

Stress management interventions among healthcare workers using mindfulness: a systematic review

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Abstract. *Background:* stress among healthcare professionals has gained more and more attention due to the negative consequences on their and patients' health. As a result of intense working hours, night shifts, responsibilities of care, and emotional contact with patients, healthcare workers experience stressful conditions. Interventions to prevent and manage their wellbeing are needed, in order to reduce the risks of onset of burnout syndrome.

Aim: the aim of this systematic review is to analyze how mindfulness courses can improve mental and physical well-being of healthcare workers.

Methods: a literature search was conducted in May 2018 using the databases Medline (PubMed), Scopus and Isi Web of Knowledge. Studies were included if they examined mindfulness interventions as possible solutions to manage stress among healthcare workers.

Results: fifty-eight articles met the inclusion criteria: 13 of them were clinical trials; 11 were randomized clinical trials; 12 were systematic reviews; 7 were narrative reviews and 15 were observational studies. The studies included showed effectiveness of mindfulness programs in reducing stress, self-compassion, burnout, anxiety and depression. Significant negative association has been observed between MBSR and stress levels (β : -0.60, 95% CI:-5.95 to -4.04, $P < 0.001$) and mental exhaustion (β :-0.43, 95% CI:-3.30 -1.86, $P < 0.001$). Clinical trials focused on psychoeducational interventions highlighted decreased burnout scores in intervention group (SDM: -0.38).

Conclusion: courses based on mindfulness showed to be effective in improving healthcare workers' well-being, increasing their quality of life and the productivity outcomes. The evidence derived

from this systematic review suggests that these interventions should be included within the work organization in order to be viable tools for promoting self-care and quality of care.

Keywords: mindfulness, stress, MBSR, healthcare workers, stress management

Introduction

The National Institute of Health underlines that “persuasive evidence exists that meditation interventions are associated with better health outcomes”(1). Indeed meditation is one of the oldest methods to reduce and manage stress (2-3).

Mindfulness can be defined as a person’s attitude to remain “purposefully and nonjudgmentally attentive to their own experience, thoughts and feelings” and (4) can be considered living the present moment and accepting it without judgment, which means let go worries about past or future at least temporarily (5). Mindfulness Based Stress Reduction (MSBR) is an 8-week intensive training in meditation that combines mindfulness meditation with yoga; it was created by Kabat-Zinn and colleagues in 1979 at the Stress Reduction Clinic at the University of Massachusetts. The program consists of weekly classes of two-and-a-half hour with records to practice at home concerning the techniques learned and a daylong retreat (6).

Mindfulness-based interventions focus on lowering reactivity to challenging experiences (7). Baer et al conceptualized it as a combination of five main items: observation of internal and external experiences, description and labeling, act with awareness, not reacting to thoughts and feelings, being non-judgmental (8). The program has been found to be effective in relieving stress and in improving well-being in multiple studies with patients affected by mental and physical diseases (1) as depression or psoriasis (9). Some studies showed an impact on the parasympathetic system, immune function and grey matter density (10-13). In fact, after the course, structural magnetic resonance images show morphologic changes: increased cortical thickness and grey matter density in the posterior and anterior cingulate cortex, hippocampus and insula. Functional studies have demonstrated increased activation in these areas as well. Cingulate cortex and insula are involved with attention and body awareness (14) and these areas of the prefrontal cortex are involved with acceptance, emotional processing, emotional regulation, perspective taking and compassion (15). Moreover, studies have demonstrated decrease in both size and activation in the amygdala which is primarily responsible for stress response (16).

More recent is the attention to the potential benefits of mindfulness on physicians and other health professionals to reduce stress and burnout and improve quality of life (17). Stress among healthcare professions has gathered significant attention because of the negative impact on workers and on patients. Stress and burnout tend to be more common among health professionals as a result of working hours, responsibilities of care, and emotional contact with patients (18-20). However, only few studies focused on stress management to reduce psychological distress and enhance quality of life (21).

The aim of this systematic review is to analyze how mindfulness courses can improve mental and physical well-being of healthcare workers.

Methods

Identification of relevant studies

According to Prisma statement (22), a systematic search was carried out for studies that examined mindfulness interventions among healthcare workers. The search was undertaken in May 2018; PubMed, Scopus and Isi Web of Knowledge were investigated using the following search algorithm: “mindfulness AND stress AND healthcare worker”. No restrictions of language were applied. The search for the missing full texts was carried out with NILDE University Network (Network Inter-Library Document Exchange); reference lists of identified studies were checked.

The first selection was performed filtering duplicated articles using release of software Zotero 5.0. Two researchers independently analyzed titles and abstracts. Then, each investigator evaluated full-texts according to the inclusion criteria. Disagreements between the two researchers were resolved during a consensus session with a third reviewer. Where there was ambiguity in trial reporting or lack of data, primary authors were contacted for clarifications whether possible. Articles that took into account interventions to manage stress based on mindfulness among healthcare workers were included in the systematic review. Primary studies (clinical trials, case-controls) and secondary studies (systematic and narrative reviews) were included.

Data extraction and management

The following information, if available, were extracted and reported of each study from two independent reviewers:

- First author and year of publication;
- Country;
- Study design;
- Aim of the study;
- Population;
- Outcomes;
- Measurement scale.

Interventions

Mindfulness techniques and courses are numerous: the standard course is “Mindfulness Based Stress Reduction (MBSR)”, an 8-week intensive training in meditation that combines mindfulness meditation with yoga. Other abbreviated and shorter versions have been implemented. Mindfulness courses often involve also nutrition advices and elements of psychoeducation.

Outcomes

The studies investigated the effect of interventions based on mindfulness and other related meditation trainings on different outcomes: anxiety, stress, depression and burnout. General well-being, compassion fatigue and mindfulness specific items were further analysed.

Compassion fatigue (CF), in particular, is the phenomenon of stress resulting from exposure to a traumatized individual rather than from exposure to the trauma itself (23).

