Systematic review

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Systematic review of interventions for reducing occupational stress in health care workers [1]

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Objectives This study evaluated the effectiveness of interventions in reducing stress at work among health care workers.

Methods A systematic search was conducted of the literature on reducing stress or burnout in health care workers. The quality of the studies found was then appraised and the results combined. A meta-analysis was performed when appropriate.

Results Altogether 14 randomized controlled trials, three cluster-randomized trials, and two crossover trials, comprising 2812 participants, were included. Only two trials were of high quality. The following comparisons were possible: person-directed interventions versus no intervention, person–work interface interventions versus no intervention, and organizational interventions versus no intervention. Person-directed interventions can reduce stress [standardized mean difference (SMD) -0.85, 95% confidence interval (95% CI) -1.21–-0.49] and burnout, measured as emotional exhaustion [weighted mean difference (WMD) -5.82, 95% CI -11.02–-0.63) and lack of personal accomplishment (WMD -3.61; 95% CI -4.65–-2.58). They also reduce anxiety, measured as state anxiety (WMD -9.42, 95% CI -16.92–-1.93) and trait anxiety (WMD -6.91, 95% CI -12.80–-1.01). Person–work interface interventions can reduce burnout, measured as depersonalization [mean difference (MD) -1.14, 95% CI -2.18–-0.10]. Organizational interventions can also reduce stress symptoms (MD -0.34; 95% CI -0.62–-0.06) and general symptoms (MD -2.90, 95% CI -5.16–-0.64). No harmful effects were reported.

Conclusions Limited evidence is available for a small, but probably relevant reduction in stress levels from person-directed, person–work interface, and organizational interventions among health care workers. This finding should lead to a more-active stress management policy in health care institutions. Before large-scale implementation can be advised, larger and better quality trials are needed.

Key terms anxiety; burnout; cognitive–behavioral therapy; meta-analysis; nurse.

Changes in global economic realities are progressively transforming the very nature of work from physical tasks to more mental and emotional endeavors. The prevention of high stress levels in the work environment is thereby imperative in efforts to improve the quality of worklife, even in the face of increased job insecurity. Stress can be defined as a subjective psychophysiological state characterized by a combination of high arousal with displeasure. Although there is some controversy about the exact mechanism of work-related or occupational stress, the most extensively used models, demand–control (1) and effort–reward (2), explain it as an imbalance between particular factors. The resultant effects of stress on individual persons are mediated by personal factors like age, experience, health, coping skills, and the like (3–5).

Health care workers are no exception when it comes to suffering from work-related stress. Under some conditions, their work-related stress can lead to anxiety and depression, burnout, or psychosomatic diseases and

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a resultant deterioration in quality of life and service provision (6–9). Burnout has been defined as "a persistent, negative, work-related state of mind in 'normal' individuals that is primarily characterized by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behavior at work. This psychological condition develops gradually but may remain unnoticed for a long time for the individual involved. It results from a misfit between intentions and reality at the job. Often burnout is self-perpetuating because of inadequate coping strategies associated with the syndrome [p 388]" (4). Burnout is considered in this review as a form of psychological stress and not as a clinical diagnosis (10). The economic impact of such conditions is high, as can be inferred from data on absenteeism and turnover (11, 12).

There are many stress factors in the workplace of health care workers that have been shown to increase the risk of distress and burnout, for example, an increasing administrative workload, contact with suffering and dying patients, verbal and physical abuse by patients, bullying by colleagues, the need to hide negative emotional responses, risk of litigation, role conflicts between professions, and organizational changes (10, 13–15). In addition, many studies have shown that levels of dissatisfaction, distress, and burnout at work are high among health care workers (12, 16–20) and may even be higher than among workers in other occupations (7). There are numerous obstacles to conducting effective stress-related interventions at workplaces; therefore, it is all the more important to be systematic when determining what really works and what does not (21). Because health care workers form a relatively homogeneous and specific population, stress management interventions can be tailored to their specific needs, and consequently the results of a review concerning this occupational group may have a higher generalizability than synthesizing studies of various occupational groups. Therefore, we thought there was a need for a systematic review especially targeting health care workers.

Several reviews have been published on the effectiveness of interventions in preventing or treating stress (22–25). However, there is only one that has focused specifically on health care workers, and it did not reach clear conclusions about the evidence (26). The aim of this review was to ascertain the effectiveness of interventions in reducing stress in health care workers.

