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REVIEW ARTICLE

Proposals for reducing burnout in Medical Residency: a narrative literature review

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Abstract

Objectives: Burnout syndrome can be defined as a long-term response to chronic emotional and interpersonal stressors at work. It comprises three domains: emotional exhaustion, depersonalization and lack of personal accomplishment. The prevalence of burnout syndrome among medical residents is high. Preventive interventions have already been performed in this population, at an individual level and inside organizations. The aim of this study was to carry out a narrative review of the literature on previously proposed interventions (mindfulness/self-compassion) to reduce the burnout syndrome among medical residents. **Methods:** We searched MEDLINE and LILACS for papers published from 2010 until December 2022, using the following keywords: "burnout AND resident OR residency". English and Portuguese language articles were used. **Results:** Of the 104 selected articles, 45 were repeated titles; two were written in Dutch; 39 were editorials, letters to the editor or abstracts; and eight did not include medical residentes or interventions. The ten articles included reported positive results with the implemented strategies (mindfulness, meditation), with score improvement in some aspects of the syndrome, such as emotional exhaustion, depersonalization and lack of personal accomplishment, but no consistent results of overall reduction of burnout syndrome were observed. Medical resident adherence to the programs was voluntary and varied widely. **Conclusion:** Intervention strategies for reducing burnout syndrome amongst medical residents seem beneficial, but further studies - including Brazilian data - are necessary to evaluate the efficacy of these methods.

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INTRODUCTION

Burnout syndrome (BS) can be defined as the long-term response to chronic emotional and interpersonal stressors at work.[1] First described in 1974 by Herbert J. Freudenberger as a condition where a feeling of failure and emotional exhaustion is observed , related to excessive consumption of energy, strength and resources.[2-4] Later, Maslach and Jackson (2016)[2-5] described the three domains that make up the syndrome: emotional exhaustion (EE), which refers to feelings of depletion of emotional resources; depersonalization (DP) which is the negative response to other people and reduced professional achievement (RPA) when the subject does not feel competent enough vis-à-vis the activity they perform.[2-4]

Maslach and Jackson developed an instrument, called Maslach Burnout Inventory (MBI), which assesses the aforementioned dimensions. This instrument is widely used to identify the syndrome. Initially, the questionnaire consisted of 47 items. Afterwards, the authors proposed a modification to the questionnaire, adapting it to 22 items, where a seven-point Likert-type response scale is used.[5] There are also summarized or abbreviated questionnaires (aMBI) from the MBI, used in some investigations. However, there is no universal consensus on what would be the best research tool to evaluate BS statistics, and several other instruments are applied to measure dimensions correlated with BS, such as well-being, empathy, compassion, among others.[6]

The prevalence of BS among doctors is high and has shown an increasing trend over recent years.[2] Among the factors related to this phenomenon we can mention the new challenges triggered by changes in society and, consequently, in healthcare systems. It should be noted, however, that the high prevalence of the syndrome in the medical profession has been observed since the undergraduate period. A cross-sectional study found a prevalence of 21% to 43% of moderate to severe BS, varying according to the medical student's year.[7] In Brazil, in a study carried out by Boni and collaborators, a prevalence of 44.9% of BS was reported in first-year students at a medical school in São Paulo.[8]

This trend is no different among resident doctors, with a prevalence of 35.1% of BS in residents of different specialties.[9] In Brazil, a study carried out by Gouveia and collaborators reported 27.9% of BS among residents of Hospital das Clínicas de Pernambuco.[4] In a recent survey carried out in RJ, it was shown that no Pediatrics resident among the hospitals evaluated presented a minimum score, that is, no evidence of the syndrome.[3] In this study, 4.6% participants showed some potential for development, 52.7% were in the initial phase of SB; in 38.9% SB was beginning to take hold and 3.8% (five residents) already had SB in a considerable phase.[3]