Measurement scales Maslach Burnout Inventory (MBI), the most frequently used questionnaire, includes 22 items that measure all three burnout dimensions: emotional exhaustion, depersonalization and low personal accomplishment. MBI is considered the gold standard for identifying burnout in medical research literature (24). Perceived Stress Scale (PSS) is a 10-item self-administered questionnaire measuring perception of stress over the last months (25). Five Facets Mindfulness Questionnaire (FFMQ) is a 39-item self-report measure of the five facets of mindfulness: observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience (26).

Freiburg Mindfulness Inventory (FMI) is a useful, valid and reliable questionnaire of 14 items that cover all aspects of mindfulness (27). Spielberger State Trait Anxiety Inventory (STAI) evaluates the State Anxiety Scale (S-Anxiety) about the current state of anxiety and the Trait Anxiety Scale (T-Anxiety) which estimates general states of calmness, confidence and security (28). Depression Beck Inventory (DBI) is a 21-item self-report measure, one of the most used scales worldwide for measuring depression (29). The Self-Compassion Scale (SCS) is a 26-item self-report measure assessing self-compassion of the individuals via six proposed subscales (30). The Depression Anxiety and Stress Scales (DASS) is a wide used screening tool to assess symptoms of depression, anxiety, and stress in community settings (31). The Mindful Attention Awareness Scale (MAAS) is a 15-item scale that measures the tendency of individuals to be aware and to focus on the present moment (32).

Results

Fifty-eight articles met the inclusion criteria: 13 of them were clinical trials; 11 were randomized clinical trials; 12 were systematic reviews; 7 narrative reviews and 15 were observational studies. (See **Flowchart - Fig. 1**) The studies included showed effectiveness of mindfulness programs in reducing stress, self-compassion, burnout, anxiety and depression.

In **Table 1** the characteristics of the included studies are shown.