Material and methods

We performed a systematic literature search up to May 2005 to locate studies in electronic databases, including MEDLINE, PsychINFO, the Cochrane Depression, Anxiety and Neurosis Group specialized registry, and the Cochrane Occupational Health Field database. References from articles and reviews were also reviewed, and all issues of Work & Stress between January 1987 and May 2005 were hand-searched (27). [See the appendix for the MEDLINE search strategy that we employed.]

We included studies with interventions that were directed at workers who had not actively sought help for stress, burnout, depression, or anxiety disorder and in which interventions were compared with nonintervention controls or with alternative interventions. As outcomes, we considered all validated self-report measures of stress or burnout and all measures of the detrimental effects of stress or burnout.

Two reviewers independently checked each identified trial, determined inclusion, and graded the methodological quality with a previously validated checklist (28). Disagreements were resolved by consensus. We needed an instrument that could also assess the quality of the nonrandomized studies of organizational interventions that we wanted to include. The checklist's scales of internal validity were used for rating study quality, scores higher than 75% of the maximum of the two scales combined indicating high internal validity.

If interventions, participants, and outcomes were comparable, we pooled the results of individual studies. If sufficient numerical data were available, we performed a meta-analysis of outcomes by combining trials using the Mantel-Haenszel method (RevMan 4.2.8, The Nordic Cochrane Centre, Copenhagen, Denmark, 2003). Statistical heterogeneity was evaluated and I^2>50% was considered significant. Outcomes were summarized as standardized (SMD) or weighted (WMD) mean differences. A weighted mean difference can be calculated if all trials have measured the outcome on the same scale (eg, burnout with the Maslach Burnout Inventory). If the scales used differ but measure the same thing (eg, stress), then a standardized mean difference (MD) can be calculated. Individual trials affect both summary measures in proportion to their sample sizes so that the weight of a study is equal to the inverse of its variance. When there was significant heterogeneity, we applied a random-effects model; otherwise we used a fixed-effects model. For the remaining studies that did not report sufficient numerical data for pooling, we performed a qualitative synthesis (29). See table 1 for the system used to grade the evidence.

If a study used a cross-over design (two groups take turns being the intervention and the control group), we used the results from just after the first implementation of the intervention. One study (30) compared more than one active intervention; therefore, we entered the intervention that we judged to be the most intense into the meta-analysis to avoid having to input the same study more than once into the meta-analysis and thus

Table 1. Qualitative synthesis of evidence [adapted from methods suggested by the Cochrane Back Review Group (29)].

Level of evidence	Contents
Strong	Two or more high-quality studies with similar positive or negative effects that are confirmed by the quantitative analysis
Limited	Only one high-quality study or multiple low-quality studies or both, with similar positive or negative effects or the results of the high-quality studies not confirmed by the quantitative analysis
Inconsistent	Results of studies point in opposite directions
No evidence	No studies available

compound its effect on the summary score. Using a fairly large assumed intracluster correlation of 0.10, we calculated the design effect for cluster-randomized studies that had not considered it. Where necessary, missing statistics data were sought from authors. Since all of the studies used questionnaires as outcome measures, we were unable to conduct an intention-to-treat analysis. We considered the influence of publication bias, but we did not use funnel plots due to the small number of trials in each comparison group.

Study characteristics

Figure 1 shows the details of the exclusion and inclusion of studies. Table 2 shows the characteristics of the 19 included studies, of which 14 were randomized controlled trials, three were cluster-randomized trials, and two were cross-over studies. All three of the cluster-randomized trials (31–33) had a unit of analysis error; in other words, they analyzed the results at the individual level without taking the effect of the cluster design into account. The reasons for excluding nine studies from the meta-analyses were unique interventions like recreational music-making (34), therapeutic massage (35), support and advice from a psychologist (31, 36), and "primary nursing" (37), or insufficient reporting of outcome data (33, 38–41).

There was only one study (42) that reported using an acceptable method of randomization and concealing group allocation until it was completed and irrevocable. There was mention in only one study (43) of blinding those rating the outcome measurements. In all but one of the included studies (35), the blinding of the participants with respect to the intervention would have been impossible due to the nature and aims of the intervention being self-evident. The loss of participants was low throughout, and only two studies (40, 44) suffered a loss exceeding 20% of the initial sample. Two reviewers (JR and JV) independently rated all of the included studies on a quality checklist (28) (table 3). The Cohen's kappa of agreement was 0.62 for the internal validity scales. There were only two studies (33, 43) that were rated as being high in quality. Both of them were studies on organizational interventions.

