Research Article

Brenda K Wiederhold*, Pietro Cipresso, Daniele Pizzioli, Mark Wiederhold, Giuseppe Riva

Intervention for physician burnout: A systematic review

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Abstract: Burnout is an important problem for physicians, with a strong impact on their quality of life and a corresponding decrease in the quality of care with an evident economical burden for the healthcare system. However, the range of interventions used to decrease this problem could be very fragmented and with the aim to shed some light on this issue, this study reviews and summarizes the currently available studies. We conducted a systematic review using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines to identify studies about intervention on physician burnout. Two authors independently searched into scientific databases to analyze and review the full papers that met the inclusion criteria. As a result, from an initial search of 11029 articles, 13 studies met full criteria and were included in this review. Of the 13 studies presented, only 4 utilized randomized controlled trials, therefore the results should be interpreted with caution. Future interventions should focus on a more holistic approach using a wider range of techniques. According to the studies selected in this review, it appears that a successful intervention for burnout should take into account the broad range of causes incorporating a variety of therapeutic tools.

Keywords: Intervention; Physician burnout; Systematic review; Burnout; Psychology; Assessment; Method

***Corresponding author: Brenda K Wiederhold,** Virtual Reality Medical Institute, Brussels, Belgium and Virtual Reality Medical Center, San Diego, California, USA, Tel. +1 858 642 0267 (office telephone), E-mail: b@vrphobia.eu
Virtual Reality Medical Center, San Diego, California, USA
Virtual Reality Medical Institute, Brussels, Belgium.
Mark Wiederhold, Virtual Reality Medical Center, San Diego, California, USA
Daniele Pizzioli, Virtual Reality Medical Institute, Brussels, Belgium.
Pietro Cipresso, Giuseppe Riva, Applied Technology for Neuro-Psychology Lab., Istituto Auxologico Italiano, Milan, Italy
Pietro Cipresso, Giuseppe Riva, Department of Psychology, Catholic University of Milan, Italy

Highlights

- We conducted a systematic review to identify empirical studies focused on interventions to impact physician burnout
- We followed the PRISMA guidelines to conduct this review, and two authors independently selected papers resolving disagreements through consensus
- Results highlight the impact of physician specialisation and personality traits
- Future interventions should focus on a more holistic approach

1 Introduction

Burnout is defined as a prolonged response to chronic emotional and interpersonal stressors on the job [1]. It results from an intense and strongly asymmetrical relationship between the "giver" and the "receiver" [1]. As stated by Maslach [2] burnout is particularly relevant for medical professions where the gap between demands and resources often leads physicians to exhaustion. Burnout can exist in near any occupation but may be more prevalent in "people work" fields, such as police work, social work, teaching and healthcare professionals (psychologists, nurses, etc.) [2].

Burnout has negative implications for job performance and social relationships [2-3]. The main feelings are a loss of work meaning, disillusionment, and the belief that self-investment may not bring the sufferer any closer to achieving lifelong goals. Consequently, lower productivity, decreased job satisfaction, job withdrawal, absenteeism, sick leave, and job turnover are the main results of burnout [3]. In addition, burnout is linked with physical health impediments such as muscle pain, headache, insomnia, respiratory illnesses and gastrointestinal disorders [4].

Physicians report a dramatically high incidence of burnout, that is highly variable and changes depending on different organizational contexts and the specific

sample [5-12]; it is estimated to range between 19% and 76% [13]. An estimated 22% of physicians in the USA, 27% of physicians in Great Britain [14], 20% of physicians in Germany [15] and between 22% and 32% of physicians in Italy, are estimated to suffer from burnout [16].

The European Agency for Safety and Health at Work estimated that the annual economic cost of work-related stress disorders in the EU was about 20 billion Euros, pointing out that burnout leads to a dramatic reduction in the quality of patient care and enormous economic costs to the health system. Similar losses have been estimated for other western countries [17, 18]. Consequently, research on effective therapeutic solutions is a priority.

The Maslach Burnout Inventory (MBI) [19] is the main measure of burnout as well as the most reliable measure. Three major components of burnout are identified and are evaluated by the MBI on three different axes. First of all, exhaustion is considered the main symptom and corresponds to the feeling of being emotionally overwhelmed. Second, depersonalization (or cynicism) refers to a specific inability to care about service recipients or to be absorbed in work activities. The last component is the lack of personal accomplishment, causing negative attitudes regarding oneself in relation to the job [3].