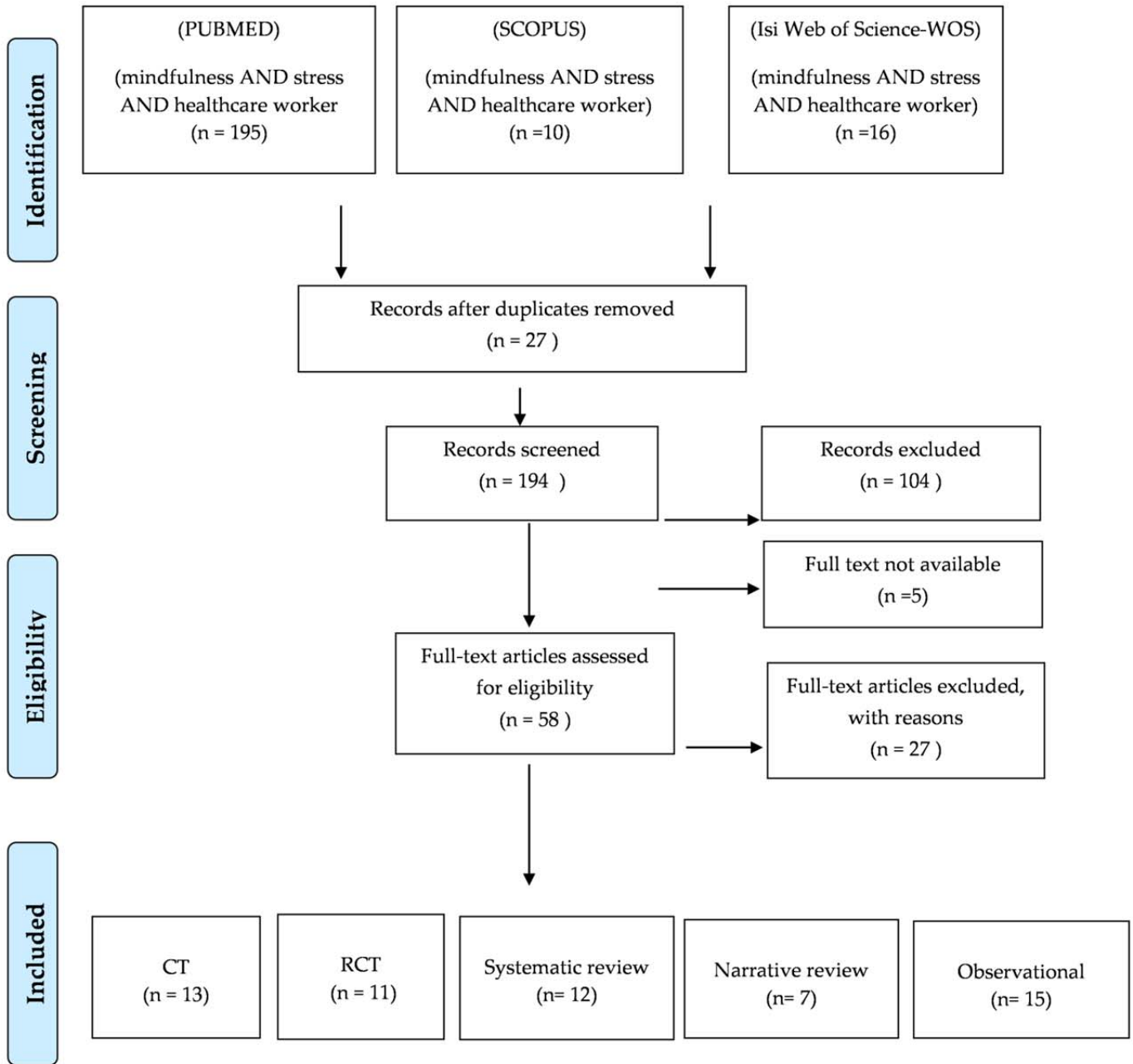


Fig. 1 - PRISMA 2009 Flow Diagram of the selected studies

Table 1

First Author/ Year	Country	Study design	Aim of the study	Population	Outcome	Measurement scale
Brady 2011	USA	Cross-Sectional	Examine the impact of the mindfulness-based stress reduction (MBSR) program on managing work stress and improving patient outcomes	Health staff of Psychiatric Unit	Stress and patient outcome	Mental Health Professionals Stress Scale (MHPSS) Toronto Mindfulness Scale (TMS), the Sense of Self Scale (SOSS), the Maslach Burnout Inventory (MBI), and the hospital patient satisfaction survey.
Hallman 2014	England	Cross-sectional	Reduce perceived levels of interprofessional staff stress and to improve patient and staff safety by implementing a brief mindfulness-based stress reduction (MBSR) training program on a high acuity psychiatric inpatient unit.	Interprofessional staff of a high-acuity inpatient adolescent psychiatric unit	Stress and safety improvement	Toronto Mindfulness Scale (TMS) and the Perceived Stress Scale (PSS)
Westphal 2014	Switzerland and US	Cross-sectional	Explore benefit of MBSR for emergency room personnel	Emergency room personnel	Anxiety, depression, burnout	Hospital Anxiety and Depression Scale, Maslach Burnout Inventory, Mindful Attention Awareness Scale

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Atanes 2015	Brazil	Cross-sectional	Verify correlations among self-reported mindfulness, perceived stress (PS), and subjective well-being (SW) in Brazilian Primary Health care Professional	Physicians, Nurse	Mindfulness, stress	Mindful Attention Awareness Scale (MAAS), the Perceived Stress Scale (PSS), and the Subjective Well-being Scale (SWS).
Chaukos 2016	USA	Cross-sectional	Investigated hypothesized risk and resilience factors and their association with burnout	First year medicine and psychiatry residents at an urban teaching hospital	Burnout	Maslach Burnout Inventory (MBI), Perceived Stress Scale-10, Functional Assessment of Chronic Illness Therapy-Fatigue Scale, Penn State Worry Questionnaire, Patient Health Questionnaire-9 (depression symptoms), Revised Life Orientation Test (optimism), Self-Efficacy Questionnaire, Cognitive and Affective Mindfulness Scale, Interpersonal Reactivity Index Perspective-Taking Scale (empathy), and Measure of Current Status-Part A
McPherson 2016	United Kingdom	Cross-sectional	To explore the experiences of managing work pressures in front-line NHS staff and to explore the factors that facilitate or hinder self-compassion	Nurses and healthcare assistant	N.A.	N.A.

			and mindfulness			
O'Mahony 2016	USA	Cross-sectional	Estimate of post-traumatic stress disorder symptoms, depression, and coping strategies	Physician, nurses, social workers	Depression, PTSD	The Acceptance and Action Questionnaire-Version II, Back Depression Inventory, Cognitive Fusion Questionnaire, PTSD symptom checklist
Yang 2016	Queensland, Australia, Singapore	Cross-sectional	MBSR for mental health professionals	Mental health professionals	Stress and burnout	Perceived stress scale, Oldenburg burnout inventory, Five facets mindfulness questionnaire
Amanullah 2017	Canada	Cross-sectional	Investigated the patterns of burnout in physicians	Physicians	Well-being of physicians	Maslach Burnout Inventory (MBI), in the General Survey version
Baker 2017	USA	Cross-sectional	This study sought to explore the influence of self-compassion on employee happiness in healthcare professionals.	Health care professional	Self-Compassion	Subjective HappinessScale(SHS).Self-Compassion Scale-ShortForm(SCS-SF).Five FacetMindfulnessQuestionnaire(FFMQ).Perceived StressScale(PSS-4).
Duan Porter 2018	Germany	Cross-sectional	Examine the unique and relative contributions of both job-related and individual factors in predicting the severity of depressive symptoms over 12 months for a cohort of actively working nursing staff.	Nurse	Burnout and depression	Oldenburg Burnout Inventory (OLBI),The 14-item Type D Scale (DS14) Copenhagen Psychosocial Questionnaire brief COPE inventory

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Goodman 2012	Virginia, USA	Cross-sectional	The purpose of this study was to determine if a continuing education course based on mindfulness based stress reduction could decrease burnout and improve mental well-being among healthcare providers, from different professions.	Healthcare providers	Burnout and improves well-being	Maslach Burnout Inventory
Hallmann 2014	England	Cross-sectional	Reduce perceived levels of interprofessional staff stress and to improve patient and staff safety by implementing a brief mindfulness-based stress reduction (MBSR) training program on a highacuity psychiatric inpatient unit.	Interprofessional staff of a high-acuity inpatient adolescent psychiatric unit	Stress and safety improvement	Toronto Mindfulness Scale (TMS) and the Perceived Stress Scale (PSS)
Kinser 2016	England	Cross-sectional	To evaluate the preliminary feasibility, acceptability, and preliminary effects of an 8-week mindfulness curriculum for interprofessional HCPs	Healthcare professionals and trainees	Stress, anxiety, and specific aspects of burnout from pre- to post-intervention	Perceived Stress Scale (PSS), State Anxiety (STAI), Emotional Exhaustion subscale of the Maslach Burnout Inventory (MBI), and the Depersonalization subscale of the MBI

			and trainees. The second aim of this study is to evaluate levels of and changes in psychological symptoms			
Fortney 2013	Wisconsin	Observational (case-control)	Evaluate if an abbreviated mindfulness intervention could increase job satisfaction, quality of life, and compassion among primary care clinicians.	Primary care physicians	Burnout, anxiety, stress, resilience, and compassion	Maslach Burnout Inventory (MBI); the Depression Anxiety Stress Scales-21 (DASS-21); the Perceived Stress Scale (PSS); the 14-item Resilience Scale (RS-14); and the Santa Clara Brief Compassion Scale (SCBC).
Mackenzie 2005	Canada	Clinical trial	Describe and evaluate the efficacy of a brief version of the traditional MBSR program on a nurse population to improve burnout symptoms, life and job satisfaction	Nurses	Stress and general health status	Maslach Burnout Inventory, Smith Relaxation Dispositions Inventory, Intrinsic Job Satisfaction subscale, Satisfaction With Life Scale, Antonovsky's Orientation to Life Questionnaire
Martín- Asuero 2010	Spain	Clinical trial	Examines how Mindfulness facilitates a distress reduction in a group of health professionals	Health professionals	Distress	SCL-90-R inventory, Survey of Recent Life Experiences (SRLE), Positive and Negative Affect Scale (PANAS), Emotional Control Questionnaire

