Interventions to reduce burnout of physicians and nurses: an overview of systematic reviews and meta-analyses

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Abstract

Objective: Numerous systematic reviews and meta-analyses on the interventions to reduce burnout of physicians and nurses have been published nowadays. This study aimed to summarize the evidence and clarify a bundled strategy to reduce burnout of physicians and nurses.

Methods: Researches have been conducted within Cochrane Library, PubMed, Ovid, Scopus, EBSCO, and CINAHL published from inception to 2019. In addition, a manual search for relevant articles was also conducted using Google Scholar and ancestral searches through the reference lists from articles included in the final review. Two reviewers independently selected and assessed, and any disagreements were resolved through a larger team discussion. A data extraction spreadsheet was developed and initially piloted in 3 randomly selected studies. Data from each study were extracted independently using a pre-standardized data abstraction form. The risk of bias in systematic reviews and assessment of multiple systematic reviews (AMSTAR) 2 tool were used to evaluate risk of bias and quality of included articles.

Results: A total of 22 studies published from 2014 to 2019 were eligible for analysis. Previous studies have examined burnout among physicians (n = 9), nurses (n = 6) and healthcare providers (n = 7). The MBI was used by majority of studies to assess burnout. The included studies evaluated a wide range of interventions, individual-focused (emotion regulation, self-care workshop, yoga, massage, mindfulness, meditation, stress management skills and communication skills training), structural or organizational (workload or schedule-rotation, stress management training program, group face-to-face delivery, teamwork/transitions, Balint training, debriefing sessions and a focus group) and combine interventions (snoezelen, stress management and resiliency training, stress management workshop and improving interaction with colleagues through personal training). Based on the Risk of Bias in Systematic reviews and AMSTAR 2 criteria, the risk of bias and methodological quality included studies was from moderate to high.

Conclusions: Burnout is a complicated problem and should be dealt with by using bundled strategy. The existing overview clarified evidence to reduce burnout of physicians and nurses, which provided a basis for health policy makers or clinical managers to design simple and feasible strategies to reduce the burnout of physicians and nurses, and to ensure clinical safety.

Abbreviations: AMSTAR 2 = assessment of multiple systematic reviews 2, RoB = risk of bias, ROBIS = the Risk of Bias in Systematic reviews, SRs = systematic reviews.

Keywords: burnout, meta-analyses, nurses, overview, physicians, systematic reviews

1. Introduction

Burnout refers to a prolonged response to chronic emotional and interpersonal stressors caused by work, manifested as emotional exhaustion, depersonalization, and reduced personal accomplishment.[1] Burnout prevalence data were extracted from 182 studies involving 109,628 physicians in 45 countries, where overall prevalence ranged from 0% to 80.5%, emotional
more attention to the mental health of human beings, especially
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Among physicians in China (9302 participants from 11 studies), burnout prevalence ranged from 66.5% to 87.8%. [3] The highest levels of burnout were reported among nurses, although all healthcare providers showed high burnout, [4] and the prevalence has been increasing in recent years. [5] Burned-out physicians and nurses not only suffer from more substance abuse, broken interpersonal relationships, and suicide ideation, [6,7] they also overwhelmingly believe they deliver poorer quality care, and patients seem to be less satisfied with burned-out physicians and nurses (impact on patient outcomes, in terms of patient experiences, quality of care, and medical errors). [8–14] Reducing burnout has been recognized as a fundamental health care policy goal across the globe, and health care organizations are encouraged to invest efforts to improve physicians’ and nurses’ wellness, particularly for early-career physicians and nurses. [14–16]

Burnout among healthcare providers is in relation to their gender, marital status, work environment, interpersonal and professional conflicts, emotional distress, and low social support. [4,17] Individual-focused, structural or organizational, or combine solutions were required. [11,18–21] Previous studies have already carried out systematic review on the physicians’ burnout. [22] However, due to the limited database and literature, no schemes have been proposed, which can be popularized and applied in real life. Recently, COVID-19 has swept the world, which has drawn pay more attention to the mental health of human beings, especially front-line health care workers. [24] This study aimed to discuss bundled strategy to reduce burnout of physicians and nurses, and attempted to present a protocol of intervention model.