Burnout is a result of the specific characteristics of a person interacting with their unique situational factors. Even if the individual factors play a role in burnout occurrence, the relationship with organizational factors seems to be much stronger, which suggests that burnout is more a social phenomenon than an individual one [2-3, 20-22]. Different factors specific to the workplace can set the stage for burnout onset, while the nature of personality influences the interpretation of work characteristics, the different strategies to cope with the stressors, and the interactions with the work environment [20-22].

Although a variety of interventions have been studied in numerous professions, including caregivers and healthcare professionals, to date it is not clear which interventions may be considered effective. Individual studies report findings that are likely internally valid, though it may lack generalizability due to the lack of randomization. Current data concerning interventions for physician burnout are insufficient to recommend particular interventions. In the following section, a description of different physician intervention programs will be reviewed.

Organization-directed interventions aim to remove the causes of job stress and are expected to lead to long-term results [7]. This kind of intervention aims to reduce the presence of stressors through work procedures like task restructuring, work evaluation, supervision aimed at decreasing job demand, increasing job control or increasing the level of participation in decision-making [23]. Some interventions reduced physicians' work-hours in order to reduce burnout rate [24, 25]. These studies have shown that physicians following the programs felt more satisfied with their jobs, and significantly less exhausted, even if the quality of patient care does not increase and if there are some concerns about the time spent on their formation and their relationship with patients. The increase of social support within an oncological team has also been shown to have a significant effect on exhaustion [26]. Consistent with these results, communication training between nurse team members has also shown to be an effective intervention for the prevention of burnout [27, 28]. The training of emotional awareness and emotional management abilities seems to decrease burnout through the maintenance of an effective and appropriate relationship among team members. Various programs have been developed in hospitals to address a variety of personal and professional issues to ensure physicians' well-being. Some institutions have adopted trainings on various issues based on cognitive-behavioral approaches such as time management, relaxation techniques, focused breathing, meditation methods, self-awareness training, and support for a healthy approach to the work environment [29, 30].

While interventions that are organization-directed aim to achieve long-term changes through the reorganization of the work environment, individual interventions can be adapted for those persons who are already in the process of burnout. We must take into account that burnout symptoms are enduring in time and lead to stress-related health problems, decreased job performance, and to consequent decreases in quality of patient care [3, 19].

Individual interventions are primarily based on the enhancement of job competencies and coping skills or improved resilience through better control of negative emotions and relaxation exercises [31]. Studies that involve participants in the training program on negative emotions have been shown to be effective in decreasing negative affect and increasing positive affect [32] in different pathologies such as anxiety, depression or job stress. Unfortunately, no consensus exists at the moment.

The aim of this review is to shed some light on research about intervention for physician burnout, summarizes the currently available studies.

2 Methods

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines [33].

2.1 Search strategy

A computer-based search in several databases was performed for relevant publications describing physician burnout. Databases used for the search were: PsycINFO, Social Sciences Citation Index (Web of Knowledge), PubMed, Medline, and Web of Science (Web of Knowledge).

We searched using the string ("burnout" or "physician burnout") AND ("symptoms" OR "intervention" OR "rehabilitation" OR "therapy" OR "treatment"). More details are available in the "Search Strategy" document provided as supplementary material, available to make this study repeatable in the future.

We excluded articles where the full-text was not available or where the abstract lacked basic information for review.

The first search was performed for publications in the English language, and then we decided to clean the results, considering only publications from 1980 forward and eventually updated the search results through September 2015. Expert colleagues in the field were contacted for suggestion on further studies not consider in our search.

2.2 Selection criteria

We included articles on burnout treatments for physicians. We included only the articles that assessed burnout with the MBI scale. There are two reasons that motivate this choice. First, measuring the same construct improves the reliability of the comparison between different studies. Second, this criterion ensures that different pathologies such as work-stress, anxiety and depression, are excluded.

To be included in this review, studies had to be empirical and the results published in English.

We tried to contact corresponding authors of the included studies with the intent of obtaining incomplete or supplementary data.

2.3 Quality assessment and data abstraction

To assess a risk of bias, PRISMA recommendations for systematic literature analysis have been strictly followed. Two authors (D.P. and P.C.) independently selected paper abstracts and titles, and analyzed the full papers that met the inclusion criteria, resolving disagreements through consensus.