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Martín-Asuero 2013	Spain	Clinical trial	Evaluate the long-term efficacy of a mindfulness program for health professionals on burnout, emotional status, empathy and self-consciousness	Health professionals	Burnout, mood state, empathy and mindfulness	Maslach Burnout Inventory, Profile of Mood States (POMS), Jefferson Scale of Physician Empathy (JSPE), Five Facet Mindfulness Questionnaire (FFMQ)
Bottaccioli 2014	Italy	Clinical trial	PsychoNeuroEndocrinology-based meditation(PNEIMED)combination the teaching of philosophy and practice of Buddhist meditation with a grounding in human physiology from a systemic and integrative perspective. We evaluated the effects of four-dayPNEIMED training(30h)on subjective and objective indices of stress in healthy adults.	Mostly health practitioners	Stress	Symptom Rating Test
Horner 2014	USA	Clinical trial	Explore the impact of mindfulness training for nursing staff on their levels of mindfulness,	Staff nurses, nurse aides, clinical secretaries, unit manager and	Mindfulness, compassion satisfaction, burnout, and	Mindful Attention Awareness Scale (MAAS)

			compassion satisfaction, burnout, and stress.	supervisor.	stress	
Johnson 2015	USA	Clinical trial	To investigate the potential effect of resilience training (RT) on symptom relief for current or recurrent depression, and other psychological/behavioral outcomes.	Healthcare professionals	Depression, stress, anxiety	CESD-1042,43 scale and the Patient Health Questionnaire(PHQ-9)
Penprase 2015	USA	Clinical trial	Nursing students and critical care nurses have been evaluated to demonstrate the efficacy of mindfulness interventions to reduce their stress levels and their efficacy on their work	Nurses	Stress, self awareness, burnout risk, job satisfaction, physical health	N.A.
Raab 2015	Canada	Clinical trial	Evaluate the effects of a mindfulness-based stress reduction (MBSR) educational intervention on mental health professionals' self-compassion, perceived stress, burnout, and quality of life.	Mental healthcare professionals	Stress, burnout, quality of life	Self-Compassion Scale (SCS), Maslach Burnout Inventory, Quality of Life Inventory

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Reingold 2015	USA	Clinical trial	Evaluation of stress among radiologic technicians	Radiologic technicians	Stress, burnout	Perceived stress scale (PSS), AIS questionnaire
Pflugeisen 2016	USA	Clinical trial	The purpose of this study was to evaluate the feasibility of implementing a video-module-based mindfulness pilot program intended to reduce stress, improve well-being, and develop mindfulness skills	Physicians	Stress, burnout, mindfulness skills	Perceived Stress Scale, Maslach Burnout Inventory, Kentucky Inventory of Mindfulness Skills
Sanko 2016	Miami, US	Clinical trial	Efficacy of MBSR for nurses	Pre-licensure and post graduate nurses	Item of MBSR	Freiburg Mindfulness Inventory (FMI), Defining Issues Test (DIT) of moral judgment version 2
Pfaff 2017	Canada	Clinical trial	This pilot study evaluated the impact of a pilot CF resiliency (CFR) programme on interprofessional staff at a regional cancer centre	professional caregivers	CF satisfaction, burnout, clinical stress and silencing responses	The Professional Quality of Life: Compassion Satisfaction and Fatigue (ProQOL) Version, Likert scale, Compassion Satisfaction Scale (CSS), Index of Clinical Stress (ICS), Silencing Response Scale (SRS)
Scarlet 2017	USA	Clinical trial	The study investigate whether CCT reduces work-related burnout,	health-care workers	mindfulness, compassion toward the self,	The Self-Compassion Scale—Short Form The Toronto Mindfulness Scale Copenhagen Burnout Inventory

			interpersonal conflict, as well as increases of mindfulness, compassion toward the self, fears of compassion, and job satisfaction scores		fears of compassion, and job satisfaction scores	
Cohen Katz (PART II) 2005	USA	RCT	The intent of this study was to investigate whether MBSR decreased burnout, and psychological distress, while increasing mindful awareness and attention.	Nurse	Burnout	Maslcah Burnout Inventory, Brief Symptom Inventory, Mindfulness Attention Awareness Scale.
Kang 2009	Scotland	RCT	To examine the effectiveness of a stress coping program based on mindfulness meditation on the stress, anxiety, and depression experienced by nursing students in Korea	Nursing students in Korea	stress, anxiety, and depression	Beck Depression Inventory – BDI
Verweij 2012	Canterbury (New Zealand)	RCT	MBSR for GPs	GPs	Burnout, empathy, (work-related) wellbeing	Utrecht Burnout Scale for Contactual Occupations (UBOS-C), Utrecht Work, Engagement Scale, Jefferson Scale of Empathy (JSE), Five Facet Mindfulness Questionnaire