2. Methods

The current overview for systematic reviews (SRs) and meta-analyses was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

2.1. Eligibility and exclusion Criteria

The inclusion criteria and exclusion were seen in Table 1.

2.2. Search Strategy and Data Sources

Databases including Cochrane Library, PubMed, Ovid, Scopus, EBSCO and CINAHL database were chosen and searched for publications from inception to December 2019 with no restriction on language, which covered a wide range of subjects including medicine, psychosociology and nursing. In addition, a manual search for relevant articles was also conducted using Google Scholar and ancestral searches through the reference lists of articles included in the final review. The search strategy included combinations of 3 key blocks of terms (burnout; physicians and nurses; interventions) using medical subject headings (MESH terms) and text words. Consultation has been conducted between the project team and information specialists before finalizing the search strategy (see Additional file 1).

2.3. Study Selection

Search results were exported from Endnote X7 and duplicates were removed. Study selection was completed in 2 stages. Titles and abstracts of the studies were screened and subsequently full texts of the selected studies were accessed and further screened against the eligibility criteria. The title and abstract screening were undertaken by XJ. Z and YQ. S. Two reviewers independently selected and evaluated, and any disagreements were resolved through a larger team discussion.

2.4. Data Extraction

A data extraction spreadsheet was developed and initially piloted in 3 randomly selected studies. Following data were retrieved from articles included in this review: study characteristics (eg, first author, year of publication, country, search period, and number of primary studies included), participant characteristics (eg, sample size), outcome measures (eg, MBI, JSS, PSS, ESS, BP and HR), and study methods (eg, interventions in experimental/control groups). Data from each study were extracted independently using a pre-standardized data abstraction form.

2.5. Assessment of risk of bias and quality

The Risk of Bias in Systematic reviews (ROBIS) and AMSTAR 2 scale were used to evaluate risk of bias (RoB) and methodological quality of the included systematic reviews and/or meta-analyses, which were evaluated independently by 2 authors. The ROBIS[23] is a tool to assess RoB of SRs which comprised phase 2 (4 domains) and phase 3. Four domains in phase 2 are study eligibility criteria, identification and selection of studies, data collection and study appraisal, and synthesis and findings. The results of each domain and phase 3 were rated as high risk, low risk, or unclear risk. The AMSTAR 2[24] includes 16 items and is not designed to generate an overall ‘score’. A high score may disguise critical weaknesses in specific domains, such as an inadequate literature search or a failure to assess RoB within individual studies that were included in a systematic review. In making an overall rating of systematic review, it is important to take account of flaws in critical domains, which may greatly weaken the confidence that can be placed in a systematic review.

Table 1

| Inclusion and exclusion criteria. | Inclusion criteria | Exclusion criteria |
|----------------------------------|-------------------|-------------------|
| Study design                     | Systematic review or/and Meta-analysis | The systematic evaluation plan repeats the traditional review and the conference abstract |
| Population                       | Physicians or/and nurses | Medical students, nursing students, nonmedical providers or beyond hospitals |
| Intervention                     | Intervention strategies for reducing burnout | Non-relevant interventions |
| Comparison                       | Baseline/no intervention | Interventions lacking robust research evidence |
| Outcome                          | **Primary outcome:** burnout (evaluated by Maslach Burnout Inventory) | Studies that did not measure a reduction in burnout qualitatively or via self- reporting scales |
|                                  | **Secondary outcome:** stress, anxiety, depression, resilience and general health status | |

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2.6. Data synthesis

A quantitative analysis of the included SRs was not performed due to information from overlapping RCTs between SRs. On the other hand, literature of different design types cannot be quantitatively synthesized. Therefore, a qualitative synthesis of the included studies was conducted instead. Literature search results and data extraction results were summarized descriptively. To exclude duplicate RCTs, 2 authors reviewed all of the RCTs in each SR. A summary of efficacy outcomes was presented based on the different outcome measures, controls and interventions. A narrative synthesis was therefore generated considering the total number of SRs that reported results, the methodological quality of SRs and RCTs, and the quality of evidence for the outcomes to yield final conclusions.

