

Evidence Check

Interventions and strategies to improve staff wellbeing in healthcare organisations

An Evidence Check rapid review brokered by the Sax Institute for the NSW Ministry of Health – April 2026

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This report was prepared by: Colleen Cheek, Robyn Clay-Williams, Rebecca Mitchell, Mary Simons, Reema Harrison, Peter Hibbert, Elizabeth Austin, Judith Johnson, Adam Neufeld, led by the Australian Institute of Health Innovation, Macquarie University.

April 2026

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Suggested Citation:

Cheek C, Clay-Williams R, Mitchell R, Simons M, Johnson J, Harrison R, Hibbert P, Austin E, Neufeld A. Interventions and strategies to improve staff wellbeing in healthcare organisations: an Evidence Check rapid review brokered by the Sax Institute (www.saxinstitute.org.au) for the NSW Ministry of Health, 2026. doi:10.57022/guyi7668

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Abbreviations

AI: Artificial intelligence

AMI: Acute myocardial infarction

CBT: Cognitive behavioural therapy

DS: Digital scribe

ETR: Electronic rostering system

MBSR: Mindfulness-based stress reduction

PTSI: Post-traumatic stress injury

ROI: Return on investment

RSMR: Risk standardised mortality rate

SBTT: Simulation-based team training

STS: Secondary traumatic stress

Executive summary

The literature reviewed in this report suggests that effective staff wellbeing strategies and interventions in healthcare organisations rarely rely on a single intervention. Instead, the most promising approaches address multiple levels of the work environment, including organisational systems, team functioning, and individual supports. While interventions must be tailored to local context, five broad approaches consistently appear in the literature and may provide a useful starting point for health services seeking to improve workforce wellbeing.

1. Improve workflow and administrative efficiency

Administrative burden and inefficient workflows are frequently identified as major contributors to staff stress and burnout. Interventions that streamline documentation, reduce duplication, de-implement low value processes or redesign workflows can improve both staff wellbeing and productivity.

Examples include:

- Digital documentation tools or medical scribes
- Redesign of electronic health record workflows
- Reducing unnecessary reporting or administrative tasks
- Process redesign to improve patient flow.

These interventions address the **system drivers of workload**, rather than focusing solely on individual resilience.

2. Improve rostering and fatigue management

Shift work, long hours, and being on call, are all significant contributors to fatigue and reduced wellbeing in staff. Evidence from the literature suggests that improvements to scheduling practices can support staff recovery and work–life balance.

Examples include:

- Reviewing actual hours worked against schedules
- Increased recovery time between shifts
- Opportunities for staff input into rostering
- Fatigue management strategies during night shifts, such as adapted shift systems.(45)

These interventions are particularly relevant for shift workers.

3. Strengthen leadership capability and team climate

Leadership practices strongly influence workplace culture, psychological safety, and staff engagement. Leadership development initiatives can support managers to create environments where staff feel respected, supported, and able to raise concerns.

Examples include:

-
- Leadership training focused on communication and psychological safety
 - Team training programs such as TeamSTEPPS(1)
 - Structured safety culture improvement initiatives
 - Regular leadership walk-rounds and listening forums

These approaches can improve both staff wellbeing and patient safety outcomes.

4. Implement structured mentoring and peer-support programs

Healthcare work can expose staff to emotionally challenging situations, including adverse events and patient harm.

Peer-support and mentoring programs can help staff process these experiences and reduce feelings of isolation.

Examples include:

- Mentoring and transition programs for early-career clinicians
- Facilitated peer discussion or reflection groups
- Structured peer-support programs following adverse events
- Coaching programs for clinicians or leaders.

These initiatives can be implemented across healthcare professions, including nursing, medicine, and allied health.

5. Support local wellbeing improvement initiatives

Many successful wellbeing initiatives are driven by local teams identifying and addressing issues within their own work environments.

Frameworks such as the Institute for Healthcare Improvement “*Joy in Work*” model(2) emphasise identifying and removing workplace barriers that prevent staff from doing meaningful work.

Examples include:

- Local improvement groups focused on staff wellbeing
- Staff surveys used to identify workplace barriers
- Small-scale quality improvement projects addressing workflow or communication issues
- Ongoing monitoring and feedback.

This approach recognises that wellbeing challenges vary across departments and professions, and solutions are often most effective when developed locally.

Introduction

Workforce Planning & Talent Development (WPTD) at the New South Wales (NSW) Ministry of Health commissioned this Evidence Check Rapid Review to support the development of a comprehensive, system-wide workforce wellbeing strategy, aligned with Recommendation 33 of the *Special Commission of Inquiry into Healthcare Funding (2025)*. To prioritise and improve the wellbeing of staff, Recommendation 33 supports routine collection and collation of detailed data that appropriately considers scope, program outcomes and financial impact, but does not negatively impact existing workload and job stressors of the workforce.

WPTD commissioned a review of contemporary international evidence on wellbeing initiatives for staff who work in healthcare organisations similar to NSW Health, including a range of individual-, team- and system-level initiatives, care or implementation models that demonstrate improved staff wellbeing outcomes. As part of the review, WPTD requested information on how existing staff wellbeing initiatives may have had an impact on patient outcomes.

Review Aim: To identify and descriptively synthesise evidence on individual-level and system-level wellbeing interventions, including programs, models of care, organisational processes, policies, supervisory structures, capability building opportunities, team dynamics, and environmental factors, that improve outcomes for staff.

Rapid review of published evidence

Methods

Rapid review methodology (3-5) was undertaken for the review (Figure 1).

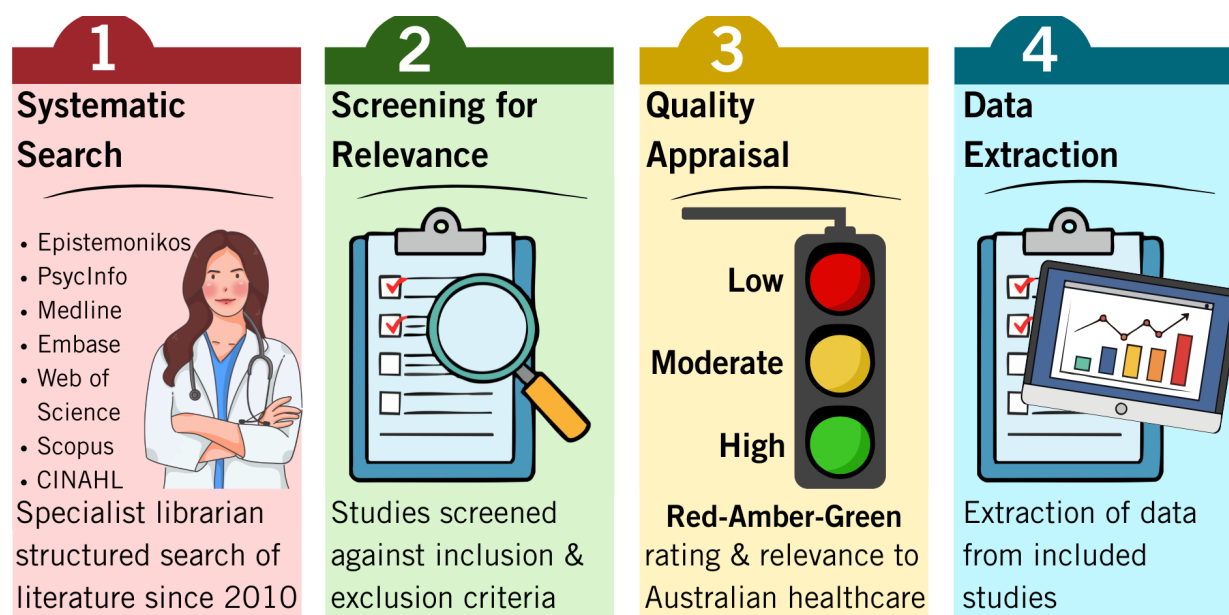


Figure 1: Approach to search and capture research evidence in this review

We conducted a pilot search in Medline Ovid and Embase on 18 January 2026; we refined the search terms and translated these into the final search strategy for seven electronic academic databases: Medline Ovid, Embase, Scopus, Web of Science, CINAHL, PsycInfo, and Epistemonikis. The search was conducted from 1 January 2010 to 6 February 2026. Appendices 1 and 2 provide the full search terms and Ovid Medline search strings as an example that was applied to all seven academic databases. We imported the results into Covidence (<https://www.covidence.org>) and duplicates were removed, resulting in a total of 6751 articles.

The inclusion and exclusion criteria were drafted and refined for clarity after reviewers dual-screened a subset of articles. The refined criteria restricted studies to high-income countries with similar health systems to Australia – the World Health Organization member countries (Europe, Americas, and Western Pacific) and additional countries ranked among the Global State of Patient Safety 2025(6) top 20 (Australia ranked 12th).

All reviewers dual-screened a subset of 147(2%) articles selected from the first 200 papers listed in Ovid Medline so that papers that met or did not meet the inclusion criteria were well represented, as well as those that would test the inclusion criteria. Following this pilot screening, further refinement was made to the inclusion and exclusion criteria by: 1) excluding health professional students in an academic setting; 2) including health professional students in a clinical setting; 3) excluding interventions to manage chemical as well as physical injury; and 4) excluding studies where only useability or feasibility of an intervention were reported, and where interventions were reported for various settings including staff in healthcare organisations but outcomes for these staff were not reported separately to staff in other settings. Inter-rater reliability was calculated in Covidence among five academic reviewers who dual screened ≥ 5 papers together. As a high level of agreement was achieved among dual reviewers ($\kappa = 0.71$), single title and abstract screening was conducted due to the short timeframe for the review. After title and abstract screening, the inclusion and exclusion criteria were refined and finalised and 492 full text articles were reviewed (Appendix 3). Systematic reviews and meta-analyses were excluded at the full-text article review but tagged for later retrieval, given the large number of included studies.

Of the 492 articles reviewed, 223(45.3%) were included as describing either individual-, team-, or system-level wellbeing interventions or any combination thereof. The PRISMA flow diagram is presented in Appendix 4. Only basic intervention type was extracted from the title and abstract of the 172 articles reporting individual-level interventions. Instead of reviewing these more comprehensively, a 2020 Cochrane systematic review(7) and a 2025 economic analysis(8) were selected for their alignment with the research aim to summarise outcomes from individual-level wellbeing interventions.