Considering the increase in the prevalence of BS among doctors in recent years, and its implications both on health systems, with the worsening of care provided, absenteeism and related costs, and on the individual's life, it is imperative that measures are adopted to prevent and mitigate the syndrome in this population.[3]

Some interventions aimed at preventing BS have already been carried out in this population. Interventions can be directed at the structure of the organizations where doctors work, removing the causes of stress. They are the most effective in the long term; however, they are the most difficult to apply as they depend on political decisions in higher spheres of power.[1] Individual interventions are based on improving work skills and coping and resilience strategies, through better control of negative emotions and relaxation exercises. Some institutions have adopted measures based on cognitive behavioral therapy, such as time management, relaxation techniques, breathing, meditation and mindfulness.[1]

Mindfulness can be defined as the intentional act of paying attention to the present moment, without judgment. Studies demonstrate the effectiveness of mindfulness-based interventions for conditions such as depression, anxiety, stress, and chronic pain.[10] Mindfulness skills enable people to be aware of their symptoms and respond with self-compassion and wisdom. In combination with cognitive-behavioral skills, this can be a very effective treatment for overcoming symptoms and reducing the suffering caused by them.[10] There are courses such as mindfulness-based stress reduction (MBSR) created by Jon Kabat-Zinn, from the University of Massachusetts, to teach mindfulness skills.[10]

However, there is no consensus on which measures would be the most effective, especially at the individual level, and studies present conflicting results.[11] More studies are needed to evaluate which interventions are the most useful for preventing and alleviating BS among resident physicians. Therefore, the objective of this paper was to carry out a literature review in order to describe intervention proposals to reduce BS among resident doctors, focusing on strategies to improve work skills and resilience, such as mindfulness.

METHODS

Narrative review of the literature, exploring studies that evaluated interventions to reduce BS in Medical Residency (MR) programs. A literature search was carried out in the MEDLINE (National Center for Biotechnology Information, Bethesda, MD) and LILACS (Latin American and Caribbean Health Science Literature Database) databases, using the following keywords: "burnout AND resident OR residency", since 2010 until nowadays. English or Portuguese language papers were used. Three independent reviewers (EBA, EAOCJ, MMRF) evaluated papers and included studies that presented original data on residents, with an identifiable intervention, in peer-reviewed papers. We chose to select papers that evaluated two interventions most frequently described in studies: mindfulness and self-compassion. The choice of this type of intervention also considered the ease of implementing these strategies, when compared to strategies

that operate at an organizational level. Editorials, letters to the editor, narrative reviews and summaries were excluded. Data were extracted on the characteristics of the study and the population evaluated, intervention, extent of BS, method of assessing BS and outcomes.

RESULTS

We selected 104 papers, 45 with repeated titles and two in Dutch were excluded. Of the remaining 57 articles, 39 were excluded because they were editorials, letters to the editor and abstracts. Thus, 18 papers were selected for full evaluation by the three reviewers. Subsequently, another eight papers were excluded because they were not about residents, did not have an assessment scale or were not intervention articles. In the end, data from all remaining studies (ten) were included in a table for better visualization and comparison (Table 1).[12-21]

From the table, we can see that the studies are quite heterogeneous, including residents from different specialties (some included residents from just one specialty such as Family Practice or Anesthesia) and others from multiple specialties.[12-21] The vast majority of studies were developed in the USA,[12,13,15-21] with the exception of one Dutch study.[14] There is no detailed description of the participants' gender and age in most studies; therefore these demographic data were not included in the table.[12-21]

Regarding the design, half of the studies were non-randomized interventions (most without a control group) and the other half were randomized clinical trials.[12-21] As an assessment scale, the MBI was the most used instrument, but other tools were used as well: Perceived Stress Scale, Brief Resilience Scale; Five Facet Mindfulness Questionnaire; Professional Fulfillment Index; Penn State Worry Questionnaire; Self-Compassion Scale Short Form; Cohen's Perceived Stress Scale-10; NIH EXAMINER; Cognitive Affective Mindfulness Scale-Revised (CAMS-R); Dispositional Resiliency Scale; among others.[12-21]