2.7. Ethics

Ethics approval is not required in overview of SRs and meta-analyses.

3. Results

The search strategy yielded 841 potential studies. After removing duplications (n = 334) and eliminating 486 by a first pass through the titles and abstracts, the potentially relevant literature was screened in 2 rounds and resulted in 22 studies from 2014 to 2019 (Fig. 1)\(^{15,16,18–21,27–42}\). The included researchers are from the USA (n = 7), UK (n = 4), Australia (n = 3), China (n = 2), Italy (n = 2), Germany, Iran, Finland and Malaysia. The search period of included research was from the inception to 2019. The 38.10% included research were meta-analyzed. The measurement instruments used in the literature are shown in Table 2, and MBI is the most widely used questionnaire to evaluate burnout. Follow-up time ranged from 0 to 7 years. The detailed characteristics of the included research are presented in Table 2.

3.1. Assessment of risk of bias

The RoB of the included studies was assessed by ROBIS. Table 3 presents the results of assessment. The first domain aims to assess
### Table 2
Characteristics of the included systematic reviews/ meta-analysis on the use of interventions for reducing burnout of physicians and nurses.

| Author, year | Country | Search period | Number of primary studies included | Number of participants included | Meta-analysis | Outcome measures | Person-directed intervention | Organization-directed intervention | Combined intervention | Follow-up timepoints |
|--------------|---------|---------------|-----------------------------------|--------------------------------|---------------|-----------------|---------------------------|-------------------------------|----------------------|---------------------|
| Petrie et al, 2019 | Australia | Inception to March 26, 2018 | RCT (n = 4) | Physicians (n = 1203) | Yes | GHQ-12 (n = 2); PRIME-MD (n = 2); BDI (n = 1); BDI-II (n = 1); PHQ-9 (n = 1); CES-D (n = 1); STA (n = 1) | Online individualized intervention (10-week, about 25 h in total); Telephone call (1-year, 0.5 h/week); Online individualized intervention (10-week, about 25 h in total); Telephone call (1-year, 0.5 h/week); | | | Baseline/no intervention |
| Li et al, 2019 | China | Inception to August 2017 | RCT (n = 4) | Nurses (n = 628) | Yes | VAS | Persuasive self-talk; | Aromatherapy (n = 4); Massage (n = 2) | | | Baseline/no intervention |
| Jackson-Koku et al, 2019 | UK | Inception to August 2017 | CS (n = 14) | Nurses (n = 1203) | | | Emotion regulation: self regulatory or taught emotion regulation skills or interventions such as mindfulness | | | | |
| Ghazal et al, 2019 | Malaysia | 2002 to 2018 | RCT (n = 2) | Nurses (n = 465) | | | | | | | |
| DeChant et al, 2019 | USA | January, 2007, to October, 2018 | RCT (n = 2) | Physicians (n = 12, 264) | | | | | | | |
| Simone et al, 2019 | Italy | Inception to September 2018 | RCT (n = 35) | Physicians (n = 391) | Yes | | | | | | |