Data extraction for system- team- and multi-level intervention studies was completed by five reviewers (CC, JJ, RM, EA, RCW).

Terms and definitions

For this review, 'wellbeing' was concerned with human flourishing in a state of mind sense, where outcomes related to personal fulfilment, growth, enjoyment, or psychological measures of wellness. As the aim was to review improved outcomes, only studies with a comparator were included.

'Healthcare personnel' and 'healthcare professionals', 'healthcare workers', 'clinicians' are among terms used interchangeably and to variably include or exclude others who work in healthcare organisations. The subject of this review was all staff who work in healthcare organisations, so 'staff' is used in its broadest sense to apply to all employees, regardless of role or status. Where an intervention targets a specific staff group or reports outcomes from a particular staff group, the term provided is reported. Where 'physicians' is used in literature from the United States (US), the term is taken to refer to medical doctors of any speciality. 'Clinician' is used in this review to refer to any regulated healthcare professional who provides clinical care. Where other terms are reported, explanation of these in the Australian context is provided by the authors of this review in a footnote.

Quality appraisal

A pragmatic two-step assessment process for study quality appraisal was completed at data extraction, as proposed by the Sax Institute. Firstly, the type of study was categorised by two reviewers according to the Australian National Health and Medical Research Council (NHMRC) levels

of evidence. Secondly, a set of three conditions was used to rate the study's reported wellbeing effect, and generalisability and applicability to the Australian health system (Figure 1). A traffic light system was used to grade each study against the criterion as a quick reference to the quality of evidence, reported impact and generalisability to the Australian context. Four team-level intervention studies that were not generalisable or applicable to Australia were excluded. These processes align with contemporary guidance to adopt flexible methodological strategies for expedited evidence syntheses.(4, 5)

Table 1: Criteria and descriptors for pragmatic quality appraisal

Criterion	Descriptor	Colour
NHMRC Level	randomised or pseudo-randomised study	Green
	comparative study with concurrent control	Yellow
	comparative study without concurrent control, pre/post	Red
Clinical Impact – wellbeing outcomes	very large or substantial	Green
	moderate	Yellow
	slight or nil	Red
Generalisable	population same or similar to Australia	Green
	population different but sensible to include	Yellow
	Population studied differ and not generalisable to Australia	Red
Applicable	Applicable with/without caveats to Australia	Green
	Probably applicable	Yellow
	Not applicable to Australian context	Red

Summary of findings

Description of studies

The number of studies published increased from 91 to 223 in the six years between 2019 and 2025. From 2019, there was an increase in studies examining wellbeing interventions at team-level (from 11 in 2019 to 22 in 2025) and system-level (from 5 in 2019 to 21 in 2025) (Figure 2). Studies reporting wellbeing interventions at multiple levels were reported from 2021.

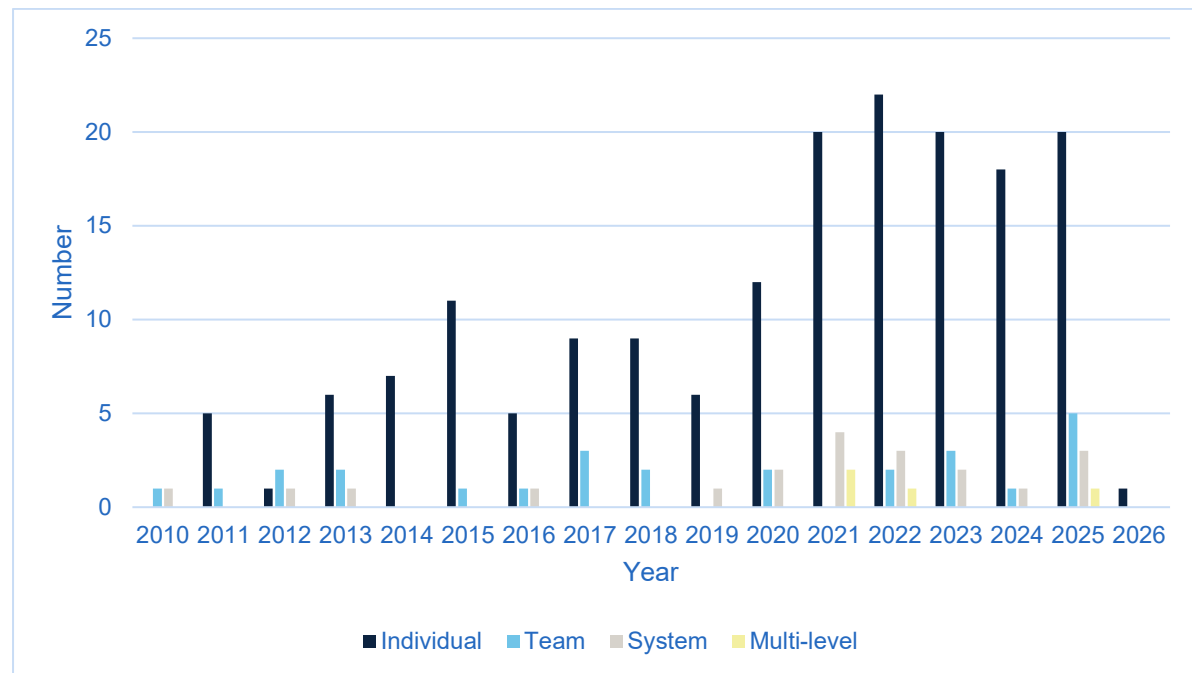


Figure 2: Number of published articles by year

The majority of studies were conducted in large urban hospital settings; exceptions were Bronkhorst et. al.(12) (one hospital and four community facilities in the Netherlands), Livni et. al.(13) (Public sector drug and alcohol health services in New South Wales, Australia), Callamassi et. al.(14) (community emergency response units in Italy), and Rickard et. al.(15) (remote hospitals in the Northern Territory, Australia). Tabulated findings from team-, system-, and multi-level interventions are summarised in Appendix 5.

Individual-level interventions

There were 172 individual-level studies, 126 (73%) of which implemented wellbeing interventions to help manage stress; 29 of these were mindfulness-based interventions. Others included attention-based training, resilience training, yoga, journaling, blog-writing, meditation, reflexology, practicing gratitude, practicing happiness, practicing relaxation, psychosocial coaching, immersive therapy, animal-assisted therapy, commitment therapy, guided imagery, autogenic training, creative arts, Reiki massage, healthy ageing at work, and breathing practice. Of the remaining 46 individual-level intervention studies, 15 promoted physical exercise; 13 used professional skills training (such as managing conflict, dilemmas, and individual coaching); 8 promoted sleep hygiene; and 10 were targeted to a specific local need. These included enacting mandated wellbeing curricula in graduate medical education, retention of sexual assault nurse examiners, evaluation of e-mental health self-help interventions for nurses and allied health professionals screening positive in a Work Health and Safety surveillance survey, evaluating the utility of bio-markers as indicators of stress in nurses, rehabilitation to work, and identifying digital intervention components and combinations that are most effective at preventing symptoms of stress-related health problems.

In a 2020 Cochrane systematic review, Kunzler et. al.(7) reviewed 44 randomised controlled trials (RCTs) of any psychological resilience intervention with healthcare professionals who were exposed to potential risk or stressors that reported primary outcomes of resilience or mental health and wellbeing, irrespective of the intervention content, duration, setting or delivery mode. Of the included studies, 15 included only nurses, 14 only physicians, eight were conducted with mixed hospital personnel, and the remaining were general medical personnel including military. Interventions included mindfulness, mindfulness-based stress reduction (MBSR), cognitive behavioural therapy (CBT), or a combination of individual interventions (eg CBT and mindfulness, MBSR and CBT, CBT and art therapy). Twenty-nine of the 44 studies delivered resilience interventions face-to-face. Ten studies used a multimodal delivery of interventions (e.g. web-based intervention and daily diary). Three studies examined online or mobile-based resilience-training programmes, and one study tested an intervention that was conducted in a laboratory setting. Meta-analysis of 21 studies showed significant Standard Mean Differences (SMD) in post-intervention measures for the following outcomes: Resilience showed moderate effect size (12 studies: SMD 0.45; 95% confidence interval [CI] 0.25, 0.65); depression – small effect size (14 studies: SMD –0.29 CI –0.50, –0.09); Stress/stress perception – moderate effect size (17 studies: SMD –0.61; CI –1.07, –0.15). There were no differences in wellbeing/quality of life, or anxiety. Within ≤ 3 months of the intervention, significant positive effects were reported for: Resilience – moderate effect size (11 studies: SMD 0.42; CI 0.17, 0.67); Depression – moderate effect size (8 studies: SMD –0.52; CI –0.81, –0.23); and Stress/stress perception – moderate effect size (14 studies: SMD –0.46; CI –0.67, –0.25). Measures of Resilience > 3 -6 months after the intervention were reported in two studies reaching significant small effect size: SMD 0.35; CI –0.41, 1.11), however, after six months the SMD did not reach significance.

Overall, the authors reported a high level of uncertainty in the reported effects due to limitations in the methods of the studies and lack of detail on reported intervention, different results across studies, the small number of participants in most studies, and as findings were limited to certain participants, interventions and comparators. Potential adverse events were only examined in three studies, showing no undesired effects.

Azadehyaei et al.(8) evaluated the economic effectiveness of 15 reported interventions to proactively mitigate post-traumatic stress injury (PTSI) among frontline health professionals and public safety personnel, focusing on the outcomes related to PTSI symptoms, absenteeism, and psychological wellness. As there was a large variation in metrics and outcomes, the authors converted all financial metrics to return on investment (ROI), which ranged from -20% to 3560%. Shorter interventions (≤ 6 months) often produced higher returns, while longer interventions (> 12 months) showed more moderate or negative returns. The authors noted that intervention effects varied among organisational contexts, program design and participants.