The data extracted from each included study were: type of therapy, sample type, study design, sample size, and selected findings.

2.4 Systematic Review Flow

The flow chart of the systematic review is shown in Figure 1. Our initial search yielded 9107 non-duplicate citations screened via PsycINFO, Soc Web of Science Core Collection (Web of Knowledge), PubMed, Medline, and other sources: more information is available in the Search strategy paragraph and supplement. After the application of inclusion/exclusion criteria, papers have been reduced to 279 articles. A more in-depth investigation of the full papers resulted in an exclusion of 267 articles.During the data extraction procedure, 26 additional full papers were excluded. In the end, only 13 studies met full criteria and were included in this review (Table 1). There is no proven research about burnout intervention; therefore, 13 studies should not be surprising.

3 Results

3.1 Selected studies on physician burnout

Despite a large volume of studies on work-related psychological difficulties, little has been done specifically concerning physician burnout. In the current review we present a broad range of different interventions assessed with the MBI scale (Table 1). The landscape appears to be very fragmented and presents many methodological weaknesses. In particular most of the studies lack randomized controls, detailed information on the treatment and on the characteristics of the sample. Of the 13 studies presented, only 4 utilized randomized controlled trials, therefore the

results should be interpreted skeptically. There is only a small number of control groups in intervention studies, however this needs to be considered in light of particular conditions of real life interventions addressing problem in balancing a control group. This represents a methodological problem that requires future studies to reconcile. In three recent studies [34-36] Mayo Clinic highlighted new methodological issues arising from acknowledgement of the changing patterns rather than of direct information. In a data science era this is not surprising, but classical RCT need to be considered and compared as well.

A cognitive-behavioural approach is acknowledged to be a very effective treatment for stress-related mood disorders, and there is strong evidence in the literature to show case its efficacy for providing permanent stress relief. Surprisingly, however, we found only two studies that focused on cognitive-behavioral techniques.

In particular the study by McCue et al. showed efficacy on the reduction of emotional exhaustion [37]. The subjects underwent a half-day workshop in which they were taught management of the stress of medical practice. The session focused on learning and practicing interpersonal skills that increase the availability of social support; prioritization of personal, work, and educational demands; techniques to increase stamina and attend to self-care needs; recognition and avoidance of maladaptive responses; and positive outlook skills. Although the study lacked a randomized control, it is noteworthy that a simple and inexpensive half-day workshop led to significant short-term burnout reduction.

Another study by Bragard et al used Stress Management together with communication skills training [38]. A first part of the intervention was organized into lectures on aims, functions, and specificity of physician-patient communication in cancer care, and on how to handle cancer patients' distress. The second part of the intervention focused on role-plays based on clinical problems brought up by the participants, followed by case discussions. The results showed a significant increase in self-efficacy and a decrease in stress to communicate, but no burnout reduction. The authors propose that the lack of burnout reduction may be due to the fact that only a few physicians in the sample experienced high burnout levels and that these subjects would be more sensitive to the training. Another explanation is that increasing the use of effective communication skills is not linked to burnout. It has been proposed that in order to make the intervention effective it should start early in the medical curriculum and be associated with work-directed interventions.

The study by Dunn, P. M. et al aimed at improving physician health and performance. It assessed long-term efficacy and sustainability of programs with the purpose