(continued)
| Author, year | Country | Search period | Number of primary studies included | Number of participants included | Meta-analysis | Outcome measures | Person-directed intervention | Organization-directed intervention | Combined intervention | Comparison | Follow-up timepoints |
|-------------|---------|---------------|-----------------------------------|--------------------------------|--------------|-----------------|----------------------------|---------------------------------|----------------------|------------|--------------------|
| Cocchiara et al, 2019 | Italy | Inception to February 2017 | CBA (n = 7) | NR | No | MBI, HPLP, DASS-21, SCS, SF12, FAI, PSS, GMS, GQHSC | Yoga (3 wk); Yoga sessions twice a week (50/60 min per session); Yoga program and meditation: 8-wk yoga program associated with a day-to-day work of 20 min of meditative awareness; 8-week YBSM | NR | Cognitive Behavioral Stress Management | NR |
| Aryankhesal et al, 2019 | Iran | January 2000 to June 2017 | RCT (n = 3) | Physicians (n = 1571) | No | NR | Communication skills training; Eight-point program: a meditation-based intervention; Thankful events; Electronic-mental health care approach: Consultation with an occupational physician; 8-wk Yoga; Professional identity development program; Psychosocial training intervention; Coping skills training a support group; Mindfulness training | Improved communication, changes in work-flow, and targeted quality improvement projects; Team-based, incentivized exercise program; Cognitive, somatic, dynamic, emotive and hands-on (Yoga, meditation, relaxation, touch therapy, energy healing) | NR | NR | 4 or 6 mo |
| Fibbins et al, 2018 | Australia | Inception to November 2017 | RCT (n = 3) | Nurses (n = 346) | No | Biagi (n = 2), WC (n = 2), BP (n = 3), HR at rest (n = 2), HBA1c, P-glucose, Insulin, Urea, Hba1c | Group discussions; Study circles; Information groups on unhealthy lifestyle; Guided low-intensity yoga Classes; Lifestyle and physical health information sessions; Educational programs | NR | NR | 10 wk to 1 yr |
| Dresin et al, 2018 | USA | Inception to January 27, 2015 | CBA (n = 14) | Healthcare providers (n = 1894) | Yes | MBI (n = 26), CB (n = 1) | Stress management workshop; Mindfulness; Brain wave; Rational emotive therapy | Job training and education; Coworker support groups; Clinical supervision; Job redesign and restructuring; Team communication | Stress management workshop; Workshop: ongoing; Workgroups and organizational consultation | NR | NR |
| Brenda et al, 2018 | USA | Inception to September, 2015 | RCT (n = 4) | Physicians (n = 597) | No | NR | Team-based intervention; Organizational leadership program | Art therapy and CBT Counseling intervention Mindful communication Stress management and communication training Communication skills training Respiratory-one Method Incentivized exercise program Changes in physicians’ professional effort Supervision of professional skills in work challenges: Development of work condition and training | NR | NR | NR |
| Johanna et al, 2017 | Finland | 20 to March 2015 | RCT (n = 3) | OAB (n = 3) | No | NR | Methods for stress management and resilience-building; Methods for behavioral and mental change; | Improving interaction with NR colleagues through personal training; Development of stress management and working methods | Baseline, post-intervention (4, 6, 9, 12 or 34 mo) | (continued) |
Table 2 (continued).

| Author, year | Country | Search period | Number of primary studies included | Number of participants included | Meta-analysis | Outcome measures | Person-directed intervention | Organization-directed intervention | Combined intervention | Comparison | Follow-up timepoints |
|--------------|---------|---------------|------------------------------------|--------------------------------|---------------|------------------|-----------------------------|-------------------------------|------------------------|-------------|---------------------|
| Panagioti et al, 2017 | Inception to May 2016 | RCT (n = 17) | Physicians (n = 1706) | CAB (n = 17) | MBSR | Workshop (interactive teaching intervention); Self-care workshops coordinated by mental health professionals; Stress reduction intervention; Bi-monthly groups; 8 weekly sessions each lasting 2.5 h, and a 1-d silent retreat between the sixth and seventh session focused on mindfulness; Interactive face-to-face workshop training; Communication and SMST; Contemplation-meditation exercises such as mindfulness meditation | Metabolism | Workload or schedule; Communication, teamwork, and quality improvement; Debriefing sessions and a focus group that explored themes around work-related stressors, coping mechanisms, and potential strategies to improve junior medical officer wellbeing | 19 weekly facilitated discussion groups incorporating elements of mindfulness, reflection, shared experience, and small-group learning for 10 months; Self-directed and team-based intervention; Individualized exercise program including self-reported exercise and gym attendance; Educational sessions and on-the-unit guided meditation; SMART educational session or standard nursing orientation session; Educational session and brief mindfulness meditative exercise | Post-intervention/ Waiting list intervention/ Continuous schedule/4-wk rotations | 18 mo |
| Gilmartin et al, 2017 | USA | Inception to January 2017 | RCT (n = 7) | Healthcare providers (n = 833) | No | MBI | SMART program: five-minute daily guided practice, three-a-day home practice; Guided mindfulness meditation sessions; MBI-based: introduction to Mindfulness and Mindfulness in Daily Life modules with pre-recorded meditation audio; BFI MBI-R-based; Buddhist-Angean basketball meditation or non-meditating activities (e.g., reading, chatting, napping); Wristwatch meditation or biofeedback or control; Free, mindfulness meditation smart phone application; Audio compact disc guided mindfulness practice or self-help control | NR | NR | 4, 8, 10 or 16 wk |
| Clough et al, 2017 | Australia | Inception to January 2016 | RCT (n = 10) | Physicians (n = 1107) | No | MBI | SMART program: five-minute daily guided practice, three-a-day home practice; Guided mindfulness meditation sessions; MBI-based: introduction to Mindfulness and Mindfulness in Daily Life modules with pre-recorded meditation audio; BFI MBI-R-based; Buddhist-Angean basketball meditation or non-meditating activities (e.g., reading, chatting, napping); Wristwatch meditation or biofeedback or control; Free, mindfulness meditation smart phone application; Audio compact disc guided mindfulness practice or self-help control | NR | NR | 4, 8, 10 or 16 wk |