Altogether 11 of the 19 included studies (30, 35, 37, 38, 42–48) had interventions that were specifically

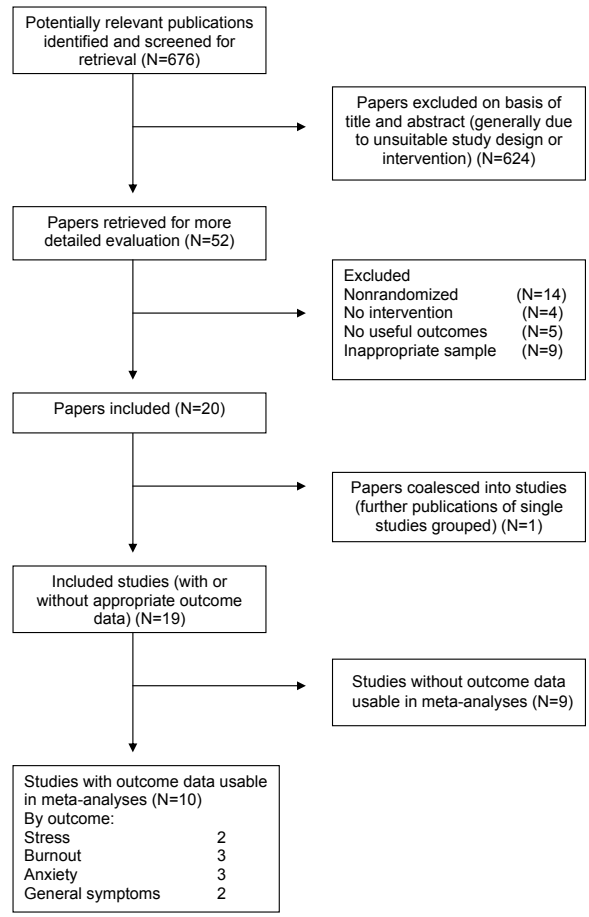

Figure 1. The inclusion and exclusion of trials.

directed towards nurses. In seven studies (32–34, 36, 39, 49, 50), interventions were directed at all of the staff of participating health care facilities, and, in one study, the intervention was directed towards respiratory therapists (40). We categorized interventions as (i) person-directed if they were aimed at changing personal characteristics without explicit reference to functioning at work, (ii) person–work interface intervention if they were aimed at improving the fit between the person and the organization (eg, role conflict–ambiguity, relationships, employee involvement in decision making), and (iii) organizational if they targeted organizational or social environments (eg, organizational restructuring, training, and job redesign) that may produce stress (22,

Table 2. Characteristics of the included studies. The categorization of interventions was conducted using the typology of DeFrank & Cooper (22). (RCT = randomized controlled trial, US = United States, UK = United Kindgom, STAI = State Trait Anxiety Inventory, SCL-90-R = Symptom Checklist-90-Revised, BDI = Beck Depression Inventory, DHEA = dehydroepiandrosterone)