Team-level wellbeing interventions

There were 23 included studies that reported team-level interventions from: United States (US) (n=13),(16-28) Canada (n=4),(29-32) Australia (n=2),(13, 33) and one from each of Japan,(34) Netherlands,(12) Sweden,(35) and the United Kingdom (UK).(36) Team-level interventions were categorised into two main groups. The first group (n=18) were those interventions implemented to promote improved workplace culture with primary wellbeing outcomes.(13, 18-24, 26, 27, 29-36) The second group (n=5), were those interventions implemented primarily to promote patient safety culture, also termed patient safety climate. In these studies,(12, 17, 25, 28, 37) authors cited the association of safety culture with staff workplace health and safety outcomes. The studies were included if wellbeing outcomes were reported, albeit as secondary outcomes.

Improving workforce wellbeing

The quality appraisal of team-level interventions to improve workforce wellbeing is reported in Table 2, with explanatory legend for the appraisal provided in Text Box 1. The studies are described thereafter in order of NHMRC level, with similar interventions clustered.

Table 2: Quality appraisal of team-level intervention studies of improving workforce wellbeing

Author, Year	NHMR Level	Clinical Impact	Generalisable	Applicable
Hata et al., 2022(19); Parris et al, 2025(26)	Green	Yellow	Green	Green
Uchiyama 2013(34)	Green	Red	Yellow	Yellow
Leiter et al., 2011(31);2012(30)	Yellow	Yellow	Green	Green
Ginsburg et al., 2017(29); Hessler et al., 2025(21); Livni et al., 2012(13); Myers et al., 2025(24)	Yellow	Red	Green	Green
Cooper A 2025(33); Gupta et al.,(18); Meurling et al., 2013(35); Ravalier et al., 2022(36); Young et al., 2024(27)	Red	Yellow	Green	Green

Kobritz et al., 2023(22)				
Haughland et al., 2023(20); Rutherford et al., 2025(32)				
Menzin et al., 2020(23)				

Improving workforce wellbeing

Against the backdrop of the COVID-19 pandemic, Hata et. al.(19) sought proactive strategies to transform institutional culture that had realistic time and cost footprints and included the full community of healthcare clinicians. A short interprofessional group (doctors, nurses and nurse practitioners) intervention to promote wellbeing was reported in one US academic medical centre. Self-facilitated dinner discussion groups were held every three months on the topics: “Reframing Challenging Patient Interactions”; “Embracing Uncertainty in Our Work”; and “Coping with Errors, Near Misses, and Bad Outcomes”. All groups conducted their first and third dinner in a conference room at the hospital with catered food, and the second dinner was held in a local restaurant. The total cost per faculty member of under US\$90 for the intervention was, paid by the department. Groups were randomised to discussion with and without a one-page guide. Statistically significant improvements were found between baseline and 3-month follow up in both groups. Overall burnout decreased from 14 faculty members (56%) at baseline to nine faculty members (41%) at the end of the study; the number of faculty who felt engaged in their work increased from 20 (80%) to 22 (96%); there was an increase in faculty who felt the department was committed to wellbeing 7 (28%) to 10 (43%). There were no changes in items of empowerment or Reaction to uncertainty.

Parris et al.(26) implemented a coaching initiative in a US academic medical centre in response to a high rate of burnout in graduate medical trainees reported in peer-reviewed literature. Academic faculty were provided with online coach training; 184 trainees and 150 faculty were randomised to coaching with mentoring, or mentoring over a 15-month time period with up to 4 x 60-minute dyad meetings. Difference-indifference analyses showed reduced burnout among coachees compared with control trainees, with a score difference of -0.37, professional fulfillment improved in coachees, with a score difference of 0.50 compared with control trainees. There were no differences in resilience or self-valuation. There were no differences in wellbeing outcomes for faculty coaches.

Uchiyama et al.(34) reported a unit-based intervention implemented in response to poor psychological work environments in a Japanese hospital. Subchief nurses¹ in each intervention unit facilitated activities within their own units over six months. During the first three months, 30-minute group meetings were held to exchange views about the unit’s needed intervention. Task sheets were used to clarify the problems, needs, and help plan execution of activities. In the study, 434 nurses in 24 units were randomly allocated to 11 intervention units and 13 control units. In the second three months, nurses in the intervention group started to improve their psychosocial work environment based on the action plans proposed in the development phase. From surveys administered at baseline and after the intervention, the authors reported some improvement in survey scales of job control (0.4), coworker support (0.5), and effort (0.3), but no improvements in the mental health status of staff.

¹ Subchief nurses work below a ‘Chief Nurse’ who is assigned to manage the smallest unit or department in a hospital or other healthcare setting in Japan. In the Australian context, a Chief Nurse would be equivalent to a Nurse Unit Manager, so subchief nurses would be the equivalent of Clinical Nurse Unit Manager in some Australian jurisdictions, or Associate Nurse Unit Manager in others.

In Canada, Leiter et al.(30, 31) implemented the *Civility, Respect, Engagement in the Workplace* (CREW) program(38) to improve social relationships and civility as a means of improving employee and organisational outcomes. Over a six-month period, 41 units in one hospital were recruited to the study. Eight units that were most representative of all were assigned to the intervention. Group members were active participants in CREW, driving improvements in civility through exercises to help the move from established behaviour patterns to explore new ways of interacting. The implementation of the CREW intervention varied by design, as units tailored the format and content of the civility exercises to areas of most concern. A survey after 12 months (mostly completed by nurses) found there were improvements in most items in the intervention groups, including: cynicism (0.35%), supervisor incivility (1.26%), exhaustion (2.25%), turnover intentions (1.85%), job satisfaction (1.5%), trust in management (0.91%), efficacy (0.81%) and organisational commitment (0.34%) These improvements aligned with the units with the strongest implementation. There were no differences in measures of coworker incivility or instigated incivility. In the longitudinal follow-up study, the authors found sustained gains in civility, incivility, workplace distress, and job attitudes, but improvements in self-reported absences were not sustained.

Other coaching or mentoring programs included Myers et al.(24) in the US, and Rutherford et al.,(32) in Canada. Myers et. al.(24) piloted individual coaching sessions for mixed health care professionals (HCPs) (n=23) who completed one-on-one sessions either in person, virtually, or by phone. The survey at 12 months did not demonstrate a reduction in burnout or an increase in job satisfaction compared to baseline. Rutherford et al.(32) reported intervention consisted of four stages: 1) a large-group virtual education session with baseline surveys; 2) an in-person mentor-mentee matching process; 3) meetings of mentor-mentee pairs in-person or virtually approximately once every two months over six months; and 4) a large-group in-person wrap-up session with post-intervention assessments of burnout and workplace engagement. Paired pre- and post-intervention surveys from 23 participants showed significant improvement in personal accomplishment (paired $t=2.12$), and while there were positive trends in other burnout dimensions, these did not reach significance.

Ginsburg et al.(29) reported a multifaceted intervention in a Canadian hospital emergency department in response to a national 'Accountability Framework' that required staff to 'Speak Up'. The intervention comprised a role-playing simulation workshop, teamwork climate data feedback and facilitated discussion with the interprofessional team (discussion briefings), and other department-led initiatives to promote trust, teamwork, and speaking up among interprofessional team members. A survey was administered to nurses, physicians and allied health professionals (with ICU staff as control group) at three timepoints: at baseline, at three months (after the workshop), and seven months after the workshop. There was a significant 20% increase in staff perception that team input was well received in the unit, but insignificant changes in other teamwork climate items. The authors reported that changing communication behaviours and a creating a climate that supports speaking up is immensely challenging and highlighted the need to assess an intervention's fit and likelihood of success in the unique context of the setting.

Hessler et al.(21) reported a nursing leadership strategy for interpersonal development in a US hospital. All leaders attended a live session that focused on empathetic communication, while education for the additional topics was provided by email. The expectation was that leaders would educate themselves and then cascade the content to their teams during scheduled staff meetings. The intervention group also attended the interpersonal development course with topics designed to enhance psychological safety such as emotional intelligence, psychological safety, trust, generous listening, and powerful questions. The standard of practice was for nurse managers and charge

nurses of the hospital to conduct nurse leader rounds/visits with each patient at least once during their admission. Nurse leader rounding is also intended to provide nurse leaders with the opportunity to recognise staff for their many efforts. The intention was to measure longitudinal outcomes; however, the study closed 18 months early due to the COVID-19 pandemic. There were no significant effects for the 'speak up', 'withholding voice', 'perceived concerns', and 'resignation toward speaking up' subscales, however the latter subscale scores decreased by 0.008 for every 1-unit increase in rounds and 'encouraging environment for speaking up' subscale scores decreased by 0.011 units. 'Psychological safety' sub scores increased significantly (5.3 to 6.3) over three months.

Livni et al.(13) introduced a six-month clinical and group supervision program among public sector drug and alcohol health services in Australia, mandated by guidelines and highly recommended by management. Clinical supervision is a well-established and critical aspect of psychologist practice in Australia, where supervision is considered a core competency as it is believed that a strong supervisory alliance is related to better outcomes. A supervisory forum to explore work-related emotions and stress was not as established across drug and alcohol services as for other staff. A generic model of voluntary supervision for staff, including nurses, case workers, addictions specialists, managers and non-clinical staff was established, in either individual or group formats. Supervisors participated in individual and group supervision knowledge and skills training workshops based on the "objectives approach to clinical supervision", (39) and strengths and values-based coaching. (40) Fortnightly sessions were planned but actual attendance ranged from 2–8 sessions per supervisee, totalling 70–480 minutes. An increase in burnout and decrease in wellbeing were reported, however these negative impacts were attributed to other organisational demands and individual factors. The authors reported office relocations occurred at several sites during study; supervision was seen as a chore by some; there were staff shortages; shift workers were unable to attend; and there was missing data due to participant coding failures and disengagement with questionnaires.

Cooper et al.(33) report an Australian intervention to create a structured, supportive environment to share stressors and successes, and build collaborative, nurturing, and supportive relationships within a hospital to promote nurse wellbeing. Run by two facilitators, the 11-month program drew on the foundations of clinical pastoral education and utilised processes to develop self-awareness through an action-reflection approach in 16, 1-hour peer group sessions. Nurse participants (n=15) completed surveys at three timepoints – baseline, after 5.5 months and at completion. The authors reported significant improvements in stress (0.6) and depression (0.4) with logistic regression. There was also a 2.2 scale point increase in the depersonalisation item. Participants recognised the intervention did not address modifiable workplace conditions, but the authors reported peer support to be a pragmatic support mechanism for nurses.