(continued)
| Author, year | Country | Search period | Number of primary studies included | Number of participants included | Meta-analysis | Outcome measures | Person-directed intervention | Organization-directed intervention | Combined intervention | Comparison | Follow-up timepoints |
|-------------|---------|---------------|-----------------------------------|---------------------------------|---------------|-----------------|-----------------------------|-------------------------------|---------------------|-------------|---------------------|
| Brand et al., 2017 | UK | October 2013 to September 2016 | GW (n = 9) RCT (n = 48) | NR | No | GHS-12 | Workplace nutrition and physical activity promotion, a total of 1.2 weeks; Collaborative Care Model program: promotion of culture of caring and safety; Workplace wellness champion program; | NR | NR | Baseline, post-intervention 3 mo |
| West et al., 2016 | USA | Inception to Jan 15, 2016 | CS (n = 37) RCT (n = 15) | Physicians (n = 3630) | Yes | NR | Mindfulness-based approaches; Stress management; Small group curricula; Work processes; | NR | NR | | |
| Luken et al., 2016 | USA | Inception to March 2014 | RCT (n = 8) | NR | No | MBI | | | | | | |
| Lee et al., 2016 | China | Inception to 2014 | RCT (n = 5) | OCT (n = 2) | Nurses (n = 1521) | Yes | MBI | Mindfulness-based programs; Stress management; | | | | |
| Buskens et al., 2016 | USA | Inception to 2015 | Cohort (n = 13) | RCT (n = 48) | | Physicians (n = 2013) | Yes | MBI | Self-care workshops; Meditation intervention; Communication and SMITP; BAHE stress training; Incentivized exercise program; Protected sleep period; Support group structure; | Duty restrictions; Balint training | NR | NR | NR |
| Westermann et al., 2014 | Germany | Inception to January 2012 | RCT (n = 10) | OCT (n = 5) | OBA (n = 1) | Nurses (n = 2033) | No | MBI (n = 14) GHS-12 (n = 2) | Communication training; MBSR; Training program managing behavioral symptoms of dementia and peer support; Time slips: a creative expression program in dementia care; Ergonomic and psychosocial training; Educational course to increase staff skills in dealing with abuse of the elderly; | Systematic review; Exercise and activity program for clients; Group discussion; Supervision meetings; | Snooker; Cooperative communication program for staff and families on dementia units; Emotional-oriented care for cognitively impaired elderly patients; | NR | 4 wk to 18 mo |
| Sheeran et al., 2014 | UK | Inception to May 2012 | RCT (n = 3) | OCT (n = 3) Qualitative (n = 2) | NR | No | | | | | | |
whether primary study eligibility criteria were prespecified, clear, and appropriate to the review question.\textsuperscript{12}12 out of 22 studies were rated low risk and 3 were unclear risk. The second domain aims to assess whether any primary studies that would have met the inclusion criteria were not included in the review. 8 out of 22 studies were rated low risk. The third domain aims to assess whether bias may have been introduced through the data collection or risk of bias assessment processes. 17 studies were of low risk while 5 studies were graded as high risk. The fourth domain aimed to assess whether the data was combined from the included primary studies. Only 8 studies rated low risk of bias. The final phase considers whether the systematic review as a whole is at risk of bias, 14 studies were rated high risk and 8 were low.