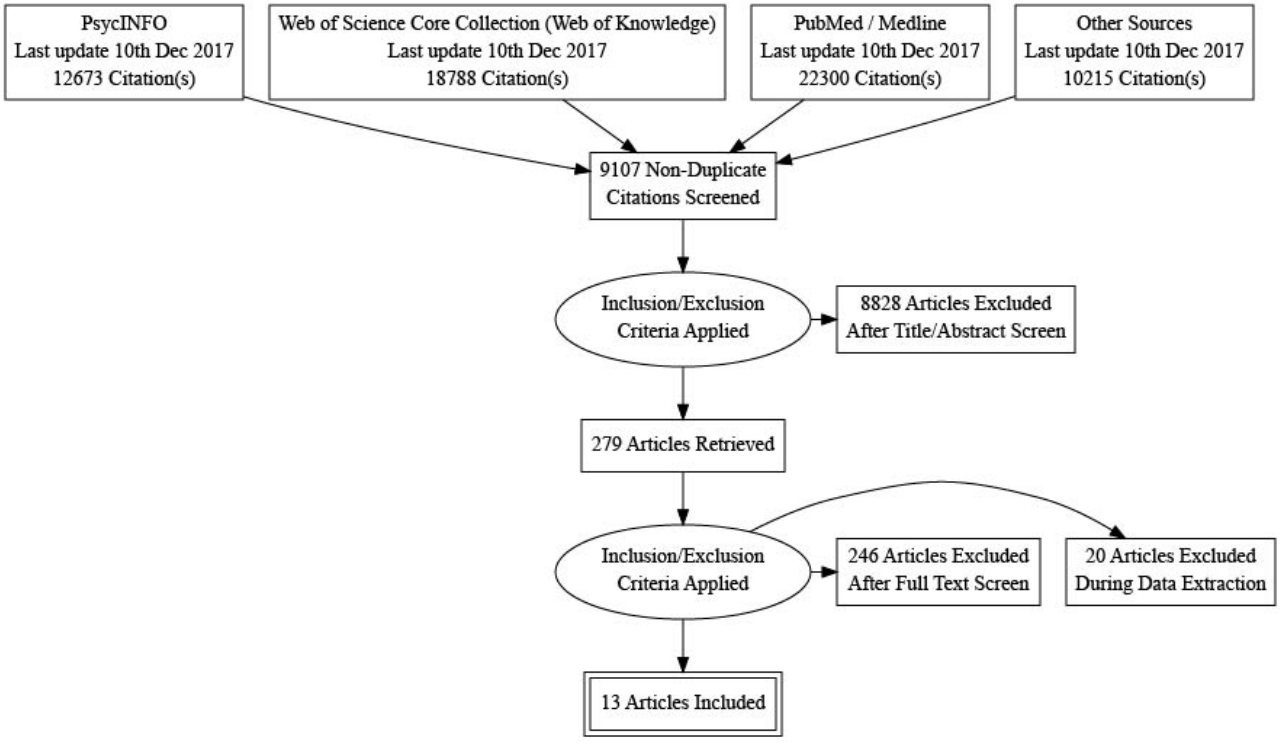

Figure 1: Flow diagram of study selection.

Table 1: Methodological characteristics, demographic information, and main results for studies on the treatment of physician burnout.

Authors	Type of intervention	Sample	Study design	N	Selected findings
Dunn, P. M., et al., 2007 [39]	interventional study	Physician	Noncontrolled prospective	22-32 over the period	Emotional and work-related exhaustion decreased significantly over the period
Milstein JM et al., 2009 [74]	Self-administered psychotherapeutic tool	Medical house officers	Non-randomized controlled trial	15	No significant differences between the groups
Italia S et al., 2008 [75]	Art therapy and CBT	Operators of oncology centers	Non-randomized controlled trial	65	Significant reduction of burnout
Le Blanc PM et al., 2007 [26]	Team-based intervention	Oncology wards	Non-randomized controlled trial	9	Significant reduction of exhaustion and depersonalization
Rø KE et al., 2008 [28]	Counseling intervention	Doctors	Cohort study	227	Significant reduction on the exhaustion dimension (associated with reduced working hours)
Krasner MS et al., 2009 [41]	Mindful communication	Primary care physicians	Pre-post, Non-randomized controlled trial	70	Significant reduction of burnout
Bragard et al., 2010 [38]	Stress management and communication training	Oncology medical residents	Randomized controlled trial	117	No significant differences between the groups
McCue et al., 1991 [37]	Stress management	Pediatrics and medicine-pediatrics residents	Non-randomized controlled trial	64	Significant reduction on exhaustion dimension
Butow P. et al. 2008 [40]	Communication skills training	Oncologists	Randomized controlled trial	30	No reductions in burnout levels
Ospina-Kammerer et al., 2003 [76]	Respiratory One Method (ROM)	Family medicine physicians	Randomized controlled trial	24	Significant reduction on exhaustion dimension
Weight et al., 2013 [34]	incentivized exercise program	Physician Trainees	Elective, team-based, 12-week, program	245	Residents and fellows may be much more sedentary than previously reported.
Shanafelt et al., 2015 [35]	Organizational leadership program	Physicians	Correlational (intervention deduced, not induced)	2813	New insights into organizational factors that affect physician well-being
Shanafelt et al., 2016 [36]	Changes in physicians' professional effort	Physicians	Longitudinal Assessment (intervention deduced, not induced)	1856 in 2011 and 1856 in 2013	Burnout and declining satisfaction were strongly associated with actual reductions in professional work effort over the following 24 months

to enhance physician and organizational well-being [39]. From 2000 to 2005, 22–32 physicians regularly completed three questionnaires. Data-guided interventions to enhance physician and organizational well-being were built on physician control over the work environment, order in the clinical setting, and clinical meaning. A data-guided program on physician well-being, using validated instruments and process improvement methods, enhanced physician and organizational well-being. Given the increases in physician burnout, organizations are encouraged to urgently create individual and systems approaches to lessen burnout risk.