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Pipe 2009	USA	RCT	Evaluate a brief stress management intervention for nurse leader	Nurses	Stress	Symptom Checklist 90-Revised, Caring Efficacy Scale.
Asuero 2014	Spain	RCT	Assess the effectiveness of a training program for primary health care professionals designed to reduce burnout and mood disturbance, increase empathy, and develop mindfulness.	Physicians	Reduce mood disturbance increase empathy.	Maslach Burnout Inventory, Profile of Mood States, Jefferson Scale of Physician Empathy, Baer's Five Facets Mindfulness Questionnaire, and a questionnaire on changes in personal habits and mindfulness practice.
West 2014	Rochester, Minnesota	RCT	Intervention to Promote physician Well-being, Job Satisfaction, and Professionalism	Physicians	Meaning in work, empowerment and engagement in work, burnout, symptoms of depression, quality of life, and job satisfaction	Physician Job Satisfaction Scale, Empowerment at Work Scale, Maslach Burnout Inventory, Medical Outcomes Study Short-Form Health Survey, Empowerment at Work Scale; Maslach Burnout Inventory; Physician Job Satisfaction Scale; quality of life.
Alexander 2015	USA	RCT	Examine the efficacy of yoga to improve self-care and reduce burnout	Nurse	Improve self-care. Reduction of	Questionnaire composed By demographic, the Health Promoting Lifestyle Profile II, the Freiburg Mindfulness Inventory (FMI),

			among nurses		burnout	Maslach Burnout Inventory
Amutio 2015	Spain	RCT	Evaluate the impact of a mindfulness-based stress reduction (MBSR) program on improving wellbeing (i.e. relaxation states and related positive emotions) in a longitudinal study for a period of one year.	Physicians	Mindfulness relaxation and other (heart rate etc)	"Five Facets of Mindfulness Questionnaire" (FFMQ).Smith Relaxation States Inventory (SRSI) .Heart rate – HR– (in beats per minute – bpm)
Duchemin 2015	USA	RCT	To determine if a workplace stress-reduction intervention decreases reactivity to stress among personnel exposed to a highly stressful occupational environment	Intensive Care Unit Personnel	Levels of salivary α -amylase	Perceived Stress Scale (PSS) and the Depression Anxiety Stress Scale (DASS-21).
Dobie 2016	Australia	RCT	This paper discusses the preliminary results of a brief mindfulnessbased stress reduction (MBSR) programme for practising	Physician	Stress	N.A.

			professionals in a public hospital mental health unit.			
Steinberg 2017	Ohio State	RCT	MBSR for surgical intensive care unit personnel	Surgical intensive care unit personnel	Work engagement, burnout and quality of life	Utrecht Work Engagement Scale, Maslach Burnout Inventory, Professional Quality of Life scale
Praissman 2007	USA	Narrative review	Clinical research about Mindfulness-Based Stress Reduction (MBSR) and demonstrate its usefulness for reducing stress in a variety of populations"	Nurses and healthcare providers	Stress, depression, and anxiety	Inventory (STAI), Dysfunctional Attitudes scale, Response Style Questionnaire (RSQ), Courtauld Emotional Control Scale (CECS), Problem-Focused Styles of Coping (PF-SOC), Multidimensional Health Locus of Control (MHLC)
Shirey 2007	Southern Indiana, Evansville	Narrative review	Manage stress and anger among nurse students	Nursing students	Stress and anger	Derogatis Stress Profile (DSP) Interpersonal Reactivity Index (IRI)
Irving 2009	England	Narrative review	This article provide an overview of the current literature pertaining to clinicians' health and wellness and a review of empirical studies that have examined the impact of participation in	Clinicians	Health e wellness	N.A.

mindfulness training						
Koren 2014	USA	Narrative review	Identify the most effective intervention to support the spirituality of health care practitioners	Physicians, nurses, occupational therapist, social workers, dieticians	Stress, Burnout	Perceived Stress Scale (PSS), Maslach Burnout Inventory, State Trait Anxiety Inventory, Brief Symptom Inventory
Raab 2014	Canada	Narrative review	Literature review to assess the importance of mindfulness programs to improve the well being and health of healthcare professionals	Health care professionals	Stress, burnout, compassion fatigue	Self-Compassion Scale, Likert scale
Romani 2014	Beirut, Lebanon	Narrative review	Stress management programs that range from relaxation to cognitive-behavioral	Physicians	Burnout	Maslach Burnout Inventory
Williams 2015	Duke	Narrative review	MBSR for advanced nurses	Advanced nurses	Acute and chronic pain, hypertension	N.A.
Foureur 2013	Sydney, Australia	Systematic review	Pilot the effectiveness of an adapted	Midwives and nurses	Health, sense of coherence, depression,	General health questionnaire (GHQ-12); sense of coherence (SOC) – orientation to life and the depression, anxiety and stress

			mindfulness-based stress reduction intervention on the psychological wellbeing of nurses and midwives.		stress and anxiety	scale (DASS).
White 2013	Ottawa, Ontario, Canada	Systematic review	MBSR for holistic health promotion in nurses	Nurses	Awareness, attention, acceptance	N.A.
Smith 2014	Hilo, Hawai	Systematic review	Efficacy of MBSR for nurses	Students from health science backgrounds and nurses	Stress, burnout, anxiety, focus, self-improvement, empathy, mood	Empathy Construct Rating Scale; The Hopkins Symptom Checklist; Symptoms Checklist 90-Revised (SCL-90-R); Subscale 4 of the SCL-90; The State-Trait Anxiety Inventory Form; The Index of Core Spiritual Experiences (INSPIRIT); Standard demographic measures; Daily journals; Evaluation packets.
Mensah 2015	USA	Systematic review	This systematic review examined the barriers preventing healthcare providers from using	Healthcare providers	Stress levels, anxiety	State-Trait Anxiety Inventory (STAI), Maslach Burnout Inventory, Depression Anxiety Stress Scales, Perceived Stress Scale, Resilience