Study	Methods	Participants	Interventions (duration)	Outcomes	Target
Bittman et al, 2003 (34)	Cross-over	112 randomly selected staff of a retirement community in the US	Recreational music making; no intervention control (six 1-hour weekly sessions = 6 hours)	Maslach Burnout Inventory, Profile of Mood States	Person-directed
Cohen-Katz et al, 2005 (49)	RCT	25 nurses, pastoral care, respiratory therapy and social work personnel in the US	Mindfulness-based stress reduction program; no intervention control (eight 2.5-hour weekly sessions and a 6-hour daylong retreat, 8 weeks = 26 hours)	Maslach Burnout Inventory, brief symptom inventory	Person-directed
Delvaux et al, 2004 (43)	RCT	115 oncology nurses in Belgium	Psychological training program; no intervention control (three 1-week courses, 3 months = 105 hours)	Nursing Stress Scale	Organizational
Ewers et al, 2002 (38)	RCT	20 forensic mental health nurses in the UK	Psychosocial intervention training; no intervention control (20 days ~ 120 hours)	Maslach Burnout Inventory	Person-directed
Heaney et al, 1995 (39)	RCT	1375 direct care staff and home managers in the US	Caregiver support program; no intervention control (six 5-hour sessions, 9 weeks = 30 hours)	Social support, organizational climate, SCL-90-R, confidence in coping ability	Person–work interface
Jones & Johnston, 2000 (42)	RCT	79 student nurses reporting significant levels of affective distress when screened in the UK	Multimodal stress management; no intervention control (six 2-hour sessions = 12 hours)	Derogatis Stress Profile, Beck & Srivastava Stress Inventory, General Health Questionnaire, STAI, BDI, ways of coping, absenteeism	Person-directed
Lee & Crockett, 1994 (45)	RCT	60 hospital nurses suffering from insomnia, headache or gastrointestinal discomfort in Taiwan	Assertiveness training; traditional in-service program about computer applications in nursing (six 2-hour sessions, 2 weeks = 12 hours)	Perceived Stress Scale, Rathus Assertiveness Schedule	Person-directed
Lökk & Arnetz, 1997 (36); 2000 (31) [a]	Cluster-RCT	26 health care personnel in a geriatric hospital in Sweden	Support and advice from a psychologist; passive attendance by psychologist (twenty 1-hour weekly sessions = 20 hours)	Blood pressure and pulse rate, prolactin, cortisol, DHEA, estradiol, stress questionnaire	Person-directed
McElligott et al, 2003 (35)	RCT	20 nurses working at a tertiary care center in the US	AMMA therapy; standardized touch therapy protocol (four 45-minute weekly sessions, 1 month = 3 hours)	Visual analogue scale for anxiety, blood pressure, heart rate, pulse oximetry, skin temperature	Person-directed
Melchior et al, 1996 (37)	RCT	161 psychiatric nurses in long-stay settings in the Netherlands	Support and advice about primary nursing given by nurse managers or quality care coordinators; no intervention control (four months of preparation = ? hours)	Maslach Burnout Inventory	Organizational
Norvell et al, 1987 (40)	RCT	12 respiratory therapists in the US	Stress management program; no intervention control (eight 1-hour weekly sessions, 2 months = 8 hours)	Maslach Burnout Inventory, Cohen-Hoberman Inventory of Physical Symptoms, The Hassles Scale, The Uplifts Scale	Person-directed
Proctor et al, 1998 (32)	Cluster-RCT	98 care staff in residential nursing homes in the UK	Developing knowledge and skills and individual program planning; no intervention control (seven 1-hour seminars and weekly visits by a psychiatric nurse, 6 months = ? hours)	The Occupational Stress Indicator, General Health Questionnaire	Organizational
Razavi et al, 1993 (46)	RCT	72 oncology nurses in Belgium and France	24-hour psychological training program; no intervention control (eight 3-hour weekly sessions, 2 months = 24 hours)	The Nursing Stress Scale	Organizational
Rowe, 1999 (50)	RCT	126 health care professionals from the US	Stress management/adaptive coping training, with refresher sessions; no intervention control (six 1.5-hour weekly sessions, 6 weeks = 9 hours)	Maslach Burnout Inventory	Person-directed
Schrijne-maekers et al, 2003 (33)	Cluster-RCT	300 professional caregivers in homes for elderly persons in the Netherlands	Emotion-oriented care training, clinical lessons and supervision meetings; no intervention control (two 1-hour lessons, 6-day training course and 3 half-day meetings, 10 weeks = 50 hours)	Maslach Burnout Inventory, job satisfaction	Organizational
Tsai & Crockett, 1993 (44)	RCT	137 nurses in Taiwan	Training about stress at work, relaxation, breathing, imagery and meditation; traditional in-service education about theory analysis (three 1.5-hour sessions, 5 weeks = 4.5 hours)	Nurse Stress Checklist, Chinese General Health Questionnaire	Person-directed
von Baeyer & Krause, 1983 (47)	Cross-over	14 nurses in a burn treatment unit in Canada	Cognitive–behavioral stress management training; no intervention control (3 hours of training over a week = 3 hours)	STAI	Person-directed
West et al, 1984 (48)	RCT	60 acute-care hospital nurses in the US	Stress inoculation training; no intervention control (1 hour twice a week, 4 weeks = 8 hours)	Maslach Burnout Inventory, job-related tension, life satisfaction STAI, Rathus Assertiveness Schedule, systolic and diastolic blood pressure	Person-directed
Yung et al, 2004 (30)	RCT	65 nurse managers in China	Cognitive relaxation; stretch–release relaxation; no intervention control (four 20-minute weekly sessions = 1.3 hours)	Chinese-STAI, Chinese General Health Questionnaire	Person-directed

[a] One of the studies was reported in two different articles.

51). A total of 13 studies used person-directed interventions, including cognitive–behavioral training (45, 47, 50), relaxation training (30, 44), music-making (34), therapeutic massage (35), and multicomponent intervention (31, 36, 38, 40, 42, 49). One study employed a person–work interface intervention consisting of mobilizing support from colleagues and learning participatory problem solving and decision-making skills (39). In the remaining five studies, the intervention [consisting of psychological training programs to improve attitudes, communication skills, and occupational stress (43, 46) or changes in work organization, knowledge, skills training, and support and advice from supervisors (32, 33, 37)] was directed towards improving the employees' functioning in worktasks.