Gupta et al.(18) reported a TeamSTEPPS model of teamwork training implemented in a radiology department over two months in a US imaging department in response to poor teamwork and communication. TeamSTEPPS is a modular curriculum based on aviation Crew Resource Management teamwork training that was developed in a collaboration between the US Department of Defense and the Agency for Healthcare Research and Quality. Members of an internal change team selected specific tools available within TeamSTEPPS based on a pre-implementation survey with team members. Significant improvements in mean teamwork climate scores (19.9) and safety climate scores (11.8) were reported from surveys of 63 participants administered four months after implementation.

Meurling et al.(35) also reported an intervention to improve collaboration and communication between professionals, in a Swedish academic medical centre. The intervention comprised simulation-based team training (SBTT) using the A-TEAM (All Team Members' Behaviour) program, where a 4-hour interactive seminar was followed by one day of in situ high fidelity simulation with structured debriefing. From 151 participants (doctors, nurses, and nurse assistants), 102 completed surveys at both time points. Overall mean differences showed statistical improvements in teamwork (3.50) and safety climate (7.46), self-efficacy of work (0.28) from SBTT, but the response was also found to be different by profession. Nurses improved in safety climate and self-efficacy scores (with reduced nursing turnover). Physicians improved in self-efficacy only. Multilevel, multimodal evaluation of team training was recommended.

Young et al. (27) reported a leadership training program implemented in a breast imaging unit in the US during the COVID-19 pandemic, when extreme financial challenges, resource and staffing shortages compelled adapted protocols and care practices. A *Positively Energizing Leadership* program was introduced for faculty, physician and departmental leads, comprising 15 training modules and specific practice. Each leader was provided with the training book and expected to read it over one month, followed by a 1-hour presentation by the author, and 10-minute presentations on each of the 15 attributes of positive leadership. The division lead was then to apply the practices through daily mentoring, coaching, and role-modelling. A survey was constructed selecting items from validated instruments, and administered to all staff (technologists, nurses, physicians and administrative staff) with 88 respondents at baseline and 85 respondents after two years (in 2023). Over the 2-year period, there was significant improvement in mean scores for leadership communication (1.21), engagement (0.41), positive workplace climate (0.68), a decrease in burnout (0.51) and intent to leave (0.56).

Ravalier et al.(36) worked with staff to codevelop, implement, and evaluate a series of mental health and wellbeing interventions delivered via a smartphone app and associated toolkit. While 786 staff completed the baseline survey, 129 completed the survey 8-14 months after initiation. A 0.65 increase in the mental wellbeing score was found to be significant, but there was no effect found on perceived stress. There were significant positive changes in item scores for: demands ($t=-2.28$); control ($t=-2.66$); and managerial support ($t=-3.08$); but no significant differences across work engagement, vigour, dedication or absorption mean scores.

Menzin et al.(23) and Kobritz et al.(22) separately implemented the 10 monthly modules of the *Mentoring and Professionalism in Training* (MAP-IT) program. Whereas Menzin et. al.(23) did not find statistically significant improvements, Kobritz et al.(22) reported an 18% reduction in the frequency of burnout after MAP-IT participation. Prior to Kobritz et al.(22) implementation, surgical faculty members participated in an iteration of MAP-IT. The format was adapted to include a 'RAT' (resident-as-teacher) component, whereby one resident in each group with interest and experience in surgical education served as a resident-facilitator. Faculty- and resident-facilitators met twice for 60-minutes prior to MAP-IT implementation to review course materials and strategise each session. Session content materials were distributed to faculty and resident facilitators monthly in advance of each MAP-IT session to establish continuity of content delivered across all small didactic groups. An 18% improvement in burnout was reported. The authors concluded MAP-IT was well-received by residents and addressed a need in surgical training by building skills and improving resident wellbeing.

Haughland et al.(20) reported an intervention implemented in a US emergency department in response to increasing turnover (16.7% in 2019 to 33% in 2021). The 'resilience bundle' intervention

included establishing a staff serenity room (massage chair, aromatherapy diffuser, light-emitting diode (LED) candles, wall art), using structured debriefing after critical events, and implementing a program of relaxation and mindfulness (whereby a group of 13 nurse leaders were taught mindfulness practices by the lead author to lead mindfulness activities). There were several challenges during the intervention period, including COVID-19 surges that led to increased nurse to patient ratios, administrative staff augmenting diminished workforce, staff turnover over 30%, and charge nurse turnover over 45%. Staff were surveyed at three timepoints – at baseline, at six weeks, and 15 weeks, with response rate diminishing from 51% to 29%. The authors reported a significant increase in mean ranked resilience scores from baseline to the mid timepoint (33.44 to 43.44), however raw scores show a decrease at the third timepoint, with an overall increase of only 0.21 from baseline. There was no effect on perceived stress. Participants commented that a serenity room is of no use if there is not time to use it.

Improving safety culture/climate

Table 3: Quality assessment of team-level intervention studies of improving safety culture

Author, Year	NHMR Level	Clinical Impact	Generalisable	Applicable
Bronkhorst et al., 2018(12)				
Bradley et al., 2018(16); Curry et al., 2017(17)				
Paine et al., 2010(25); Yuce et al., (28)				

Bronkhorst et al.(12) implemented a six-month multifaceted strategy to improve safety climate in a healthcare organisation (one hospital, two community disability facilities, one community mental health facility, and one home-healthcare organisation) in the Netherlands. The interventions included: 1) the introduction of senior management safety rounds; 2) safety-leadership (SSTL) training for supervisors; and 3) the use of an online discussion platform for team members ('Synmind') to give their opinion on health and safety issues followed by regular team-meetings to discuss the online results. Three consecutive two-month rounds with specific themes were carried out. To help plan and monitor the intervention activities, a local project manager was appointed at each of the participating organisations. A total of 1323 employees working in 91 teams participated in the study, of which 45 teams (630 employees and 37 supervisors) were assigned to the control group and 46 teams (693 employees and 37 supervisors) to the intervention group. All were invited to complete an online survey during a five-week period before the start of the six-month intervention program, and another directly after the program finished. There were 520 employees (258 in the intervention and 262 in the control groups) who completed both surveys. Compared to the control groups, there was a significant improvement compared to baseline in safety climate (effect 0.52) and safety behaviour effect (0.3) in

the intervention groups, but there was no effect on increasing supervisor commitment to safety or safety compliance. The results also showed that within the intervention group, higher post-intervention safety climate and safety behaviour was associated with more positive actions of supervisors, including completion of planned activities such as safety rounds, consideration of work tasks and workload, discussion of wellbeing topics with staff and changes were made to daily procedures relevant to employee health and safety.(12)

Based on evidence that hospital culture can improve the safety of care, Bradley et al.(16) and Curry et al.(17) reported on the US *Leadership Saves Lives* collaborative. The two-year intervention involved 10 hospitals to reduce 30-day acute myocardial infarction (AMI) risk standardised mortality rate (RSMR). Within each hospital, a guiding coalition of 15 key staff involved in the care of patients with AMI were appointed from multiple departments and multiple disciplines. Coalition members participated in four one-day, on-site workshops during the study period, and a subset of four of these members participated in three all-hospital annual forums to promote sharing of experiences across hospitals. The workshop curriculum was grounded in a strategic problem-solving approach that sought to foster organisational culture to promote better performance while implementing evidence-based strategies with the goal of identifying and addressing root causes of AMI mortality to reduce RSMR. Networking among hospitals and access to related program materials were facilitated through a web-based platform. Coalition members were surveyed at baseline (n=147), 12 months (n=154) and 24 months (n=167). Uptake of five evidence-based strategies associated with reducing RSMR for AMI (e.g., creative problem solving, monthly meetings to review AMI cases, pharmacists rounding on all patients with AMI, physician and nurse champions for AMI care, and nurses dedicated to covering the cardiac catheterisation lab) was measured by report from a single respondent at each hospital. Changes varied across hospitals: the use of evidence-based strategies increased by 1.5 over 24 months; significant mean difference in RSMR (1.07) was found in six hospitals that experienced improvements in organisational culture scores (5 to 8), while four hospitals did not experience RSMR improvement had little organisational culture improvement. The authors concluded that organisation efforts can improve individual perceived level of work-related distress, but this requires: representation of staff from different disciplines and levels in the organisational hierarchy; authentic participation and engagement of diverse perspectives in the work of the guiding coalition; and ways of managing conflict, fatigue and motivation that collectively moves staff toward shared goals.(16)

Paine et al.(25) implemented a 2-3-year comprehensive unit-based safety program (CUSP) in 150 hospital units, leveraging multiple strategies including coaching, safety climate assessment, training, grand rounds. A CUSP team leader (usually a nurse) and physician leader needed 10-20% of their time for the efforts. The authors found that this was a substantial investment of dedicated resources, so it was important to focus on units with lowest safety culture scores and ensure that all staff understood the science of safety and had practical tools to improve patient safety. After two years, 144 units completed safety climate surveys and there were significant improvements since baseline in safety climate (8.36) and job satisfaction (5.60), but not in stress recognition.

Yuce et al.(28) report outcomes from a surgical improvement collaborative encompassing 55 hospitals. All hospitals were enrolled in a common data registry, received formal quality and process improvement training, participated in collaborative-wide QI projects, received funding for QI projects, created leadership engagement plans, presented annual quality reports, and received guidance from surgeon mentors and process improvement coaches. As a component of the collaborative, the safety culture of participating hospitals was assessed at baseline in 2015, and three years later. Participants in the reported survey included operating theatre staff, administration and hospital leaders. A 39%

response rate to survey dissemination included 36 hospitals, five of which were rural, with 444 individual participants representing all staff groups targeted. The authors reported a significant 3.9% increase in positive responses for teamwork climate and 3.2% for safety climate. Whereas perceptions of management, working conditions, and employee engagement trended upward the changes did not reach significance. Hospitals with the lowest baseline perceptions of hospital safety culture experienced the largest improvement.