			mind-body interventions to care for themselves and ways that it has been facilitated			Scale, Santa Clara Brief Compassion Scale, Antonovsky's Orientation to Life Questionnaire, Perceived Stress Scale (PSS)"
Cocker 2016	Australia	Systematic review	Systematic review of the effectiveness of interventions to reduce Compassion Fatigue	Healthcare, emergency and community service workers	N.A.	Professional Quality of Life Scale (ProQoL); Compassion Fatigue Scale (CFS); the Compassion Satisfaction and Fatigue Test (CSFT)
Lamothe 2016	Canada	Systematic review	Identify outcomes in studies on the effect of mindfulness-based stress reduction in healthcare providers and assess changes in empathy, identification of one's own emotions, identification of other's emotions and emotional acceptance	Healthcare workers	Emotional acceptance, empathy	Mindfulness Attention Awareness Scale (MAAS), theFive Facets Mindfulness Questionnaire (FFMQ), Toronto Mindfulness Scale (TMS), Freiberg Mind-fulness Inventory (FMI),Kentucky Inventory of Mindfulness Skills(KIMS)
Luken 2016	USA	Systematic review	Evaluate the evidence for practicing mindfulness to treat job burnout and to explore implications for occupational therapy practitioners	Healthcare professionals	Burnout, stress, anxiety	Maslach Burnout Inventory

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Gilmartin 2017	USA	Systematic review	Studies that tested a brief mindfulness intervention with hospital providers and measured change in well-being (eg, stress) or behavior (eg, tasks of attention or reduction of clinical or diagnostic errors) were selected for narrative synthesis	Healthcare Providers	Well-being, behavior	N.A.
Guillaumie 2017	England	Systematic review	The objective of this paper is to systematically review the scientific literature on the effects of mindfulness on nurses and nursing practices, given the particular stressors of the nursing profession, such as proximity to death and illness and close contact with patients. More specifically, this review explore characteristics of mindfulness-based interventions targeting nurses, what are the	Nurses and nursing students	Anxiety, depression and performance at work.	N.A.

			impacts of interventions and what do nurses perceive the benefits. furthermore the study evaluate if these benefits are confirmed by quantitative studies			
Leary 2018	USA	Systematic review	Determine the effect of a structured Internet-delivered Mantram Repetition Program (MRP) on burnout and stress of conscience (SOC), stress related to ambiguity from ethical or moral conflicts among health care workers (HCWs)	Veteran Affairs (VA) Healthcare System.	Burnout and stress conscience	Maslach Burnout Inventory-General Survey
Regehr 2014	Toronto, Ontario, Canada	Systematic review and meta-analysis	Efficacy of intervention to reduce anxiety and burnout	Physicians and medical students	Anxiety, burnout	Spielberger State Trait Anxiety Inventory (STAI), Perceived Stress Scale (PSS), Profile of Mood States (POMS), Maslach Burnout Inventory

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Burton 2015	UK	Systematic review and meta-analysis	This systematic review and meta-analysis reviews evidence on the effectiveness of mindfulness-based interventions (MBIs) for reducing stress.	Health Care Professionals	N.A.	Perceived Stress Scale; the Mental Health Professionals Stress Scale; the Depression Anxiety Stress Scale ;the Survey of Recent Life Experiences ;a rating scale from 0–10 a visual analogue scale . Mindfulness Attention Awareness Scale ; Toronto Mindfulness Scale ; Five Facet Mindfulness Questionnaire
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Mindfulness: anxiety and depression

Most studies of Gilmartin review reported positive changes about anxiety and symptoms of burnout among healthcare workers (33). Considering physicians, cognitive behavioral and MBSR interventions were associated with decreased symptoms of anxiety (1-34), SDM: -1.07 (95% CI: -1.39 to -0.74). Results among medical students reported SDM: -0.55 (95% CI: -0.74 to -0.36) (34-35) and effective results were registered for nursing students too to decrease their anxiety (36). In the observational study of Fortney the examined class obtained decrease in anxiety ($P = 0.006$) (37). Some studies show the prevalence of post-traumatic stress disorder among palliative workers involved in mindfulness programs. Individuals who scored higher in mindfulness programs, reported significantly less anxiety (RR: 0.55, $P=0.001$) and depression (RR: 0.49, $P=0.001$) (38-39).

The Johnson's experimental study investigated the effect of a mindfulness-based program, that synergizes elements of mindfulness meditation with nutrition and exercise, on symptom as current or recurrent depression, and other psychological/behavioral outcomes. Participants showed statistically significant improvements in many psychological and behavioral outcomes, including a 63–70% reduction in depression, a 48% reduction in stress, a 23% reduction in trait anxiety, and a 52% reduction in presenteeism (40).

Mindfulness: stress

Significant negative associations were found between each of the MBSR items and stress (β : -0.60, 95% CI: -5.95 to -4.04, $P < 0.001$), exhaustion (β : -0.43, 95% CI: -3.30 -1.86, $P < 0.001$) and disengagement (β : -0.49, 95% CI: -3.48 to -2.06, $P < 0.001$). Among the five items of mindfulness, acting with awareness demonstrated the strongest negative association with stress, exhaustion and disengagement (41).

The systematic review of Smith and Koren confirmed that MBSR course decreased participants' stress and distress, emotional exhaustion, time-related pressures and increased relaxation (1; 42-43). Fortney evaluated the efficacy of the course among physicians with decrease perceived stress ($P = 0.002$) assessed by the Perceived Stress Scale (37).

In the RCT of Reingold, after a 6-week MBSR, 42 radiologic technologists showed improvement in their perception of stress (44). A brief MBSR programme implemented among staff of hospital mental health unit showed a perceived reduction in psychological distress (45-49). In the Horner's experimental study, a short awareness training was effective to reduce stress levels of nursing staff (50-53). While in their studies, Penprase and Pfaff demonstrated the efficacy of mindfulness interventions on nurses and professionals caregivers to manage their stress at work (54-55).