Results

Stress

Person-directed interventions. Two studies (42, 45) measured stress directly and reported usable outcome data. Since both used different scales [ie, the Beck and Srivastava Stress Inventory (52) and the perceived stress scale (53)], we used standardized mean differences in the analysis (figure 2). Person-directed interventions reduced stress significantly when compared with no intervention and when measured with these two scales (SMD -0.85, 95% CI -1.21 – -0.49). In one study (45) stress remained lower for a month (MD -6.10, 95% CI -8.44 – -3.76).

Organizational interventions. The results of one study (43) showed that psychological training (eg, about attitudes and communication skills) reduced stress (mean difference -0.34, 95% CI -0.62 – -0.06) when compared with no intervention and when measured with the nursing stress scale (54). This difference became nonsignificant after 6 months (MD -0.19, 95% CI -0.49 – 0.11).

Burnout

Person-directed interventions. Altogether three studies (38, 49, 50) used the Maslach Burnout Inventory (MBI) (55). The summary effect of two subscales of the MBI favored the intervention, emotional exhaustion (WMD -5.82, 95% CI -11.02 – -0.63) and lack of personal accomplishment (WMD -4.89, 95% CI -8.71 – -1.07). There was considerable heterogeneity between the three studies in the meta-analysis (figure 3).

The results of one study (50) showed that, when compared with 6 weeks of cognitive–behavioral training, having refresher sessions at 5, 11, and 17 months led to significantly lower emotional exhaustion (MD -6.00, 95% CI -8.16 – -3.84) and lack of personal accomplishment (MD -5.82, 95% CI -7.89 – -3.75) after 2 years.

Table 3. Study quality measured with the Downs & Black checklist (28).[a]

Study	Reporting (maximum 10)	External validity (maximum 2)	Internal validity (maximum 13)	Power (maximum 5)	Total (maximum 30)
Person-directed interventions					
Bittman, et al 2003 (34)	8	2	8	4	22
Cohen-Katz et al, 2005 (49)	3	–	8	1	12
Ewers et al, 2002 (38)	8	1	9	–	18
Jones & Johnston, 2000 (42)	7	–	8	3	18
Lee & Crockett, 1994 (45)	8	–	8	3	19
Lökk & Arnetz, 1997 (36); 2000 (31)	7	1	8	1	17
McElligott et al, 2003 (35)	5	–	6	–	11
Norvell et al, 1987 (40)	3	–	6	–	9
Rowe, 1999 (50)	8	–	9	3	20
Tsai & Crockett, 1993 (44)	5	1	6	4	16
von Baeyer & Krause, 1983 (47)	8	1	9	–	18
West et al, 1984 (48)	6	–	8	1	15
Yung et al, 2004 (30)	10	–	9	2	21
Person–work interface interventions					
Heaney et al, 1995 (39)	5	–	6	5	16
Organizational interventions					
Delvaux et al, 2004 (43)	8	1	10	4	23
Melchior et al, 1996 (37)	7	1	7	4	19
Proctor et al, 1998 (32)	6	–	7	3	16
Razavi et al, 1993 (46)	7	–	8	3	18
Schrijnemaekers et al, 2003 (33)	7	1	10	5	23

[a] Studies that scored 75% or more (10 points) on internal validity were considered high quality.

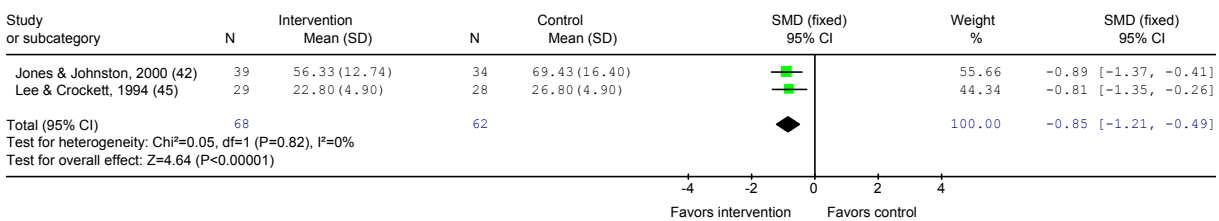

Figure 2. Person-directed intervention versus no intervention measured with stress scales.