Regarding the intervention, several mindfulness programs were implemented, some lasting 10 hours,[12] others were longer such as the 20-hour MBSR.[14] A training program (Enhanced Stress Resilience Training - ESRT) based on mindfulness strategies was a of the interventions used.[15] Some studies were based on smartphone applications to implement meditation and mindfulness techniques.[18,19,21]

As for the outcome, the results are not homogeneous. All studies were intervention and voluntary choice by the group of residents to join the program. However, engagement was not 100%. Some demonstrated improvements in some aspects of BS, such as emotional exhaustion, depersonalization, and reduced professional fulfillment, but consistent results of a global reduction in the syndrome as a whole were not observed in several studies.[12-21] Lack of time and knowledge were the two main barriers to the practice of meditation, cited by residents in one of the studies.[21]

One of the studies carried out a pre- and post-intervention analysis of pro-inflammatory genes (NF-κB and AP-1), the stress-inhibited Type I interferon signaling pathway (ISRE), and the cAMP response element binding protein (CREB), which are stress-related RNA profiles known for the conserved transcriptional response to adversity.[15] It was observed in the pooled analysis of both trials that residents who participated in the training (ESRT) had reduced levels of pro-inflammatory RNA expression compared to controls.[15]

DISCUSSION

The conditions related to BS in resident doctors are multifactorial and involve the individual, the work and learning environment. Although MR is a graduate degree with in-service training, considered the gold standard for medical specialization and a period marked by intense learning, the resident is exposed to sleep deprivation, high workload, unsatisfactory salaries, in addition to taking on large responsibilities, fear of making mistakes and fatigue.[3,4,9] Therefore, MRI provides a series of anxiogenic and stressful factors for the professional in training.[3]

The studies analyzed in this review showed that intervention programs with mindfulness, meditation and improved well-being strategies brought benefits to residents, with reduced emotional exhaustion scores, depersonalization and reduced professional fulfillment.[12-21] However, these results are not consistent across all jobs. Some showed little or no change in these parameters. An important aspect was the engagement of residents in the programs, which may have influenced the results of each intervention. Other review studies have already demonstrated the difficulty of finding the optimal combination of interventions at individual and organizational levels to reduce BS.[22]

BS seems to be triggered by a mismatch between the professional and their work context and, although individual factors and personality traits are important, the syndrome, being a social phenomenon, is greatly influenced by the work environment.[1,2] The factors mentioned in the literature as the main factors involved in BS development are high workload, lack of autonomy, insufficient compensation (financial or social) and poor quality of communication at work.[1] Furthermore, factors such as subspecialty, marital status and Children under 21 are also factors that influence the prevalence of the syndrome among doctors.[1]

Our selection focused on mindfulness and self-compassion strategies to reduce BS. However, other individual or organizational interventions have been investigated with the same objectives. Strategies for reducing BS in MR may include reducing excessive workload, increasing the perception of control over their work, increasing recognition of the contribution of their work, better division of tasks and a sense of justice.[23] In a randomized study carried out with female residents only, a professional coaching program reduced emotional exhaustion and impostor syndrome

Table 1. Characteristics of intervention studies to reduce burnout syndrome in Medical Residency.