System-level wellbeing interventions

System-level interventions are those that involve organisational structural reform such as changes to rostering practices or shiftwork models, work policies, hierarchical reform, or environmental changes. There were 20 included studies that reported system-level interventions from: US (n=3),(41-43) Japan (n=3),(44-46) Netherlands (n=3),(47-49) Australia (n=1),(15) United States and Australia (n=1),(50) and one from each of France,(51) Israel,(52) Italy,(14) Norway,(53) Portugal,(54) Singapore,(55) South Korea,(56) Sweden,(57) and the UK.(58) The quality assessment of system-level interventions is reported in each of the tables below, preceding the description of studies. System-level interventions were categorised into four main groups relating to the nature of the main reform: 1) Improving hours of work or reducing the impact of shiftwork (41, 43, 44, 45, 46, 51, 52, 56, 58); 2) Improving workload (15, 49, 55, 57); 3) Improving organisation of work(42, 47, 48, 54); and 4) Improving the work environment.(14, 50, 53) Findings for each group are detailed below.

Improving work hours or reducing the impact of shiftwork

Table 4: Quality appraisal of system-level interventions of improving work hours or reduce the impact of shiftwork

Author, Year	NHMR Level	Clinical impact	Generalisable	Applicable
Bilimoria et al., 2016(41)				
Stevens et al., 2020(43); Kubo et al., 2022(46); Zion et al., 2019(52)				
Tanaka et al., 2010(45)				
Cooper L et al., 2025(58)				
Hoshi et al., 2022(44); Hong et al., 2021(56)				
Fratissier et al., 2021(51)				

Nine studies reported wellbeing outcomes associated with interventions to adapt the hours of work or make these more flexible, and three to reduce the impact of night shifts on levels of fatigue.

Bilimoria et al.(41) considered the impact of new regulated hours for medical residents on surgical patient outcomes. The standard policy group was compared with a flexible duty hours policy (where

there was a cap on shift length for interns (≤ 16 hours) and residents² (≤ 28 hours) and minimum time off between shifts in the standard group, and no caps and minimum time off stipulated in flexible group) in a cluster-randomised trial in 118 accredited general surgery resident programs in the US over a 12-month period. A total of 4330 (response rate 84-87%) residents completed surveys which found residents' self-reported satisfaction regarding their overall wellbeing and satisfaction with education quality was similar and there was no difference in patient outcomes following the intervention.

Kubo et al.(46) evaluated the impact of an additional day off for nurses in Japan working 12-hour rotating shifts after two consecutive night duties, and compared wellbeing outcomes against nurses working the standard roster (ie Night, Night, Evening, Evening to Night, Night, Off, Evening, Evening, 55-hour break instead of 31 hours). Nurses were provided with fatigue counselling prior to the trial, then worked two months of one roster and two months of the other. From 37 participants, the study found significantly lower levels of vital exhaustion (5-point difference) and distress (2.5-point difference) in the intervention condition from the control, but no obvious benefit was found in objectively measured stress, sleep, or vigilance.

Stevens et al.(43) reported the outcomes of a 32-week intervention for residents of one speciality who worked three 13-week rotations over the study period at one of six hospitals. Residents were assigned two hours of protected non-clinical time per week by the chief resident of that hospital, scheduled when clinical learning opportunities were lowest. This intervention was initiated in response to high levels of burnout in residents, with authors reporting that the only intervention consistently reported to impact positively, was reduced hours. The intervention was associated with clinically meaningful decreased burnout (0.63 points) and increased wellbeing (1.26 points) in the 19 residents.

Zion et al.(52) measured the impact of a scheduled nap during night shift in hospital areas where patient care was not affected, compared with no nap. Perceptions of sleepiness decreased with the nap ($F = 31.0$), but there was no effect on cognitive performance.

Tanaka et al.(45) conducted a study in Japan that captured elements of nurses wellbeing while comparing self-reported adverse events in three hospitals that operated a two-shift system (08.00-17.00 (9 hours) and 16.30-08.00 (15.5 hours), with regulated breaks of one-hour (day shift) and two-hour nap (night shift), and two hospitals that operated a three x eight-hour shift system (08.30-17.00, 15.00-23.30, and 23.00-09.00, with regulated breaks of one hour (day shift), 0.5 hour (evening shift) and 1.5-hour nap (night shift)). Pre-study questionnaires captured individual variables, and a questionnaire after six months captured self-reported frequency of error-related adverse events, defined as an unanticipated incident in which the nurse made an error which resulted in harm to a patient. Of the 1407 shift-working nurse participants, 737 (52.4%) worked the two-shift system while 670 (47.6%) worked the three-shift system. Nurses with 3-6 years of experience who worked the three-shift system reported a higher 'effort-reward imbalance' ratio compared to peers working two shifts (1.8 compared to 1.6), higher depression (7.6 v 7.1) and higher nursing stress (42.1 v 38.7). Although fewer participants were sleepy at work compared with their peers (18.9% v 28.9%), this group reported a significantly higher frequency of adverse events than any other group (1.4 during the six-month study period). Adjusting for years of experience and wellbeing, nurses working the three-shift system had a higher frequency of perceived adverse events than nurses working the two-shift

² Post-graduate years 2-5, equivalent of junior doctors in Australia

system. The authors suggested the difference was due to less fatigue working the two-shift system as fewer nights were worked, a longer nap time was provided during nights worked, and elimination of evening shifts reduced exposure of staff to artificial light.

Hong et al.(56) and Fratissier et al.(51) both reported trials of two x 12-hour shifts (rather than three x eight-hour shifts) for nurses. Hong et al.(56) trialled the shifts over two months in 49 hospital departments in South Korea. Over 100 nurses were surveyed at one time point, finding those working 12-hour shifts reported better recovery between shifts ($t=3.90$), quality of life scores ($t=3.69$), and lower chronic fatigue ($t=-2.38$), but no differences in reported turnover intention, needlestick injuries, medication errors or near-misses. The trial reported by Fratissier et al.(51) occurred over 7-9 months in a French hospital and surveyed nurses immediately before the implementation of 12-hour shifts, and after 7-9 months working 12-hour shifts. The authors reported day staff were in favour of 12-hour shifts with reported benefits of less time pressure (-1.29%), improved work-life balance (5.1%) and satisfaction with work schedules (15.8%). However, night staff were less satisfied (55%), describing a deterioration in working conditions and work-life balance.

Cooper et al.(58) evaluated the impact of a three-month trial of self-rostering system using an electronic rostering system (ETR) on 130 nurses in two hospital departments. There were 46 participants in the baseline survey and 84 at the end of the intervention. Compared with baseline, the survey showed 31% increase in participants reporting supportive work-life balance, and 31% increase in participants reporting positive wellbeing, with only two respondents not in favour of ETR (only descriptive statistics reported).

Hoshi et al.(44) investigated the effect of well-lit conditions at nurses' stations during night duty but found no change in wellbeing outcomes for nurses working night shift with well-lit desk conditions compared with dark conditions.

Improving workload

Table 5: Quality assessment of team-level intervention studies of improving workload

Author, Year	NHMR Level	Clinical Impact	Generalisable	Applicable
Rickard et al., 2012(15)	Yellow	Yellow	Green	Green
van Kraaij et al., 2025(49)	Yellow	Red	Green	Green
Eklund et al., 2025(57)	Red	Red	Green	Green
Koh et al., 2023(55)	Red	Red	Yellow	Yellow

Rickard et al.(15) report multiple system interventions to improve retention of nurses in two regional hospitals in the Northern Territory, Australia, a remote area that is geographically, professionally and socially isolated and experiences rural-specific challenges in expanded roles and workforce attrition. Regulatory changes enforced more organisational attention to reduce levels of stress in staff and reduce turnover. The '*Jobs Demand-Resources*' model was applied to conceptualise work demands and required resources, resulting in implementation of a nursing workload tool with best practice rostering principles (and rosters were audited for compliance), additional nursing positions, a long-term funded recruitment strategy, an expanded graduate program, and staff access to continuing professional development. Surveys were conducted in the two main hospitals two years apart, finding significant improvement in psychological distress (–3.77 points in hospital 1, and 3.52 in hospital 2), and job satisfaction (0.66 and 0.37). Turnover only decreased significantly in one hospital, however the turnover in the region during the intervention period remained around 30%, whereas it had been 55% four years prior.

In response to a recent survey in the Netherlands showing 15% of nurses intend to leave their jobs, and 19% of these intended to leave the profession altogether, van Kraaij et al.(49) reported on differentiated nursing practices (in which nursing roles and responsibilities were assigned based on each nurse's education level, work experience, and expertise). This program, while implemented nationally, was tailored at each hospital. A total of 5411 nurses and 3rd and 4th year nursing students, representing 19 hospital sites, were surveyed across baseline and ≥1 year following implementation. While improvement in the work environment was reported, this had no effect on turnover intention.

Eklund et al.(57) (Sweden) and Koh et al.(55) (Singapore) both evaluated the impact of transition programs for graduate nurses. Eklund et al.(57) surveyed 211 nurses working in all departments across two regions (six hospitals), some of whom had undertaken the transition program and some who had not, to elicit long-term outcomes. To explore the impact of transition programs on wellbeing, experiences of work environment and turnover intention on early career nurses, surveys were undertaken up to two years after commencement of employment. No differences were found in the unstratified sample.

The first year of a two-year nurse transition program in Singapore focused on knowledge and skill development, and 1:1 mentorship with experienced nurse leaders in the second year. Koh et. al.(55) surveyed nurses at two time points and concluded the program enhanced new graduate nurses' practice confidence, particularly within the first six months but did not impact their job satisfaction. Factors that were associated with nurses' attrition within 24 months of clinical practice were practice confidence at six months and an extension to their probation period.

Table 6: Quality assessment of team-level intervention studies of improving the organisation of work

Author, Year	NHMR Level	Clinical Impact	Generalisable	Applicable
Ventura-Silva et al., 2024(54)				
Bloemhof et al., 2021(47)				
Nguyen et al., 2023(42)				
Scheepers et al., 2021(48)				

Ventura-Silva et al.(54) implemented primary nursing care³ in Portugal; there were no changes in perceptions of patient safety, and slight changes in structural and psychological empowerment in the study involving 48 nurses.