### 3.2. Assessment of quality

The quality of included studies was assessed by AMSTAR 2 (Table 4), which is not designed to generate an overall 'score' to avoid disguising critical weaknesses in specific domains, such as an inadequate literature search or are a failure to assess risk of bias with individual studies that were included in an overview.\textsuperscript{16}12 of the 16 items were reported over 60% of compliance, which were as followed: the research questions and inclusion criteria for the review include the components of PICO (item 1); explain their selection of the study designs for inclusion in the review (item 3); use a comprehensive literature search strategy (item 4); perform study selection in duplicate (item 5); perform data extraction in duplicate (item 6); provide a list of excluded studies and justify the exclusions (item 7); describe the included studies in adequate detail (item 8); use a satisfactory technique for assessing the RoS in individual studies that were included in the review (item 9); account for RoB in individual studies when interpreting/discussing the results of the review (item 13); provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review (item 14); carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review (item 15) and report any potential sources of conflict of interest, including any.

| Author, year       | Phase 1: Study eligibility criteria | Phase 2: Identification and selection of studies | Phase 3: Data collection and study appraised | Phase 4: Synthesis and findings | Phase 5: Risk of bias in the review |
|--------------------|-----------------------------------|-----------------------------------------------|-------------------------------------------|--------------------------------|-----------------------------------|
| Petroz et al., 2019 | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Li et al., 2019    | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Jackson-Kuku et al., 2019 | ![Unclear Risk]            | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Ghaswara et al., 2019 | ![Low Risk]                        | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| DeChant et al., 2019 | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Simone et al., 2019 | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Coccia et al., 2019 | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Aryankhezel et al., 2019 | ![Low Risk]                        | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Fabbio et al., 2018 | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Dejansen et al., 2018 | ![Low Risk]                        | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Bruch et al., 2018  | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Johanna et al., 2017 | ![Low Risk]                        | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Panagiot et al., 2017 | ![Low Risk]                        | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Gilmar et al., 2017  | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Claugh et al., 2017  | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Brem et al., 2017  | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| West et al., 2016  | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Lukan et al., 2016  | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Lee et al., 2016  | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Basile et al., 2016  | ![Low Risk]                       | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |
| Westermann et al., 2014 | ![Low Risk]                        | ![Low Risk]                                   | ![Low Risk]                               | ![Low Risk]                     | ![Low Risk]                      |

- ![Low Risk]: low risk
- ![High Risk]: high risk
- ![Unclear Risk]: unclear risk