Source	Design	Population	Place	Scale	Intervention	Outcome
1.Author: Minichiello V et al.[12] **Journal:** Fam Med **Year:** 2020_	Intervention without a control group	17 Family Practice Residents	USA, 2016	Qualitative evaluation (transcription of telephone interviews and evaluation by 6 reviewers). Quantitative assessment (before, immediately after and 3 months after): Maslach Burnout Inventory (MBI), Perceived Stress Scale (PSS), Brief Resilience Scale and Five Facet Mindfulness Questionnaire	Mindfulness program: Mindfulness-Based Stress Reduction Curriculum (total of 10 hours divided into 5 sessions, weekly or bi-weekly)	Of the 17 participants, 3 residents participated in all 5 sessions; 7 participated in 4 sessions and 16 participated in at least 1 or 2 sessions; 8 residents completed the qualitative and quantitative assessments. Qualitative evaluation: positive feedback from the program: (1) appreciation of the use of the community space to practice mindfulness, (2) participation in a mindfulness training, (3) taking sessions during the first year of residency, and (4) one of the instructors was a family doctor. One point of controversy was whether the program should be mandatory or voluntary. Quantitative: significant improvement in depersonalization (DP), perceived stress and mindfulness experience. All responders fell outside the "high level of burnout" range on the emotional exhaustion (EE) and PD subscales.
2.Author: Szuster RR et al.13 **Journal:** Int J Psychiatry Med **Year:** 2020	Intervention without a control group	14 first-year residents from 2 non-surgical programs	Hawai, 2018	Assessment 1 week before, 1 week after and 3 months after. The scales used were: Professional Fulfillment Index (PFI) – professional satisfaction, stress and burnout; Patient Health Questionnaire-4 (PHQ4) – symptoms of depression and anxiety; and a four-point Likert scale – adherence to mindfulness practice	Mindfulness-based intervention pilot program (PRACTICE), integrated into residents' regular curriculum, with 4 2-hour sessions, every 2 weeks	There was no significant difference in the averages of professional satisfaction. There was a significant difference for professional exhaustion (post hoc tests with a tendency to reduce from pre- to post-intervention, with an increase in follow-up) "Interpersonal disengagement" differed significantly in the three assessment moments, with a reduction from pre- to post-intervention and an increase in follow-up. The composite burnout score had a similar result. These reductions were more important in individuals with a higher level of engagement. Despite reductions in depression and anxiety scores on the PHQ-4, only depression scores were significantly different.

3. Author: Verweij H et al.[14] **Journal:** J Gen Intern Med. Year: 2018	Randomized Clinical Trial	Residents from various clinical, surgical and primary care specialties.	Radboud University Medical Center Nijmegen, Holland	Dutch version of the MBI, renamed the Utrecht Burnout Scale (UBOS-C), where two items were deleted. Secondary outcomes: Penn State Worry Questionnaire; Survey Work–home Interaction NijmeGen (work from home); Five-Facet Mindfulness Questionnaire Short Form (mindfulness); Self-Compassion Scale Short Form (compassion); Mental Health Continuum–Short Form (mental health); Jefferson Scale of Physician Empathy.	The intervention was composed of MBSR (Mindfulness-Based Stress Reduction), which consists of 8 weekly sessions of 2.5 hours at night and 6 hours of silent daytime on the weekend. Participants practiced mindfulness exercises, including yoga and meditation. They received education about stress, and were instructed to practice daily at home for 45 min. They were encouraged to become aware of automatic behaviors and consider replacing them with healthier behavior.	Of the 148 participating residents, 138 (93%) completed the post-intervention assessment. There was greater participation of females (88%) and clinical specialties compared to surgical specialties. There was no significant difference in emotional exhaustion between the two groups. However, the MBSR group reported significant improvements compared to the control group in professional achievement ($p = 0.028$), concern ($p = 0.036$), mindfulness techniques ($p = 0.010$), self-compassion ($p = 0.010$) and empathy ($p = 0.025$).). No effects were observed for other measures.
4. Author: Lebares CC et al.[15] **Journal:** Ann Surg. **Year:** 2021	Randomized clinical trial	Surgery and multiple specialties residents - 1st year of Graduate Studies (PGY1), who were undergoing surgery training.	University of California, San Francisco	The following scales were used: Cohen's Perceived Stress Scale-10 (perceived stress); NIH EXAMINER (Executive Abilities: Measures and Instruments for Neurobehavioral Evaluation and Research) to assess cognitive function; Cognitive Affective Mindfulness Scale-Revised (CAMS-R) to assess well-being; Brief MBI with 9 items. Furthermore, a pre- and post-intervention genetic analysis of pro-inflammatory genes (NF-κB and AP-1), stress-inhibited Type I interferon signaling pathway (ISRE), and the cAMP response element binding protein (CREB) was performed. , which are stress-related RNA profiles known for the conserved transcriptional response to adversity.	The intervention consisted of 8 weekly 2-hour classes in the 1st year of residency (Enhanced Stress Resilience Training - ESRT-1), focused on the development of mindfulness techniques. In the 2nd year (ESRT-2), there were 6 weekly 90-minute classes with techniques more applied to surgery, hospital work and challenges of maintaining well-being during demanding training. Both trainings took place in protected times, and focused on 3 cognitive skills: interoception (i.e., moment-to-moment awareness of thoughts, emotions and sensations), emotional regulation (i.e., development of non-reactivity in response to these stimuli) and metacognition (i.e., conscious perception of these cognitive stimuli).	Neither training version reduced perceived stress. Higher executive function and mindfulness scores were observed during training in the 1st year (ESTR-1), and lower emotional exhaustion and depersonalization scores in the 2nd year (ESTR-2), in the pre/post intervention, at a 50-week follow-up (ESRT-1) and at 32-week follow-up (ESRT-2), compared to controls. In pooled analysis of both trials, residents who participated in training (ESRT) had reduced levels of pro-inflammatory RNA expression compared to controls.