A study conducted by Butow and colleagues with oncologists focused on communication skills training [40]. Similar to the study by Bragard and colleagues [38], the communication skills training consisted of an intensive face-to-face workshop of one and a half days, incorporating presentation of principles, a DVD mode-

ling ideal behavior and role-play practice, followed by video-conferences and role-play of scenarios brought up by participants. During role-plays, participants interacted with actors who were supplied with detailed scenarios to ensure a realistic presentation. Interviews and MBI measures were administered to all participants at baseline, after completing training and at 12 months post-baseline. Although there was an improvement in the communication skills, the intervention did not succeed in reducing levels of stress. Again, the authors attribute this result to the fact that the causes of burnout have been shown to be multifactorial, and a person-directed intervention alone may not be enough to show efficacy.

In the study conducted by Italia and colleagues on oncology units, burnout was successfully reduced using creative art therapy in a cognitive behavioral framework. The intervention was structured with different activities: psychodrama techniques aimed at promoting communicative exchanges; 'play-therapy' aimed at stimulating a sense of comfort by means of non-verbal communication based on play; Ericksonian relaxation techniques to reduce anxiety and negative emotions; discussion of a video that showed techniques used to support children during painful procedures. The results were statistically significant, however, the lack of a randomized control and the mixed sample (half physicians, half caregivers) make these results weaker.

Counselling therapy seems to be a good support for burnout patients, but not the only responsible factor for the positive effect. In a study by Rø et al, physicians were invited to describe their situations to a psychiatrist [27]. The therapy was based on an integrative approach with psychodynamic, cognitive, educational, and motivational interviewing theories. The authors concluded that a short term counselling intervention could contribute to reduction in emotional exhaustion in doctors, but that this effect was associated with reduced working hours and, in men, but not in women, was predicted by satisfaction with the intervention.

Another intervention, which succeeded in reducing burnout, was Mindfulness-based meditation therapy. This technique has been inherited from the Buddhist tradition and has been increasingly employed in Western psychology to alleviate a variety of mental and physical conditions [41]. Topics included in the therapy were: awareness of thoughts and feelings, perceptual biases and filters, dealing with pleasant and unpleasant events, managing conflict, reflecting on meaningful experiences in practice, setting boundaries, examining attraction to patients, exploring self-care, being with suffering, and examining end-of-life care. These themes framed and provided the rationale for the experiential exercises that comprised the majority of the session time.

Le Blanc and colleagues prepared a specific intervention for oncology ward units consisting of support group meetings in a non-judgmental environment during which care providers were able to share their work-related feelings and to discuss work-related problems and the ways of solving them [26]. The care providers in the experimental group felt significantly less exhausted than care providers in the control group directly after the program ended as well as 6 months later. The authors took these results as providing evidence that a team-based, participatory approach to burnout intervention may have a stabilizing effect on levels of burnout.

The intervention on self-administered psychotherapy reported by Milstein [74] was ineffective and used a very small sample. In addition, their participants presented no burnout on the MBI scale.

4 Discussion

Burnout can contribute to a broad range of psychological and physiological symptoms all of which can impact a physician's quality of life and lead to lower productivity, absenteeism, sick leave, and job turnover, with a consequent reduction of quality of patient care and enormous economic costs on the health system. Burnout is a social phenomenon related to work overload, time pressure, insufficient control in the workplace, low levels of decision-making, poor quality of communication at work, and insufficient rewards. These factors are difficult to control because they deal with the organization of institutions and its economical availabilities concerning more a political decisional level. However, work-hour regulation programs, as well as programs to improve physician team-communication skills have shown some efficacy in burnout reduction.

Personality characteristics seem to play a key role in burnout, and the high-risk personality profile is characterized by high neuroticism, low agreeableness, introversion, and negative affectivity. Personality traits could prove useful in future research to create more individualized interventions and to identify professionals who are more resilient to burnout.

