaliteit van leven en welzijn te verbeteren, en biedt daarmee een waardevol instrument voor het verminderen van stress bij spoedgevallen artsen.

En het zevende hoofdstuk geeft een kijk op de het tweede tot en met zesde hoofdstuk die dan gezamenlijk de cruciale behoefte aan allesomvattende benadering om het welzijn van spoedgevallen artsen aan te pakken weergeeft. Strategieën moeten alomvattende ondersteuningssystemen, op maat gemaakte interventies en inzicht in de complexe wisselwerking tussen individuele persoonlijkheidskenmerken, werk gerelateerde factoren en de ontwikkeling van burn-out bevatten. De bevindingen vragen om doorlopend onderzoek en de ontwikkeling van gerichte programma's om het fysieke en mentale welzijn te behouden van degenen die zich inzetten voor het redden van levens in spoedgevallen departementen die onder hoge druk staan.

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Curriculum Vitae

Francis Somville ° 5th of April 1958.

Francis Somville, MD.
Emergency Medicine
Surgery - Traumatology
Evaluation Human Damage
Master in Insurance Medicine
Judicial expertise (P.A.O.G.) EXP no. 2022347
Lecturer Thomas More (Belgium)
BAP UAntwerp (Belgium)
Research Member at the Antwerp Surgical Training,
Anatomy and Research Centre (University Antwerp) (Belgium)
Research Member at the CRIC (University Antwerp) (Belgium)
Head of the Regional Trauma Centre of AZ St Dimpna Geel, Belgium
RIZIV no. 1/17295/75/149
Correspondence address: Klein Mijlveld, 44, 2547 Lint, Belgium
Email: francis.somville@uantwerpen.be; secretariaatsom@hotmail.com

Medical Education:

Leuven, Antwerp, Nijmegen, Leuven, Gent, Antwerp, Leiden, Antwerp

- Medical Doctor KULeuven 1985
- Specialization Surgery - Traumatology U.Z. Leuven 1985 1991
  * UAntwerpen - KULeuven University Exchange Program
  *KULeuven dept. Kortrijk
  *K.U. Nijmegen (The Netherlands)
  * KULeuven
- Senior Member Emergency & Traumatology department U.Z.Leuven
  Traumatology 1990 1992
- Emergency Medicine Ministry of public health and environment:1995
- Master Medico-Legal Medicine/ Master in Insurance Medicine KULeuven,
  UAntwerpen, RU Gent 1996
- Medical Judicial Expert (P.A.O.G.) Medical Law Expert RU Gent 2002

- Research study, Promoter: Prof. Dr. Van Sprundel. UAntwerp 2010
  How to analyze and prevent medical failures: A practical view of the physician
- Research Study , Prof. Dr. S. Maes+ U. Leiden 2008
  Stress related problems by emergency physicians
- PhD Study , Promoter: Prof. Dr. Erik Franck & Prof. Dr. Peter Van Bogaert
  UAntwerp Burnout among Emergency Physicians: from detection to prevention

Membership:

- Fellow of The International College of Surgeons (FICS)
- Fellow of The New York Academy of Sciences (NYAS)
- Fellow of European Society for Trauma and Emergency Surgery (ESTES)
- Fellow of The Belgian Society of Emergency and Disaster Medicine (BeSEDiM)
- Fellow of The European Society for Emergency Medicine (EUSEM)

Boards:

- Associated editor of Acta Chirurgica Belgica
- Member of the extended board of BeSEDiM
- Member of the well-being board of EUSEM

Scientific publications:

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1. Work stress and burnout among emergency physicians: a systematic review of last 10 years of research. **Somville F**, Van Bogaert P, Wellens B, De Cauwer H, Franck E (2023). Acta Clinica Belgica: International Journal of Clinical and Laboratory Medicine. https://doi.org/10.1080/17843286.2023.2273611.

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