5. Author: Ricker M et al.[16] **Journal:** Fam Med. **Year:** 2020.	Intervention with a Control Group	Family Practice Residents (1st, 2º, e 3º anos).	University of Arizona, Tucson; Beth Israel Medical Center, New York; Carolinas Medical Center, Charlotte; Hennepin County Medical Center, Minneapolis; Maine-Dartmouth, Augusta; Maine Medical Center, Portland; University of Connecticut, Hartford; e University of Texas Medical Branch, Galveston.	The following scales were used: MBI, PSS, Center for Epidemiologic Studies – Depression Scale (CES-D), Satisfaction with Life Scale, Positive and Negative Affect Scale, Interpersonal Reactivity Index, Trait Meta-Mood, Gratitude, Freiberg Mindfulness Inventory.	251 family practice residents were included. Eight programs were selected to begin a pilot Integrative Medicine program in the curriculum, and four were recruited to serve as controls (without formal education in Integrative Medicine). Aspects such as the heterogeneity of programs were considered (e.g. academic and community aspects; urban x rural location).	Two indicators of burnout (emotional exhaustion, depersonalization) increased between the beginning of the residency and the beginning of the 2nd year, remaining high during training. Emotional intelligence was lower at graduation than at the beginning of residency. On the other hand, measures of well-being (stress, life satisfaction, affection) increased during the 2nd and 3rd years. Depression, mindfulness and gratitude remained stable. High levels of burnout risk were negatively associated with emotional intelligence, mindfulness and gratitude.
6. Author: Ricker M et al.[17] **Journal:** Fam Med. **Year:** 2021.	Intervention without control group	1st year Graduate Residents (PGY1) - various specialties (Anesthesia, Emergency Medicine, Family Medicine, Internal Medicine, Neurosurgery, OBGYN., Pediatrics, ENT, Surgery, Orthopedics, Psychiatry)	University of Arizona Tucson Medical School	The following scales were used: MBI, Dispositional Resiliency Scale, Connor-Davidson Resiliency Scale, Response to Stressful Experiences, Gratitude, Wellness behaviors, Course evaluation survey	Residents were enrolled in the program 1 month prior to orientation, with support from a medical wellness education subcommittee. Participation was voluntary. The 4.5-h online courses taught wellness fundamentals (sleep, nutrition, exercise, resilience, and mindfulness) and included a 10-min, daily, 2-week, self-selected resilience activity. Participants completed self-assessments before starting the courses.	Approximately 2/3 of residents completed the study (n=53/87, 61%). Significant improvements ($p < 0.05$) were found for resilience and burnout (emotional exhaustion, depersonalization). There was no change in gratitude. The professional achievement index of the burnout scale declined. The most frequently reported wellness behaviors were in the area of sleep, exercise and diet.