[Table 3: Risk of bias of included systematic reviews/ meta-analysis.]
| AMSTAR 2 criteria | Petrie et al, 2019 | Li et al, 2019 | Jackson-Koku et al, 2019 | Ghanadra et al, 2019 | Simone et al, 2019 | Cocchiara et al, 2019 | Aryankhesal et al, 2019 | Ribbins et al, 2018 | DeSousa et al, 2018 | Bremda et al, 2017 | Johanna et al, 2017 | Panagioti et al, 2017 | Gilmartin et al, 2017 | Clough et al, 2017 | Brand et al, 2017 | West et al, 2016 | Luken et al, 2016 | Lee et al, 2016 | Buijumedy et al, 2016 | Westermann et al, 2014 | Stewart et al, 2014 |
|-------------------|-------------------|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 1. Did the research questions and inclusion criteria for the review include the components of PICO? | Y | N | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 2. Did the report of the review contain an explicit statement that the review methods were established prior to conduct of the review and did the report justify any significant deviations from the protocol? | Y | N | N | Y | N | N | N | N | Y | N | Y | N | N | N | N | N | N | Y | N | Y | N | N | N |
| 3. Did the review authors explain their selection of the study designs for inclusion in the review? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 4. Did the review authors use a comprehensive literature search strategy? | Y | Y | PY | Y | Y | PY | N | Y | Y | Y | PY | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| 5. Did the review authors perform study selection in duplicate? | Y | Y | N | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | N | Y | Y | N | Y | N |
| 6. Did the review authors perform data extraction in duplicate? | N | Y | N | Y | Y | N | Y | Y | Y | Y | Y | Y | N | Y | Y | N | Y | N | Y | N | Y | N | N |
| 7. Did the review authors provide a list of excluded studies and justify the exclusions? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| 8. Did the review authors describe the included studies in adequate detail? | PY | PY | PY | PY | PY | PY | PY | Y | Y | Y | Y | N | PY | N | N | Y | Y | Y | Y | N | N | N | N |
| 9. Did the review authors use a satisfactory technique for assessing the RoS in individual studies that were included in the review? | PY | PY | PY | PY | PY | PY | Y | N | PY | N | N | Y | Y | Y | N | Y | N | N | N | N | N | N |
| 10. Did the review authors report on the sources of funding for the studies included in the review? | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| 11. If meta-analysis was justified did the review authors use appropriate methods for statistical analysis? | Y | Y | N/MC | N/MC | N/MC | Y | N/MC | N/MC | Y | N/MC | N/MC | Y | N/MC | N/MC | Y | N/MC | N/MC | Y | N/MC | Y | N/MC | N/MC | N/MC |

(continued)
| AMSTAR 2 criteria | Petrie et al, 2019 | Li et al, 2019 | Jackson-Koku et al, 2019 | Ghandar et al, 2019 | DeChant et al, 2019 | Simone et al, 2019 | Cocchiara et al, 2019 | Aryankhesal et al, 2019 | Filbins et al, 2018 | Dreizen et al, 2018 | Brennan et al, 2017 | Johanna et al, 2017 | Paragiosi et al, 2017 | Gilmarlin et al, 2017 | Clough et al, 2017 | Brand et al, 2016 | West et al, 2016 | Luken et al, 2016 | Lee et al, 2016 | Busrieddy et al, 2016 | Westermann et al, 2014 | Stewart et al, 2014 |
|------------------|-----------------|------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 12. If meta-analysis was performed did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis? | Y | Y | N | M | C | N | M | C | Y | N | M | C | Y | N | M | C | Y | N | M | C | Y | N | M | C | Y | N | M |
| 13. Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review? | Y | Y | Y | Y | Y | Y | N | Y | N | N | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review? | Y | Y | N | M | C | N | M | C | Y | N | M | C | Y | N | M | C | Y | N | M | C | Y | N | M | C | Y | N | M |
| 16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |

N = no, NMC = no meta-analysis conducted, PY = partial Yes, RoB = risk of bias, Y = yes.
funding they received for conducting the review (item 16). 4 items with compliance lower than 40% were the main reporting limitations to be blamed: contain an explicit statement that the review methods were established prior to conduct of the review and did the report justify any significant deviations from the protocol (item 2, 27.27%); report on the sources of funding for the studies included in the review (item 10, 0.00%); use appropriate methods for statistical combination of results (item 11, 36.36%); and assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis (item 12, 36.36%). As a whole, the methodological quality and quality of included studies was from moderate to high.