Results of a systematic review and meta-analysis of Burton (56) suggested that mindfulness-based interventions have the potential to significantly improve stress among healthcare professionals. Meta-analysis was performed to explore the effects of the mindfulness-based interventions on levels of stress. The combined effect size was $R = 0.342$ (95% CI = 0.202– 0.468). The intervention reported in the Kinser research demonstrates statistically significant reductions in perceived stress, anxiety and specific aspects of burnout, including lack of feeling towards patients (57).

Considering university medical students, MBSR may facilitate the handle of stress and diffusion of anger (58). In the Kang's RCT the intervention among nursing students showed significantly

reduced stress levels compared to control group. Study participants experienced psychological tension at the beginning of clinical practice, but stress scores decreased during the stress coping program (36).

Bottaccioli (59) evaluated the effects of four-day Psycho Neuro Endocrine Immunology-based Meditation (PNEIMED), that combines the teaching of philosophy and practice of Buddhist meditation with a grounding in human physiology, on subjective and objective indices of stress and cortisol level in health practitioners. In the intervention group, improvement of psychological well-being was accompanied by decrease in cortisol levels at awakening. In particular, paired t-test revealed significant before-vs-after reduction in cortisol peak (20.22 ± 4.52 and 11.46 ± 2.15 nmol/l at T0 and Tf, respectively; $P < 0.05$) The amplitude and duration of the cortisol response decreased after PNEIMED, whereas no effects were found in controls. RCT of Duchime (60) investigate reduction of stress in Intensive Care Unit Personnel after MBIs. As biological marker of stress author used salivary α -amylase an index of sympathetic activation. Levels of this marker were significantly decreased between the 1st and 2nd assessments in the intervention group with no changes in the control group. There was a positive correlation between salivary α -amylase levels and burnout scores.

Mindfulness and burnout

Considering interventions as psychoeducation, skills about communication and mindfulness meditation resulted in decreased burnout scores in physicians SDM: -0.38 (95% CI, -0.49 to -0.26). (35) In the RCT of West, rates of high depersonalization at 3 months had decreased by 15.5% in the intervention arm vs a 0.8% increase in the control arm ($P=0.004$). This difference was also sustained at 12 months (9.6% vs 1.5% decrease; $P=0.02$). Rates of depersonalization, emotional exhaustion, and overall burnout decreased substantially in the trial intervention arm, decreased slightly in the trial control arm, and increased in the non-trial cohort ($P = 0.03, 0.007, \text{ and } 0.002$ for each outcome, respectively) (61). A pilot study was realized among surgical intensive care unit personnel: significant results were reported for job-related stress, burnout scales and professional quality of life (62). Greater mindfulness is correlated with better mental health and less burnout among emergency room personnel. Workers higher in mindfulness reported less burnout-related depersonalization (RR: 0.37, $P: 0.001$) and emotional exhaustion (RR: 0.52, $P: 0.001$) (39).

In RCT of Asuero (63) conducted on primary healthcare professionals the intervention group improved in the burnout score, empathy and mindfulness. The magnitude of the change was of -7.1 between the two groups with SES: 1.15, mindfulness difference between groups was 11 with SES 0.9, burnout scores difference between groups was -7 with SES 0.74 and empathy scales difference between groups 5.2 with SES 0.71.

A systematic review conducted in 2016 demonstrated the efficacy of mindfulness intervention to reduce burnout among healthcare providers (64). Fortney showed better scores among primary care professionals about emotional exhaustion ($P = 0.009$), depersonalization ($P = 0.005$) and personal realization ($P < .001$); (2) after nine months of follow up. (37) The intervention reported in the Kinser research demonstrates statistically significant reductions specific aspects of burnout, including depersonalization, lack of feeling towards patients and emotional exhaustion among healthcare professionals and trainees (57).

In Goodman observational study among 93 health professionals, both doctors and other health professionals, reported improvement in emotional exhaustion ($P < 0.03$), depersonalization ($P < 0.04$) and personal realization ($P < 0.001$) (65).

RCT of Cohen Katz (66) shows similar results. MBSR was effective to decrease burnout and psychological distress in nurse while it increased mindful awareness, personal accomplishment and self-care (67).

In the RCT of Verweij, the MBSR intervention group of general practitioners decreased in depersonalisation compared to the control group AD: -1.42, (95%CI: -2.72 to -0.21, $P: 0.03$) (68).

Mindfulness specific items

MBSR specific mindful items concern: observation of internal and external experiences, description and labeling, act with awareness, not reacting to thoughts and feelings, being non-judgmental.

MBSR decreased distractive ruminative thinking, increased attention and awareness, concentration and decreased confusion (1). In the RCT of Verweij conducted among general practitioners, MBSR specific skills increased significantly AD: 6.90, (95% CI: 1.42 to 12.37, $P: 0.01$) and dedication (AD 2.17, 95%CI = 0.51 to 3.83, $P: 0.01$), but no significant change was obtained in empathy (68).

However, a systematic review conducted in 2016 by Lamothe et al (69), showed different results. Fourteen studies included in the review measured empathy or emotional competence in healthcare providers. Improvements in burnout, stress, anxiety and depression were recorded, but no clear evidence is currently available on emotional competencies. At the same time, other studies highlight the effectiveness to reduce distress and empathy by using MBSR (70-71). White underlined the ability of MBSR to increase ability to experience being present with 'acceptance', 'attention' and 'awareness' (72).

Mindfulness and well being

Goodman's study showed positive health related results obtained by mindfulness based programs among workers from very different backgrounds (65). Mental well-being, in particular positive approach to life, cognitive and emotional benefits (73) and physical health improved significantly (65)(74-75). Considering different healthcare categories, in the RCT of West conducted among physicians, empowerment and engagement at work increased of 5.3 points in the intervention arm three months after the study ($p=0.04$), and the improvement sustained at 12 months (+5.5 vs +1.3 points ($p=0.03$)) (61). In the RCT of Amutio (76) conducted among physician showed significant improvements in MBSR group on the levels of mindfulness and relaxation. The authors found also change effect size significantly increased at the end of the maintenance period after a year, especially for mindfulness and positive energy. Increments in mindfulness, as measured with the FFMQ, were strongly correlated with improvements in SRSI-3 measures ($p < 0.05$): basic relaxation ($r = 0.59$), positive energy ($r = 0.59$), core mindfulness ($r = 0.70$), and transcendence ($r = 0.67$). Heart rate changes were significantly associated to the mean change in most of relaxation dimensions, as measured by the SRSI-3 ($p \leq 0.02$): basic relaxation ($r = 0.62$), positive energy ($r = 0.60$), and core mindfulness ($r = 0.57$). All these correlations were even stronger at the end of the maintenance phase at 12 months.