7. Author: Carullo PC et al.[18] **Journal:** J Clin Anesth **Year:** 2021	Intervenntion without control	Anesthesiology Residents and Fellows.	Department of anesthesiology of the University of Pittsburgh	Questionnaires included the short MBI, Depression Index, Cohens Stress Score, Pittsburgh Sleep Quality Index, and a Headspace® self-questionnaire.	Anesthesia residents and fellows received 1 free year of a mindfulness app. Participation was voluntary and included burnout and well-being questionnaires at 0, 1 and 4 months.	Of the 112 eligible residents, 71 completed baseline questionnaires, 54 created app accounts, and 29 completed the full protocol with 4 months of app use. Use of the app was associated with reduced depression scores and increased levels of professional achievement in the 1st and 4th month. Burnout and feelings such as depersonalization and emotional exhaustion did not improve with the use of the application.
8. Author: Weitzman RE et al.[19] **Journal:** Laryncoscope **Year:** 2021	Crossover, prospective, randomized assay.	Otolaryngology residents (ORL)	Departments of Otolaryngology and Anesthesiology of Mount Sinai, New York	Residents completed the MBI at baseline and after 2 months when they crossed over.	One group used a virtual reality (VR)-based meditation app and a second group received no intervention. VR-guided meditation was done for 10 minutes weekly using a smartphone app that guided users through rhythmic breathing and mindfulness meditation. The software combined a smartphone coupled with a Samsung Gear Oculus VR headset. After 2 months, all subjects completed an MBI and crossed over to the other arm.	Eighteen residents completed the study (five females). Weekly use of VR guided meditation and rhythmic breathing was associated with a significant reduction in emotional exhaustion (p=0.009) and in subgroup analysis, male gender was associated with a reduction in emotional exhaustion (p=0.027). In the post-intervention interview, 42.9% of the participants reported that VR encouraged them to employ rhythmic breathing, 71.4% reported that they would use the technology if available, and 21.4% reported that they will use rhythmic breathing in the future.
9. Author: Brennan J et al.[20] **Journal:** Int J Psychiatry Med **Year:** 2015.	Non-randomized clinical trial. Note: They did not describe very well how this sample was selected.	23 residents from the Family Practice residency program	USA	The main objective was to describe an intervention to prevent burnout and its effects in the 2 programs where it has already been implemented. They used: Connor-Davidson Resilience Scale, the Professional Quality of Life Scale, and the MBI.	A series of interactive and experiential sessions were developed based on the literature. Mindfulness was just the topic of one of these sessions. Note: They described the intervention with a control group, but although they describe the intervention in detail, they do not clearly state the methodology.	22% of residents showed emotional exhaustion, 9% depersonalization and 48% low personal fulfillment. Residents in the intervention group rated the sessions as useful with a score of 9.25 out of 11.