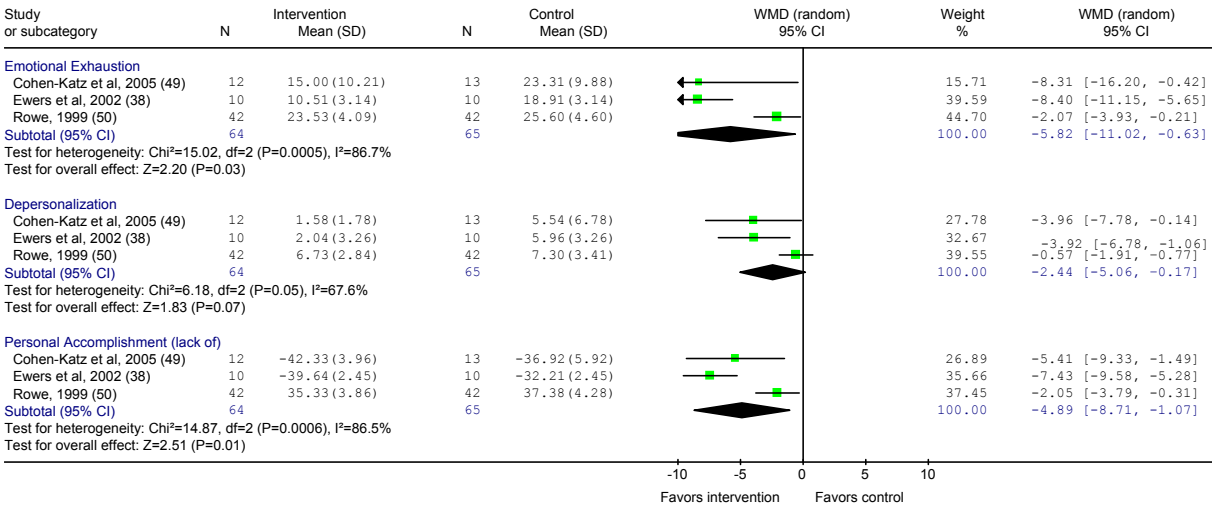

Figure 3. Person-directed intervention versus no intervention measured with the Maslach Burnout Inventory.

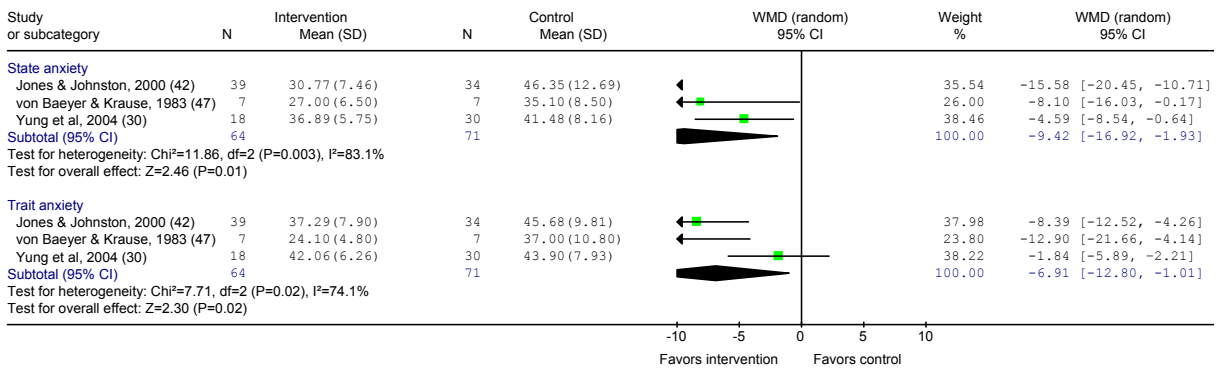

Figure 4. Person-directed intervention versus no intervention measured with the State Trait Anxiety Inventory.

Organizational interventions. According to one study (37), support and advice given by nurse managers or quality-care coordinators reduced symptoms on one of the subscales of the MBI: depersonalization (MD -1.14, 95% CI -2.18–-0.10) when compared with no intervention.

Anxiety

Person-directed interventions. According to three studies (30, 42, 47), person-directed interventions significantly reduced both state anxiety (WMD -9.42, 95% CI -16.92–-1.93) and trait anxiety (WMD -6.91, 95% CI -12.80–-1.01) when compared with no intervention, as measured with the state-trait anxiety inventory (56). There was considerable heterogeneity, one study (30) showing lower decreases on both scales than the other two studies (figure 4). According to two studies (30, 42), the state anxiety (WMD -8.31, 95% CI -11.49–-5.13) and trait anxiety (WMD -4.09, 95% CI -7.60–-0.58) scores remained lower in the intervention group for at least 1 month.