In cross sectional study of Atanes (77) conducted among primary care professional categories were found correlations between mindfulness, perceived stress and subject wellbeing. In particular in nurses lower levels of mindfulness were related to higher perceived stress and lower subject wellbeing.

Mindfulness and quality of care

The study of Brady (49), performed among psychiatric unit's staff, showed that MBSR decrease the stress levels and improve self-care. Moreover, this resulted in improved patient care. Results showed increases in patient satisfaction score and a decrease in the number of patient safety events observed at 3 months post intervention. The number of safety incidents decreased by 38% during this 3-month. This decrease demonstrates a clinically significant improvement in patient safety. In primary care physicians, a relatively short exposure to awareness training has also proved effective to improve health and well-being, a condition that is also reflected in patient care. These positive effects were maintained for the long term over 9 months after the intervention without recall sessions (37) Hallman's study demonstrates that a short MBSR program, offered to the staff of a psychiatric unit, improved awareness, staff safety and quality of care and reduced staff absenteeism (46).

Discussion

Stress, burnout and other related physical and psychological problems are common among health care workers. Common sources of stress in work include: inconsistent management, difficulties in communication, conflicting demands, work overloads, lack of breaks and time pressures (44). Consequences of stress can range from job dissatisfaction to patient dissatisfaction with care, lower quality of care, and high risk of negative patient outcome (78-82).

Interventions to promote well-being are fundamental for both health of workers, patients and quality of care. The purpose of this paper was to examine and summarize the effectiveness of mindfulness based courses to enhance self-awareness, self-care and management of stress among healthcare workers. There was great variability in types of programs, health professionals and outcomes of interest. To aid data synthesizing and interpreting the systematic review divided results on the basis of outcomes. Mindfulness can improve a range of biological and psychological aspects in a variety of medical illnesses, including acute and chronic pain, hypertension (15); benefits include different cognitive and emotional outcomes as: stress, mood, burnout and anxiety, empathy and awareness (1).

As far as concern anxiety and depression outcomes, cognitive behavioral and MBSR interventions were associated with decreased symptoms (1)(33-34)(40) and individuals with higher score in mindfulness items, reported better results (38-39) Kang and colleague found meditation to be particularly effective on stress reduction by decrease rumination and circular thinking (36) ; also brief training and courses demonstrated efficacy (33)(50).

Regarding stress, significant negative associations were found between each of the MBSR items and stress, exhaustion and disengagement (1)(41-43). The decrease of stress was also confirmed by lower level of bioumoral markers as alfa-amilasi and cortisol.

Considering different healthcare categories, the course was realized among physicians (37) nurses (50-53) radiologic technologists (44) staff of hospital of mental health (45-49). Although staff and setting with higher job demand, as hospital intensive care units, are the most appropriate to decrease the negative effects of stress (62). The course has been implemented among biomedical students with positive results (58)(36). Therefore, mindfulness courses can be spread to participants from very different backgrounds, so the intervention can be useful to a large audience (65).

Interestingly participants of courses reported a reduction of perceived stress as individuals and as collective groups (50). The fact that courses are held for workers is therefore also important for cohesion and sharing of experience among co-workers. This condition leads to a reduction in stress at the workplace. As far as concern other outcomes, engagement in work improved meaning, presence at work and reduced depersonalization (61) and consequently quality of care improved (37)(46).

Two studies focused on the effect of mindfulness on self-compassion, reporting increased scores. Compassion was enhanced on healthcare workers themselves and consequently towards patients (68)(83). Numerous studies focused on mindfulness specific items, the course improved clear thinking to remain focused and calm in stressful situations during professional clinical performances (84). As a consequence integrating mindfulness into medical education and practice can enhance staff qualities of awareness, acceptance and attention and being in the present moment (72) (1).

Greater and constant practice of mindfulness is correlated with better mental health and less stress (39), increase the ability to accept painful sensations and associated negative emotions, that must not be fought, suppressed, inhibited (15).

Although the course is important to manage and reduce stress, occupational interventions are fundamental in the work settings to improve wellbeing and reduce job related stress (62).

Consequently it is fundamental to combine programmes based on mindfulness and psychoeducation with environmental and management intervention, in a multidisciplinary approach (21). Further research is needed to investigate the combination of intervention that strengthen individual resources, as those developed by mindfulness, with intervention that increase external resources. The management of stress such as environmental changes, smart working, shifts, breaks, leadership are important in order to reduce job demand and enhance decision latitude.

Strengths and Limitations

This overview has several strengths. Firstly it investigate interventions to reduce stress among healthcare workers, secondly there is the comparison of the program among different healthcare professionals. Furthermore this overview examine a variety of outcomes: stress, anxiety and depression, burnout, mindfulness specific items, quality of care and wellbeing.

Nevertheless, this overview also has some limitations: the interventions and studies were heterogeneous so it was not possible to apply a quantitative analysis and synthesis.

Conclusion

It is fundamental considering numerous sources of stress in healthcare workplace such as inconsistent management, conflicting demands, work overloads and time pressures, interventions to manage and overcome stress. Courses based on mindfulness can improve physical, emotional, psychosocial and spiritual well-being. These Interventions must be combined with interventions on the work organization in order to be viable tools for promoting self-care and quality of patient care.

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