Bloemhof et al.(47) evaluated the effects of the implementation of a professional practice model based on Magnet principles on the nurse work environment in a Dutch teaching hospital. Hospitals that are prepared to create a Magnet culture invest in transformational leadership, structural empowerment, exemplary professional practice, new knowledge, innovations and improvements, and empirical outcomes. The program included collecting baseline measurements of the three pillars (Nurses, Organisation, Patient) and then collecting the same measurements every three years to monitor the effect of interventions that participating organisations developed based on research outcomes. Overall job (0.7) and professional satisfaction (21.4) and perception of quality of care improved significantly after interventions were implemented.

Nguyen et al.(42) reported the of impact of Artificial Intelligence (AI) scribes on reducing electronic health record administrative burden and improving wellbeing for doctors and nurse practitioners in one US cancer centre. Examination room discussions were recorded, transmitted to the vendor, where the digital scribe's (DS) AI components organised the recorded information into a visit note, which was edited by vendor staff before being released to the clinician for review and confirmation. In this small sample, the DS was considered marginally acceptable and marginally usable; many clinicians felt that having on-site, close vendor support and internal clinician super-users would have greatly facilitated workflow redesign and integration of the DS into their workflow. There was a small

³ Primary nursing is a model of care where individual patients are assigned to a named nurse for the duration of the shift, with the nurse assuming overall care responsibility. This model became popular and was widely implemented around the late 1900s, including in Australia, but relies on predominantly registered nurse workforce. Previous models included team-based nursing where a group of nurses collectively cared for a large group of patients over the shift. Team nursing or hybrid models have been reintroduced, particularly to ensure appropriate supervision of junior staff or ancillary roles such as Assistants in Nursing.

but significant improvement in mean scores on the Mini-Z for perceived time for documentation (2.1 v 3.6) but no improvement in burnout (3.6 v 3.9).

Scheepers et al.(48) evaluated a two-month pilot program of an additional nurse assistant (who completed a two-year training course and could do routine tasks (e.g. bathing, cleaning) on evening shifts, to consider the impact on nurses' perceptions of job demands, job resources, and wellbeing, with preliminary evidence that this resource could reduce workload, physical demands and sleep problems among nurses.

Improving the work environment

Table 7: Quality assessment of system-level intervention studies of improving the work environment

Author, Year	NHMR Level	Clinical Impact	Generalisable	Applicable
Calamassi et al., 2022(14)	Green	Red	Green	Green
Vaag et al., 2013(53)	Yellow	Red	Green	Green
Abel et al., 2020(50)	Red	Red	Green	Green

Calamassi et.al.(14) trialled listening to music during breaks at 440Hz vs 432Hz for emergency response workers during the COVID-19 pandemic. Staff (mostly nurses) were divided into three groups: listening to music at one of the two frequencies and a liberal activity group. All three groups showed reduced mean anxiety 2.50 (from 2.0 to 5 on STA1X1), suggesting any break was welcomed, although there was a slightly greater reduction in those listening to music tuned to 432Hz.

Vaag et al. (53) reported choir singing for all employees over a five-month period in two county hospitals, supported by professional performing artists, sound, light, and film resources (group music videos were made), culminating in an informal competition and concert. Compared with non-participants, there was a 0.20 positive effect in job engagement and 0.33 in organisational commitment. Compared with non-participants, participants self-reported increased engagement (0.17), demand-control (0.8) and health (0.11).

Abel et al.(50) reported the impact of a *Frontline Leader Certificate Program* for nurse leaders in hospitals in the US and Australia. The online program consisted of a development plan and workbook, self-study, interviews with leaders to gain practical tips, and interactive scenarios to improve communication skills, taking less than six hours to complete. Participants reported the program helpful with statistically significant improvement in mean structural empowerment (18.50), on the Psychological Empowerment Scale, but not in psychological empowerment or intent to stay.

Multi-level interventions

There were four studies that reported multi-level interventions: US (n=3),(60-62) and one from the Netherlands.(63) The quality assessment of system-level interventions is reported in Table 8. Pierce et al.,(61) Sprang et al., Acevedo et al., and de Wijn et al., all implemented interventions at multiple organisational levels and reported statistically improved outcomes.

Table 8: Quality assessment of multi-level intervention studies

Author, Year	NHMR Level	Clinical Impact	Generalisable	Applicable
Pierce et. al. 2021(61); Sprang et al., 2021(62)				
Acevedo et al., 2025(60); de Wijn et al., 2022(63)				

Pierce et al.,(61) implemented a wellbeing intervention across five departments in four health organisations, informed by structured consultations with more than 40 organisations convened by the National Taskforce for Humanity in Healthcare in 2015. This consensus was a three-step framework: reframing distress as a systems issue rather than individual failure; adopting metrics that assess emotional thriving and recovery rather than deficit-based burnout measures; and developing a human-centred blueprint for systemwide change. To translate the approach into action, a comprehensive, integrated pilot program was implemented that aimed to improve both burnout and overall individual, team, leadership, and organisational wellbeing by simultaneously addressing culture, leadership, team- work, and clinical workflows. The intervention included steps for: 1) Onboarding units and conduct baseline wellbeing measurement; 2) Participation in evidence-based interventions; 3) A human-centred leadership development program; 4) Relations for health transformation; 5) Four x four-day sessions to enhance/elevate joy and remove hassles; 6) Two x two-day sessions to hardwire interventions and create an appreciative environment. An overarching team comprising faculty members facilitated all sites for onboarding, process Improvement, consultant-facilitated redesign, post data collection and analysis.

Although the intervention did not meet the predetermined aim of improving emotional thriving and emotional recovery by at least 5% for all participants, early trends toward improvement were found, including 7% reduction in emotional exhaustion for staff overall and by more than 10% for doctors, nurse practitioners, physician assistants, and nurses.

Sprang et al.(62) responded to organisational survey results of high levels of secondary traumatic stress (STS). In each of seven organisations within one state Department of Health and Human Services, 5-10 volunteer representatives, with coaching and consultation from STS and organisational change experts, used survey results to create goals toward becoming more STS-informed and monitoring progress toward goal completion. Each team directed and assisted with enactment of

strategies within their representative units. Over 2300 participant surveys, representing seven organisations, were collected over three timepoints – baseline, end of the initiative, and five-month follow-up, showing significant increases in mean scores of subscales from baseline to five-month follow up for: resilience (4.8), safety (5.0), policies (5.1), leadership practices (5.4), routine practices (9.4), with an increase in overall STS informed organisational assessment of 5.8. Importantly, scores continued to trend upwards after the initiative to the five-month follow-up survey. There was a slight reduction in burnout (0.8).

De Wijn et al.(63) examined work-related stress in the context of large societal costs and implemented the *Psychosocial Risk Management Approach (PRIMA)* across 15 emergency departments in the Netherlands. A multidisciplinary project team – including researchers, project managers, and an ED manager – designed and oversaw a two-year participatory intervention that included risk assessment, translating risks into action plans, implementing actions and evaluating outcomes and the evaluation process.

Using participatory action research, organisations were supported to design and carry out their own interventions. Although all professional groups took part, only nurses were surveyed. The study found that the *quality* of the intervention – appropriate actions matched to psychosocial risks, strong communication, and active employee participation – mattered more than the *number* of actions taken. Over the project period, there were significant positive effects in scales of perceived staffing levels (0.07), worktime demands (0.06), within worktime recovery (0.05), aggression (0.02), emotional demands (0.03), work engagement (0.12), depersonalisation (0.02), and emotional exhaustion (0.01).

A resident-led, faculty-supported committee developed the resident wellness program in a US hospital. The committee consisted of one resident per year-cohort and two faculty members. Primarily, the committee developed and implemented department-specific initiatives to: promote work–life balance; support physical, psychological, and emotional health; and provide a peer support and advocacy network throughout residency. A Resident Wellness Committee met quarterly, there were annual group and individual wellness assessments with mentors, a resident wellness week comprising a grand round on physician burnout and wellness, a wellness retreat, a families group, quarterly dinners, and monthly wellness afternoons. The Department initiated some offsite meetings, basketball, welcome events, a chairman and program directors dinner, a crisis management protocol, a resident wellness fund, wellness workshops and debriefings, mindfulness programs, and Schwartz rounds. In this small sample, there was a 5% reduction in ‘burnout, 10% reduction in ‘ineffective’, 10% increase in ‘engaged,’ but 5% increase in ‘overextended’.

Discussion

We have examined the research evidence provided in peer-reviewed literature since 2010 describing interventions and strategies that report improved wellbeing outcomes for staff at individual-, team- and system-levels of healthcare organisations similar to those governed by health jurisdictions in Australia. Nursing and medical staff are predominantly featured in reported studies. These two professional groups were targeted in interventions to improve hours of work, organisation of work and workload at system-level, and were the main participants in interventions to improve general wellbeing and patient safety culture. All other staff groups are included only in some team- and multi-level interventions for staff in general, mainly conducted in hospitals. There is very little literature

reporting the outcomes of wellbeing strategies and interventions for staff who work in the community, including hospital outreach teams and services and paramedics.

It is difficult for leaders to redirect resources away from direct clinical care without knowing what will work, for whom, and under what circumstances. There were some common themes that provide generalisable learning. In this section, we discuss structures for reported interventions including models of care and clinical processes, those factors reported as contributing to intervention effectiveness, the relationship between staff wellbeing and patient safety outcomes, and frameworks, policies and mechanisms for change.

Models of care or clinical processes influencing staff wellbeing

Models of care and clinical process changes did not commonly feature in interventions that reported staff wellbeing outcomes, but there were four exceptions.