General symptoms

Person-directed interventions. According to two studies (30, 42), person-directed interventions did not reduce general symptoms significantly more than no intervention (WMD -11.87, 95% CI -27.24–3.49) when measured with the General Health Questionnaire (57). The results of one study (30) showed that cognitive relaxation training maintained the reduction in scores of the General Health Questionnaire for at least 1 month, whereas stretch–release relaxation training did not (MD -7.10, 95% CI -10.58–-3.62).

Organizational interventions. One study (32) showed that a combination of training knowledge and skills and individual program-planning decreased general symptoms (MD -2.90, 95% CI -5.16–-0.64) when compared with no intervention and when measured with the General Health Questionnaire (57).

Levels of evidence

The qualitative analyses agreed with the results of the meta-analyses. [See table 4 for the results of our grading

Table 4. Results of the studies unfit for meta-analysis according to outcome.

Outcome	High-quality positive effect (strong evidence)	Low-quality positive effect (limited evidence)	High-quality negative effect (strong evidence)	Low -quality negative effect (limited evidence)	High-quality inconsistent effect	Low-quality inconsistent effect
Person-directed interventions						
Stress	·	Jones & Johnston, 2000 (42); Lee & Crockett, 1994 (45); Tsai & Crockett, 1993 (44); West et al, 1984 (48)	·	·	·	Rowe, 1999 (50)
Emotional exhaustion	·	Cohen-Katz et al, 2005 (49); Ewers et al, 2002 (38); Norvell et al, 1987 (40); Rowe, 1999 (50); West et al, 1984 (48)	·	·	·	Bittman et al, 2003 (34)
	·	Ewers et al, 2002 (38); Rowe, 1999 (50)	·	·	·	Bittman et al, 2003 (34); Cohen-Katz et al, 2005 (49); Norvell et al, 1987 (40); West et al, 1984 (48)
Personal accomplishment	·	Cohen-Katz et al, 2005 (49); Ewers et al, 2002 (38); Rowe, 1999 (50); West et al, 1984 (48)	·	·	·	Bittman et al, 2003 (34); Norvell et al, 1987 (40)
State anxiety	·	Jones & Johnston, 2000 (42); von Baeyer & Krause, 1983 (47): West et al, 1984 (48); Yung et al, 2004 (30)	·	·	·	·
Trait anxiety	·	Jones & Johnston, 2000 (42); von Baeyer & Krause, 1983 (47); West et al, 1984 (48)	·	·	·	Yung 2004 (30)
General symptoms	·	Jones & Johnston, 2000 (42); Yung et al, 2004 (30)	·	·	·	Cohen-Katz et al, 2005 (49); Norvell et al, 1987 (40); Tsai & Crockett, 1993 (44)
Person–work interface interventions						
General symptoms	·	·	·	·	·	Heaney et al, 1995 (39)
Organizational interventions						
Stress	Delvaux et al, 2004 (43)	·	·	·	·	Proctor et al, 1998 (32)
Emotional exhaustion	·	·	·	·		Melchior et al, 1996 (37)
	·	·	·	·		Melchior et al, 1996 (37)
Personal accomplishment		·	·	·	·	Melchior et al, 1996 (37)
General symptoms	·	Proctor et al, 1998 (32)	·	·	·	·

of the evidence and table 1 for our criteria for judging what was considered strong, limited, inconsistent, or no evidence.] Studies that scored 75% or more (10 points) on internal validity on the Downs & Black checklist (28) were considered high in quality.

Discussion

From the meta-analyses and qualitative analyses, we can conclude that there is limited evidence that person-directed interventions among health care workers effectively reduce the levels of burnout, anxiety, and stress and that organizational interventions reduce the levels of stress, burnout, and general symptoms.

We could not subdivide the person-directed interventions further because almost all of the studies used several different components. Most of the studies claimed that it is possible to change the participants' cognitions about stressful elements at work. We refrained from further sensitivity analyses based on differences (i) in quality because most of the studies scored about mid-range on the quality scale and (ii) in the content of the interventions because most of the interventions were complex. It is interesting to note that the studies involving organizational interventions scored higher on the quality checklist even though it is more difficult to carry out interventions targeted at worktasks (21). This finding is surprising because the implementation of organizational interventions is dependent on more stakeholders than the patient alone and these types of interventions are therefore more difficult to organize and keep under control. The authors of the included organizational intervention studies not only succeeded in randomizing workplaces, they did it well. One would have not only expected these studies to have weaker study designs as is usually the case (21), but also to display the largest effects since

they aimed higher in the hierarchy of controls. [See the report of Lamontagne et al (58).] Since there were no direct comparisons, we did not attempt to compare the outcomes of person-directed with person–work interface or organizational interventions, as indirect comparisons are susceptible to bias (59). However, it is clear that the problem of attrition is bigger in the latter, as the personal interests of participants apparently differ in this type of intervention. All of the studies included in this review used standardized and previously validated self-report scales to measure the outcomes [eg, Maslach Burnout Inventory (55), General Health Questionnaire (57), State Trait Anxiety Inventory (56), and Beck & Srivastava Stress Inventory (52)].