Burnout is the result of a complex interaction between environmental stressors, genetic vulnerabilities, and coping styles. It leads to emotional exhaustion, depersonalization, and a sense of decreased personal accomplishment. The studies reviewed suggest that residents,

especially in the early years of training, are particularly vulnerable to developing burnout. In particular, specialties with the highest risk are critical care physicians, emergency physicians, oncologists and internal medicine physicians.

Different demographic characteristics have been studied such as age, gender, status, medical specialty, and personality attitudes. The understanding of how these factors influence burnout is a key issue because it can help to personalize interventions, which until now have focused on a "one size fits all" model [43].

Several studies report a negative effect of age on burnout. According to Spickard, burnout levels in physicians tend to decrease with age [44]. This trend is consistent with findings of other authors showing higher levels of burnout in younger versus older workers [45, 46, 47]. These finding are in line with the observation that burnout is negatively related to work experience [22, 3].

In a study of U.S. physicians, females were shown to be 1.6 times more likely to report burnout as compared to males [48]. The same author also claims that average reported income for female physicians was lower than for their male colleagues. The fact that females are still a minority in medicine may add social pressure to their position, and consequently play a role in their burnout levels. Another study of Dutch physicians found no gender difference in burnout levels, suggesting that previous results might possibly be due to cultural factors [3].

Burnout, depression and job-stress have to be considered as different problems even if they are interconnected, share several characteristics, and can sometimes be solved with similar solutions.

The stressors and the issues that physicians must face vary with their specific specialty. Consequently, there is a large body of literature that reports different incidence rates of burnout across specialties. According to a wide-reaching French investigation conducted on 3196 physicians, emergency physicians are the most predisposed to burnout reaching 51.5% compared with 42.5% found among other specialties [49]. In another study the emergency physicians scored even higher on the MBI scales, with an incidence of 60% scoring in the moderate to high burnout range [50]. Embriaco and colleagues found that almost half of critical care physicians studied in France had high levels of burnout symptoms and almost a quarter had significant symptoms of depression [51]. Similar results have been found in Italian critical-care physicians, with pediatricians reporting the lowest level of burnout and highest rate of work satisfaction [52]. A study on U.S. physicians in a health managed organization (HMO) showed a greater incidence of burnout among emergency care physicians and internists and a lower incidence among general surgeons and paediatricians [53]. These results are consistent with an extensive review on physicians' satisfaction that showed general internal medicine physicians have the lowest rate of job satisfaction, while pediatricians have the highest [46]. A Spanish study found that oncologists work in a high number of stressful circumstances and experience higher levels of burnout as compared to other specialists [54]. Studies conducted in France [55] and in the United States confirm the high burnout incidence and high stress level among cancer care physicians [56, 57]. In 2004, Martini and colleagues [58] did a unique study that compared burnout rates among the different specialties using the MBI. The overall burnout rate was 50% and ranged from 27% to 75% among different specialties. However variation among specialties didn't reach statistical significance, and this may be due to the fact that many important specialties were not represented in the study (e.g. critical care physicians, oncologists, and pediatricians).

Burnout seems to develop as the result of mismatches between professionals and their job context in different areas of working life. In contrast with the studies on individual variables, most of the research conducted on organizational risk factors can account for a significant amount of burnout. First, workload and time pressure have been found to be related with exhaustion. Overload depletes the capacity of workers to meet the demands of their job, particularly when there is little opportunity to rest and recover [3, 22, 59]. Insufficient personal control at the workplace or insufficient authority to pursue the work's goals is strongly correlated with exhaustion [59]. Additionally, a positive association between active participation in decision-making and lower levels of exhaustion has been shown [60, 61]. Not only insufficient financial reward, but also a lack of intrinsic social reward seems to increase a person's vulnerability to burnout and feelings of inefficacy [62, 63]. Another important factor is the quality of the social interaction at work. Work group cohesion is also a very good predictor of burnout and job satisfaction. This appears to mitigate stress-related effects and have a primary role in burnout prevention [64, 65, 66]. The leadership style of a supervisor also has some aspects in common with both reward and group cohesion. Burnout decreases when the supervisor is fair and supportive [67, 68]. In summary the most important organizational factors that may lead to burnout are work overload, time pressure, insufficient control at one's workplace, low levels of decision-making authority, poor quality of communication at work, and insufficient rewards. All these

findings provide a framework in which all the factors are strictly interdependent upon one another and at the same time interact with individual characteristics.