The *Leadership Saves Lives (LSL)* quality collaborative evaluated by Bradley et al.(16) and Curry et al.(17) was established to reduce persistent differences in the RSMR following AMI between the highest and lowest performing hospitals.(64) Through their efforts to improve beta-blocker use and timeliness of ST-elevation myocardial infarction procedures in patients who experienced AMI, they found high-performing hospitals demonstrated common themes: clinical engagement and senior management support for quality improvement efforts; effective use of data; strong communication and collaboration across groups; and problem-solving that fosters learning and resilience to setbacks.(17) A structured approach(65) guided development of the intervention, engagement with and tailoring to each site, which included identifying the root causes of AMI mortality and addressing these through both local solutions and evidence-based practices. The team selected sites based on sufficient volume of AMI presentations, willingness to engage with the program, and their average or below-average RSMR performance. The mean number of evidence-based strategies employed by participant hospital teams increased from 2.4 to 3.9 ($p<0.05$), there was a mean difference in RSMR of 1.07 ($p=0.003$), and there were significant positive changes in culture between baseline and 24 months, particularly in learning environment and senior management support, with positive trend in psychological safety.(17)

In nursing, the differentiated nursing practices program evaluated by Van kraaj(49) focused on establishing structures that promoted work autonomy, resource adequacy, and strategically positioned nurses within the organisation through shared governance structures.(66) Each hospital established a nurse coordinator on site to implement differentiation tailored to the organisation context so there was variability across sites. While the program positively impacted nurses' perception of their work environment, measures were non-significant, and turnover intention was not reduced. Ventura-Silva(54) implemented primary nursing in Portugal, finding a reduction in missed care and nursing staff wellbeing and job satisfaction. Primary nursing and team nursing are both used in Australia with mixed success.(67)

The evaluation of digital scribes (DS)(42) is topic of contemporary interest, demonstrating a new process to alleviate administrative burden in clinical care provision. In this short pilot study, the scribes were associated with increased time for documentation but no improvement in doctor or nurse practitioner wellbeing. Although scribed notes required reviews and edits before being signed, there were more delays in getting the notes signed with DSs compared with human scribes because the vendor first needed to release the notes to the clinician. Clinicians reported that having on-site, 'at-

the-elbow' (42) vendor support and internal clinician super-users would have greatly assisted in facilitating workflow redesign and integrating the DS into their workflow.

Contributors to intervention effectiveness

Commitment to interventions at all levels of the organisation was a strong and consistent theme among reported studies(12, 16, 17, 30, 31, 41, 47, 60-62, 64, 68) and included high-level executive support, championing and facilitating interventions by leaders, and engagement by individuals. Executive-level support was needed to provide necessary resources, including funding and project facilitator or management positions. Project facilitators or coordinators were evident in all larger interventions, but the nature of their skills or training was not well described. It may be that the important factor is having a person with dedicated time for implementation, as even short-term interventions without support relied on staff contributing to the effort above their worked hours, which is often not sustainable in the longer term. Nevertheless, successful interventions relied on good engagement which demands facilitators have credibility and are able to generate momentum for change. Well-led groups had built camaraderie(24); attributes of good leaders included the ability to manage conflict and internal hierarchies(18) and redirect group members toward shared improvement goals.(16, 17, 24)

Executive-level accountability, connection of intervention effort to organisational goals, and maintaining visibility on the project and engagement of frontline staff were also reported to contribute to successful implementation and realisation of outcomes. Conversely, lack of resources (time and financial) was cited as a major barrier to making sustained change.(63) To demonstrate authentic commitment and engagement with the interventions, leaders needed to grasp the significance of the effort in terms of financial impacts, morale, individual wellbeing, patient safety and staff retention. That is, executives needed to recognise that effort to promote staff wellbeing was a crucial component of providing healthcare to the population, and that staff wellbeing is associated with other organisational effectiveness and efficiency goals such as reduced sick leave, reduced staff turnover and better patient care quality(45). Like all investment, however, executives needed to strategise and commit to staff wellbeing judiciously, with appropriate monitoring to inform ongoing improvement.

Coaching, mentoring, facilitated groups to discuss adverse events, and programs for mitigating secondary traumatic stress were frequently reported team- and system-level interventions, again relying on the capacity of those in the coaching or facilitation role. These interventions often incorporated training prior to implementation to build capacity and capability, but training varied across programs and focused on one staff group. A program that provides trained peer responders across all disciplines to support healthcare staff after stressful clinical events is the RISE (*Resilience in Stressful*) program developed at John Hopkins Hospital.(69) This program was developed by a multidisciplinary team based on a survey of healthcare participants, most of whom reported experiencing emotional distress following an unanticipated adverse event, half of whom had reached out for support from a peer or colleague.

Relationship of staff wellbeing interventions to patient safety outcomes

Direct patient outcome data was generally very limited across studies. The primary evidence linking staff wellbeing interventions to patient outcomes was mostly indirect, based on known associations between burnout/workforce stability, fatigue, and patient safety/experience. Safety measures reported

as secondary outcomes included changes in reported incidents, including adverse events, medication errors, needlestick injuries, with staff perception of changed safety culture also used. There were two studies that focussed on patient safety outcomes, relating staff wellbeing outcomes.

The *Leadership Saves Lives (LSL)* quality collaborative evaluated by Bradley et al.(16) and Curry et al.(17), however, was established primarily to improve RMSR post AMI, with strong evidence of patient outcomes, and secondary outcomes of staff wellbeing, demonstrating a bi-directional relationship.

Several studies in Japan focused on reducing nurse fatigue relating to shiftwork. Of these, Tanaka et al. (45) collected self-reported unanticipated incidents in which a nurse made an error which resulted in harm to a patient during a six-month period in hospitals working two different patterns of shiftwork. The authors attributed the higher reported incidents in the three-shift system to fatigue. Nurses in the two-shift system worked fewer night shifts, were provided with a longer nap during night shifts, and did not have to work evening shifts, reducing their exposure to artificial light.

Frameworks, policies and organisational mechanisms

Within the peer-reviewed literature, the drivers of reform included: local staff surveys that exposed fatigue(58); intention to leave(49); particularly challenging work contexts such as rurality(15), mental health nursing(33), emergency medicine(24) and graduate transition to the workplace(26, 55, 57); poor teamwork(18, 35); the COVID-19 pandemic(19, 27); and high turnover(15, 20); local committees that prioritised staff initiatives(60); and a specific patient safety issue.(16, 17) Policy or regulations that drove interventions arose from professional employee agreements(15, 41); service guidelines(13); national quality and safety mandates such as Canada's '*Speak Up*'(29); and national alliances to improving the wellbeing and retention of healthcare personnel, such as the US National Taskforce for Humanity in Healthcare.(61)

Whereas individual-level interventions are still valuable for individuals seeking self-care options, a systems approach to professional wellbeing provided the structure and organisational commitment necessary to establish resources, trust and engagement and successful strategies allowed tailoring of interventions to the local context. Some health systems have started embedding wellbeing into organisational governance structures. For example, the NHS in England has introduced the Health and Wellbeing Guardian role(70), which places responsibility on senior leadership to ensure staff wellbeing is considered in organisational decision-making. Other frameworks and guides for improving professional wellbeing that may be useful include:

1. *National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC) – Impact Wellbeing Guide*(71)

This is a healthcare-specific organisational framework developed by the CDC and NIOSH to help health systems implement wellbeing strategies. It emphasises organisational design factors such as leadership, staffing, workflow, psychological safety and administrative burden, rather than focusing primarily on individual resilience. The guide also includes practical implementation steps for organisations, including leadership engagement, measurement, and continuous improvement.

2. *Institute for Healthcare Improvement (IHI) – Joy in Work Framework*(2)

The IHI framework focuses on improving staff wellbeing by identifying and removing workplace barriers to meaningful work. It uses a very simple improvement cycle:

- Ask staff what matters to them
- Identify barriers (“pebbles in the shoe”)
- Implement local changes
- Measure and adapt.

This framework reinforces the idea that wellbeing strategies need to be locally tailored. Many of the team-level interventions in the review (such as quality collaboratives, safety culture initiatives, peer discussion groups) operate through this kind of local improvement process.

3. *U.S. Surgeon General – Five Essentials for Workplace Mental Health*(72)

This is a very clear and policy-oriented framework that identifies five domains for all workplaces to prioritise mental health:

- Protection from harm
- Work-life harmony
- Mattering at work
- Opportunity for growth
- Connection and community

Similarly, the Stanford WellMD model(73) conceptualises physician wellbeing as the interaction of three domains:

- Culture of wellness
- Efficiency of practice
- Personal resilience.

This model emphasises organisational and workflow factors as key drivers of wellbeing. However, in practice, many organisations tend to implement only the individual-level components (such as resilience or mindfulness programs). This aligns with the findings of the review, which suggest that individual-level interventions alone rarely produce sustained improvements unless system factors are also addressed.

Successful strategies included clear definition of the problem, frameworks for implementation, and evaluation.

Problem definition

To guide problem definition and/or intervention, reviewed articles cited a range of change, psychological, organisational behaviour and implementation theories. One theme that appears across the literature is a shift away from purely individual interventions toward multi-level strategies that address both workplace conditions and individual supports. Some studies (for example Rickard(15) and de Wijn(63)) conceptualised this through the *Job Demands–Resources* (JD-R) model, which focuses on reducing excessive job demands (such as workload or administrative burden) while strengthening job resources (such as leadership support, autonomy and teamwork). The JD-R model makes four assumptions: 1) poorly designed jobs or chronic job demands exhaust employees both mentally and physically and lead to exhaustion and health problems; 2) Job resources have a more motivational nature, and their presence may lead to high work engagement, low cynicism and high

performance; 3) Job resources buffer the impact of job demands; and 4) Job demands strengthen the effect of job resources. The *Quality of Work Questionnaire* is theoretically based on the JD-R model.(74)

Closely related to this model, *Self-Determination Theory* (SDT)(75) suggests that workplace interventions are more likely to be effective and sustained when they support three basic psychological needs of all individuals:

- Autonomy (having input into work and decisions)
- Competence (having the skills and support to perform effectively)
- Relatedness (feeling supported and connected to colleagues)

Together, these frameworks help explain why interventions that combine organisational change, team functioning and individual support tend to have greater impact than single-level interventions.