10. Author: Taylor M et al.[21] **Journal:** Pediatr Ann. **Year:** 2016.	Intervenion without a control group (pilot study)	Pediatrics Residents	University of Chicago, USA	We used three scales: short MBI and the Mindful Attention Awareness Scale	Participants used the free Headspace® smartphone app to complete a 10-day program in mindfulness meditation. Each session consisted of a 10-minute recording, which was a combination of educational material and a short guided meditation.	Of the 33 registered, 31 completed the initial questionnaires and 11 completed the final questionnaires. A total of 71% of the residents had tried some form of meditation or had a personal practice. Lack of time and knowledge were the two main barriers to meditation practice, with 84% of residents citing time as the main limitation. After the intervention, there was an increase in the percentage of residents who perceived mindfulness as a useful intervention for patients and, a statistically significant increase in those who planned to use mindfulness as a therapeutic option for their patients (61% of 48%; 95% CI 2.3- 23.9). High levels of emotional exhaustion were also present, with 2nd year residents accounting for the highest average score (15.4 out of 18.8).

scores in residents.[24] Professional coaching uses perceptions, beliefs and habits to reshape and align work with personal values.[24] In a systematic review In a recent study, Busireddy and collaborators demonstrated that an intervention reducing residents' workload consistently led to a reduction in emotional exhaustion, with lower BS scores.[22] On the other hand, reducing workload can lead to inadequate resident training, being a challenge for preceptors.[22] Other interventions such as self-care workshops improved depersonalization and meditation reduced emotional exhaustion in this same study.[22]

Our review demonstrated high rates of BS at the beginning of some residencies and an increase in these scores throughout training.[16,21] These results are in line with the literature cited previously.[3,4,9] In general, the interventions were well received by residents, but there was not 100% engagement in the programs. One of the studies cited that 84% of residents considered lack of time as the main limitation for implementing these strategies.[21] Some residents may see the program as an additional task within their already busy day. Therefore, these strategies must occur within a time protected from MRI, as was done in most studies.

One of the innovative aspects observed in some studies was the use of smartphone applications and virtual reality glasses to implement meditation/mindfulness strategies.[18,19,21] The results obtained through these applications were similar to the rest of the studies with a reduction of some parameters of BS.[12-21] Therefore, the use of new means of digital communication can be an interesting alternative that is easier to accept by residents in today's world.

Another study that differed from the others carried out a genetic analysis of stress-related RNA profiles, known for their conserved transcriptional response to adversity, showing a reduction in the genetic pro-inflammatory profile in those residents who received the intervention.[15] Based on these results, new studies can be carried out investigating the influence of these strategies at the molecular level.

Although it was not the objective of our study, it is important to consider the consequences that BS brings to the affected individual. It is closely linked with other common mental disorders, to the point that it is considered by some authors as an entity within the spectrum between stress and mood disorders such as Major Depression.[11] Therefore, not

only risk of depression and other common mental disorders is increased in these individuals,[11] as well as the presence of physical symptoms such as muscle pain, headache, insomnia, respiratory and gastrointestinal disorders.[1] Furthermore, it is associated with risk behaviors such as drug abuse, increased interpersonal conflicts, disruption of relationships and poor quality of life.[2] The negative consequences of BS will also affect work performance, with lower productivity, absence from work, absenteeism and job change,[1] in addition to increasing the chance of error and interfering with resident learning.[8] In this way, BS leads to a reduction in the quality of patient care and large economic costs.[1]

Our study has some limitations. When carrying out the review with a focus on mindfulness and self-compassion, it is possible that some articles were not included and evaluated. Another aspect is publication bias. We observed that the vast majority of studies are American, in some cases with similar groups. This may be due to the fact that perhaps these studies are paying more attention to the topic, including the development of a mindfulness program, such as MBSR, by the Department of Psychiatry at the University of Massachusetts. This Department forms partnerships with other places to implement MBSR, helping other residences.[10] On the other hand, our study carried out an extensive review on a topic of extreme relevance to MR, bringing possibilities of useful strategies that are easy to implement in programs and that can have a significant impact on residents' mental health.

CONCLUSION

Intervention strategies to reduce BS among medical residents, such as mindfulness and meditation, were beneficial, with a reduction in emotional exhaustion, depersonalization and reduced professional achievement scores. However, the data is not consistent, perhaps due to the lack of resident compliance. New studies, including with Brazilian data, are necessary to better clarify the effectiveness of these methods.

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