Personality also plays a critical role in affecting individual behavior at work, emotional reactions to work, and the predisposition to experience positive or negative emotions. McManus and colleagues found that physicians with high levels of stress show higher levels of neuroticism. In particular physicians reporting more emotional exhaustion also had higher neuroticism levels, as well as being more introverted, while those with higher levels of depersonalization report lower levels of agreeableness. Overall physicians' career satisfaction is related to lower levels of neuroticism [69]. Lue and colleagues measured the personality characteristics of physicians with high levels of burnout and found high levels of neuroticism, negative affectivity, and disengagement coping [70]. In summary evidence from literature indicates neuroticism, low agreeableness, introversion, and negative affectivity as the main personality traits related with burnout.

Interestingly a comparison between more compassionate-empathic physicians and other physicians revealed that physicians from the compassionate-empathic group are younger, have fewer years in medical practice, and score higher on pro-social, non-stereotypic attitudes toward patients and on empathy measures, but report more emotional exhaustion than other physicians [71]. It is worthy to note that even if the patient desires a compassionate and empathic physician, these attitudes are often found lacking in medical settings. All these findings appear to suggest that the same personality traits and coping strategies that make a "good physician" are the same that put them at a greater risk of burnout [72-73]. The fact that younger physicians seem to follow a more "idealistic" approach and a compassionate-empathic attitude may also explain why they are more exposed to burnout risk than the older physicians [72].

There exist a paucity of studies relating to person-directed interventions for physicians, and studies that have been undertaken employ a large variety of approaches, making comparison difficult. Some of the stress-management approaches seem to be at least partially effective, while others do not. In particular the studies that were more focused on communication skills training failed in reducing burnout. Perhaps these interventions may show a positive effect if considered as part of a more comprehensive treatment package. The relaxation techniques considered here succeed in reducing emotional exhaustion and may prove even more effective if combined with other interventions.

As an example of how empirically supported approaches for stress management can be transitioned to intervention of physician burnout states, we believe evidence points to stress inoculation training. For example, over the past ten years, we have been treating posttraumatic stress disorder (PTSD) with physiologically-driven virtual exposure. In general treatment of PTSD syndromes is reasonably successful, however, the approximate 10-20% of non-responders require further thoughts on additional approaches. It is clear that more weight needs to be given to prevention. We have successfully used pre-deployment stress inoculation training in U.S., Coalition, and NATO forces for both deployments into war zones and peacekeeping missions. In addition, pilot studies addressing the stress hardening needs of Special Forces troops and military medical corps personnel have yielded interesting information. Because the skill level of military medical corps personnel and Special Forces personnel is generally much higher than other deployed troops, we note that PTSD, when it occurs, presents differently than the standard model. In some cases, based on our preliminary investigations, the PTSD spectrum in many ways resembles severe burnout. We are actively investigating these important differences and are employing advances in wireless and mobile communication technology as a means to effect positive outcomes. For example, we have deployed iPhones to National Guard units currently in Afghanistan for the assessment of PTSD and TBI. This important and very difficult problem will require careful attention to presenting symptoms combined with innovative uses of advanced technology interventions.

5 Conclusion

According to the studies selected in this review, it appears that a successful intervention for burnout should take into account the broad range of causes and should incorporate a variety of different therapeutic tools. Reducing stress in only one aspect of the working condition and may not be sufficient to diminish burnout rate. An important set of techniques emerged in the studies reviewed here. Among them, the training of coping strategies, the training of interpersonal skills to increase social support, the management of negative emotions, the improvement of communication skills, the discussion of specific professional high-stress situations, and the use of relaxation techniques should be considered. All these therapeutic tools could be organized and synthesized into a more holistic, person-directed intervention. It appears that interven-

tions should also be developed at both the individual and institutional levels, in a balance between service responsibilities and personal training. Finally, new generations of physicians should begin individual-prevention training early in their careers in order to develop a skill set and personal belief system to provide effective inoculation against situations that may make them more prone to the experience of burnout.

Authors' contributions: DP and PC independently selected paper abstracts and titles, and analyzed the full papers that met the inclusion criteria, resolving disagreements through consensus. BKW, DP, PC and GR, participated in the study design and wrote the paper. BKW, MW, and GR conceived the study and participated in its drafting, design and coordination. All authors read and approved the final manuscript.

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