### 3.3. Interventions of reducing burnout of physicians and nurses

Previous studies have reported on the content, intensity, form, evaluation, and timepoint of follow-up of interventions to reduce the burnout of physician and nurses (Table 2). There were three types of interventions: individual-focused, structural or organizational, and combine interventions. Emotion regulation was an important psychological variable, which associated with burnout. The self-regulatory or emotion regulation skills such as mindfulness was used to reduce the doctors’ burnout.[28] Individual-focused interventions included self-care workshops,[19,31,40] stress management skills,[31,37,39,42] and communication skills training.[19,21,42] Other interventions such as yoga,[16,32,33] massage,[13] mindfulness,[16,18,20,31,37,39,42] and meditation[16,19,31,40] have been reported. Structural or organizational interventions included workload or schedule-rotation,[19,31] stress management training program,[27] group face-to-face delivery,[19,27,31] teamwork/transitions,[30,42] Balint training,[25] debriefing sessions and a focus group.[19,20,31] Team-based primary care redesign, “Primary Care 2.0”, with the goal of addressing the Quadruple Aim of health care (ie, the Triple Aim plus reducing workforce burnout) with the following components:

1. an expanded “care coordinator” role for medical assistants including scribing, population health management, and between-visit care management,
2. health coaching and motivational interviewing,
3. “lean” quality improvement to support a Learning Health System,
4. telehealth,
5. protected physician time for care coordination, and
6. an onsite extended interdisciplinary care team (ie, mental health, pharmacy, physical therapy).[30]

Combine individual-focused and structural or organizational interventions included Snoezelen,[21] stress management and resiliency training,[34] stress management workshops,[18,20] and improving interaction with colleagues through personal training.[34] Training and follow-up were conducted by face-to-face,[27,31] phone,[20,31,35] e-mail,[27] video,[20,31] or online,[18,20] and the timepoint of follow-up ranged from 0 to 7 years (Table 2).

## 4. Discussion

### 4.1. Summary of main findings

The purpose of this study was to summarize the evidence and clarify a bundled strategy to reduce burnout of physicians and nurses. According to ROBIS, 12 research were in low risk in domain 1, 8 in domain 2, 17 in domain 3, and 8 in phase 3. By using AMSTAR 2 to assess the methodological quality and
quality of included research, most of those were considered as relatively good quality.

4.2. Implication for future study

Burnout of physicians and nurses has become a global public health problem. This overview analyzed the contents of 22 papers with results that physician-directed interventions are associated with small reductions in symptoms of common mental health disorders among physicians. Organizational interventions that ignore individual factors cannot really reduce burnout of physicians and nurses. Therefore, based on theories and studies, when physicians and nurses face stressors caused by work, they will make different coping strategies. Coping refers to the “cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person.”

Emotional intelligence theory suggests that emotion regulation skills facilitate the maintenance of appropriate emotions, reducing or adapting undesirable emotions in oneself and others. Physicians and nurses constantly alternate between exhaustion and happiness. Resilience is the bridge from burnout to wellness. Based on previous theories and studies, physicians and nurses experience a dynamic change between burnout and wellness. If positive intervention strategies can be adopted to enhance resilience, the incidence of burnout of physicians and nurses is greatly reduced and the wellness improved (Fig. 2).

4.3. Strength and limitations

This research included studies in different settings, which brought to light the range of interventions, which could provide the “cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person.”

This overview has included 22 systematic reviews and meta-analyses to summarize the relevant studies of interventions to reduce burnout of physicians and nurses, which provide a basis for health policy makers or clinical managers to design simple and feasible strategies to reduce the burnout of physicians and nurses, and to ensure clinical safety. Considering partial databases selected and gray literature not included, the results are used only as an overview of the field.

5. Conclusion

This overview has included 22 systematic reviews and meta-analyses to summarize the relevant studies of interventions to reduce the burnout of physicians and nurses and form an evidence resource, which provides reliable evidence support for further intervention. It is an urgent need to implement and evaluate the long-term effect of bundle strategy.

Author contributions

XJZ, YQS and TYS designed, performed and analyzed the research. XJZ, YQS, TYS and TTJ advised on article inclusion and exclusion. XJZ and ND designed the Tables. XJZ, YQS and TTJ wrote the manuscript. XJZ, YQS, TTJ, ND and TYS read and revised the manuscript. All authors read and approved the final manuscript.

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