Limitations of the review

In the meta-analyses of person-directed interventions there was considerable heterogeneity, two studies (30, 50) showing less decrease in burnout and anxiety immediately after the intervention. However, in the studies in which follow-up lasted at least a month, these differences disappeared. We could not find a good explanation for the heterogeneity in the results of the studies with post-intervention measurements only. The quality of the evidence that we found was not very high. Some of the studies applied rigorous methods but contended with attrition problems. Most of the randomized controlled trials were small, and, in all but one (42) of the included studies, the method of randomization was not reported or not valid. It was also difficult to get a good impression of the concealment of allocation to the researchers. We assumed that outcomes that were measured by a questionnaire were reported blind to the researchers. Even though we found significant results, it is difficult to say how the results are related to the clinical relevance of the changes achieved. With the Maslach Burnout Inventory (55), there is no generally accepted change that would be regarded as clinically relevant (Wilmar Schaufeli, personal communication). Since most of the studies had only a small sample size and all of them reported positive outcomes, it is conceivable that there may have been publication bias. However, the extent of publication bias is impossible to assess, as all of the studies did not report outcomes that could be used for a statistical analysis.

Comparison with other reviews

This review used more rigorous inclusion criteria and found more and better-quality evidence than previous reviews about stress interventions directed towards health care workers (7, 26). Another review involved a meta-analysis of interventions to prevent or treat stress in all occupations (25). The review synthesized all of the study outcomes available in primary studies. This approach makes it difficult to decipher the meaning of their findings. In contrast to our review, they concluded that there was no evidence for work-directed or person–work interface interventions (25). Due to the different samples of studies (our review contains 13 studies that theirs does not) and methods used, it is difficult to explain this contrasting finding. A recent review about interventions to improve the morale of staff was restricted to mental health care workers only (60).

Implications

The results of this review show that stress management interventions can lead to positive health effects among health care personnel. There is evidence from one trial (30) that interventions that contain cognitive elements yield better results than those with behavioral elements. However, before large-scale implementation can be advised, larger and better-quality trials are needed. It would also be good to know what the current prevalence of various stress management strategies is. According to our own experience, it is much more common to measure various indices of stress than it is to do something about it. None of the studies looked specifically at stress reduction among physicians, probably because this professional group is often more reluctant to participate. Since physicians usually have more decision latitude or control, autonomy, possibilities for development, and rewards than nurses do, it is logical to assume that they may also need especially tailored stress management interventions. It is therefore difficult to say whether our results can be generalized also to physicians. Studies are needed that contrast various stress- or burnout-reducing techniques with one another. Studies that contrast organizational and person–work interface interventions with person-directed interventions will show whether or not one type of intervention is more effective in reducing stress levels than the other.

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Appendix

MEDLINE search strategy

[randomised controlled trial.pt. OR controlled clinical trial.pt. OR randomised controlled trials OR random allocation OR double blind method OR single blind method OR clinical trial.pt. OR exp Clinical trial OR (clin$ adj25 trial$).ti,ab. OR ((singl$ OR doubl$ OR trebl$ OR tripl$) adj25 (blind $ OR mask$)).ti,ab. OR placebos OR placebos.ti,ab. OR random.ti,ab. OR research design OR comparative study OR exp "Evaluation and Follow Up" OR follow up studies OR prospective studies OR (control$ OR prospectiv$ OR volunteer$).ti,ab.] NOT (animal NOT human)

AND

exp Burnout, professional OR burnout.tw. OR exp job satisfaction OR job satisfaction.tw. OR (mental adj25 health adj25 professional$).ab,ti. OR (stress adj25 professional$).ab,ti. OR (stress adj25 occupational).ab,ti. OR exp anxiety OR exp anxiety disorders OR anxiety.ti. OR exp Depression OR depression.ti.

AND

(exp Health personnel OR (health.ti,ab. AND personnel.ti,ab.) OR Nursing OR nurse.ti,ab. OR nursing.ti,ab)) AND LIMIT human