Implementation and evaluation

Bespoke frameworks had been developed to guide implementation in some studies, such as *The Innovate, Develop, Engage, Develop* (AIDED) framework(64) in association with the *Leadership Saves Lives* collaborative.(16) Common data registries allowed aggregation and comparison of multisite interventions such as the Illinois Surgical Quality Improvement Collaborative, described by Yuce et al.(28) These studies illustrate the value of frameworks in broad implementations and monitoring. Sustainability appears to be a challenge, particularly in individual-level interventions. Economic evaluation showed the highest return on investment for individual-level interventions is during or immediately after implementation. However, economic evaluation lacks standardisation, and may be different where a strategy is based on building on developed capacity over time.

Measures and instruments used to assess wellbeing outcomes

A vast number of instruments were used to assess the wellbeing of staff, as catalogued in Appendix 6. Many studies chose subscales or items from several instruments to measure different domains and to minimise the time required to complete a survey. Careful selection of scales and items is required to avoid compromising validity and reliability. Potential adverse effects were not addressed in most included studies. Few studies measured patient outcome data which represents an evidence gap, particularly as associations between burnout/workforce stability and patient safety/experience become more accepted.

When considering change, it is also important to understand staff wellbeing as a slow variable – it can evolve slowly in either direction in response to long-term processes, often over a period of years. In contrast, fast variables can be influenced quickly with low-level action, and change can be accomplished within days, weeks or months. While both slow and fast variables contribute to health system resilience, for effective change to occur it is vital to adopt a strategy that is tailored to the type of variable we seek to influence. With this understanding, rapid improvement in all measures of staff wellbeing may not be realistic, but a strategy that demonstrates long-term commitment appears to be important.

Conclusion

The evidence from this review suggests that workforce wellbeing is most effectively supported through **coordinated strategies that combine system-, team-, and individual-level interventions**.

Health services seeking to improve workforce wellbeing may therefore benefit from implementing a **wellbeing strategy that includes system-level changes, leadership capability development, and locally tailored improvement initiatives**.

Based on the included studies and broader evidence, five commonly supported approaches appear to be:

1. Improving workflow and administrative efficiency

For example reducing documentation burden or introducing tools such as digital scribes.

2. Improving rostering and fatigue management

Several studies in the review evaluate shift design, recovery periods and scheduling autonomy.

3. Strengthening leadership and team climate

Leadership training, psychological safety initiatives and structured team training programs often aim to improve workplace culture.

4. Implementing mentoring or peer-support programs

These can help address emotional stress, professional isolation and recovery after adverse events.

5. Supporting local wellbeing improvement groups

Many effective initiatives involve teams identifying and addressing workplace issues through local quality improvement processes.

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Appendices

Appendix 1 – Search terms

Concept	Search terms
Population	- Healthcare workers employed within NSW Health or comparable systems, including Health, hospital personnel/staff, including: Nurse, Doctor, Physician, Medical specialist, Registrar, Physio, Psychologist, Dietician, Dietetic, Audiologist, Speech pathologist, Therapist, Radiographer, Podiatrist, Dentist, Occupational Therapist, Health care professional, Clinician, Doctor in training, Registrar, Paramedic, Pharmacist, Exercise Physiologist, Social worker Exclude: contracted non-clinical workers such as cleaners and building services staff
Intervention	- Resilience-building and psychological wellbeing programs - Staff exercise or physical wellbeing programs - Reflective practice or clinical debriefing - Access mechanisms to existing support services (e.g., EAP) - Team-level - Peer support programs - Mentoring and capability building opportunities (both formal and informal) - Leadership development opportunities (both formal and informal) - Team dynamics interventions; team culture interventions - System-level - Hierarchy or organisational structure reforms - Rostering models to address fatigue, shift patterns, and flexibility - Administrative process changes (reducing burden; addressing micro-aggressions) - Policy-level interventions (centralised vs LHD-led) - Physical environment or structural modifications (lighting, greenery, break spaces) - Models of care or clinical workflow changes that influence wellbeing - Rural health, Job Autonomy, Built environment - WHO elements of burnout – energy depletion or exhaustion, cynicism, negativism, reduced efficacy

Concept	Search terms
	Moral distress
Setting	- NSW-specific health system equivalent, including public hospitals, community health and rural and remote services where oversight is provided by the overarching health service - Not - Exclude NGOs and independent Aged Care and disability services
Outcome	- Improvement in - Burnout, fatigue, emotional exhaustion - Psychological wellbeing and resilience - Engagement, job satisfaction, morale - Retention, turnover, absenteeism, presenteeism, sick leave - Safety culture - Critical incidents or adverse event rates - Patient experience or patient safety indicators
Study Types	Systematic reviews, RCTs or quasi-experimental studies

Appendix 2 – Part 1: Search string example

Ovid MEDLINE(R) ALL <1946 to February 06, 2026>

- 1 *exp Health personnel/ or *Nurses/ or *Medical Staff/ or *Physicians/
- 2 ("Health Personnel" or "hospital personnel" or "hospital medical staff" or "Medical staff" or "Nursing staff" or "Hospital staff" or "Healthcare professional*" or "Health professional*" or Nurse* or Physician* or "Medical specialist*" or Doctor* or Surgeon* or Clinician* or "Health care provider*" or "Healthcare provider*" or Hospitalist* or "Health* Practitioner*" or "Health workforce" or "Healthcare workforce" or "health* worker*" or "health care worker*" or "health* professional*" or "junior medical officer*" or resident* or intern* or registrar* or doctor*-in-training or "doctor* in training" or "allied health" or "health* administrat*" or Physiotherap* or Psycholog* or "Occupational Therap*" or "Exercise Physiolog*" or Dietician or Dietetic or "Social Work*" or "speech patholog*" or "speech therap*" or audiolog* or Pharmac* or radiograph* or radiolog* or Dentist or Dental or paramedic* or "ambulance officer*").ti,ab.
- 3 1 or 2
- 4 (mental health/ or resilience, psychological/ or occupational stress/ or burnout, professional/ or Stress, Psychological/ or coping skills/ or Exercise/ or alert fatigue, health personnel/ or emotional

exhaustion/ or compassion fatigue/ or Ethical Dilemmas/) and (distance counseling/ or counseling/ or mental health services/ or inservice training/ or staff development/)

5 ((("Mental health" or resilience or wellbeing or stress* or burnout or fatigue or work-life or cope or coping or exercise or "energy depletion" or exhaustion or cynicism or negativity or incivility or "reduced effic*" or "moral distress") adj2 (support* or program* or train* or counsel* or develop* or inservice or in-service or "in service" or intervention* or educat* or teach* or service*))).ti,ab.

6 Cognitive Reflection/ or ("self-review" or reflection or reflective or debrief* or feedback or experience*).ti,ab.

7 Occupational Health Services/ or ("support service" or "professional support" or EAP or "employee assistance program*" or ((employ* or occupational) adj2 (service* or support or assistance or program*))).ti,ab.

8 (Mentoring/ or Mentors/ or Leadership/ or group dynamics/ or peer group/ or interprofessional relations/ or interdisciplinary communication/ or physician-nurse relations/ or "Attitude of Health Personnel"/ or Aggression/) and (Staff Development/ or Inservice Training/)

9 ((Mentor* or leadership or supervis* or "group dynamics" or interprofessional or interdisciplinary or "peer group" or teamwork or collaborat* or culture* or cultural) adj2 (intervention* or training or program* or develop*))).ti,ab.

10 "personnel staffing and scheduling"/ or shift work schedule/ or work schedule tolerance/ or workload/ or government programs/ or organizational policy/ or health policy/ or health care reform/ or working conditions/ or confined spaces/ or noise/ or environment design/ or ergonomics/ or air conditioning/ or heating/ or lighting/ or ventilation/ or workflow/ or organizational culture/ or workforce diversity/ or Systemic Racism/ or patient care planning/ or case management/ or critical pathways/ or progressive patient care/ or "delivery of health care, integrated"/ or managed care programs/

11 (schedul* or roster* or "shift work" or "job autonomy" or sleep* or workload or "work* environment" or racism or racist* or ergonomic* or heating or "air conditioning" or ventilation or workspace* or noise or workflow* or ((centrali?ed or regional or local or public or private or community or rural or remote) adj2 (administrat* or manage* or polic*))).ti,ab.

12 personnel loyalty/ or personnel turnover/ or work engagement/ or physician engagement/ or Absenteeism/ or Presenteeism/ or Sick leave/ or ("Psychological wellbeing" or resilience or Engage* or "job satisfaction" or morale or motivat* or Retention, or turnover or absenteeism or presenteeism or "sick leave" or "inten* to leave" or "Safety culture" or "Critical incident*" or "adverse event*" or Patient experience or patient safety indicators).ti,ab.

13 Occupational health/ or Occupational health services/ or (intervention* or program* or training or "stress management").ti,ab. or ((wellbeing or well-being or psychological or behavio?ral or workplace or organi?ational) adj2 (intervention* or program* or support* or service*)).ti,ab. or (Prevention & Control or Therapy).fs.

14 Developing countries/ or Poverty/ or (third-world or "third world" or "low or middle class" or developing or "low* income" or low-income or disadvantaged or poverty).ti,ab.

15 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11

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- 16 3 and 12 and 13 and 15
- 17 16 not 14
- 18 (people or patient* or inpatient* or adult* or elderly or child* or youth* or teenage* or family or families or caregivers* or relative* or farmer* or women or pregnan* or babies or student* or school* or undergraduate* or volunteer* or veteran* or adolescen* or domestic or "aged care facility*" or "disability service*" or "non-government* organi?ation*").ti,ab,kf. or (phenomenological or process evaluation* or cross-sectional or Delphi or "case stud*" or "observational stud*" or protocol* or meta-analys*).ti,ab.
- 19 17 not 18
- 20 case-control studies/ or cohort studies/ or follow-up studies/ or longitudinal studies/ or prospective studies/ or controlled before-after studies/ or exp Clinical trial/ or Randomized Controlled trial/ or (case-control or before-after or cohort or follow-up or longitudinal or prospective or trial* or RCT or randomi?ed controlled trial or quasi-experimental or difference-in-difference or cluster randomised control* trial).ti,ab.
- 21 19 and 20
- 22 limit 21 to "review"
- 23 21 not 22
- 24 limit 23 to yr="2010 - 2026"
- 25 remove duplicates from 24

Appendix 3 – Inclusion and exclusion criteria

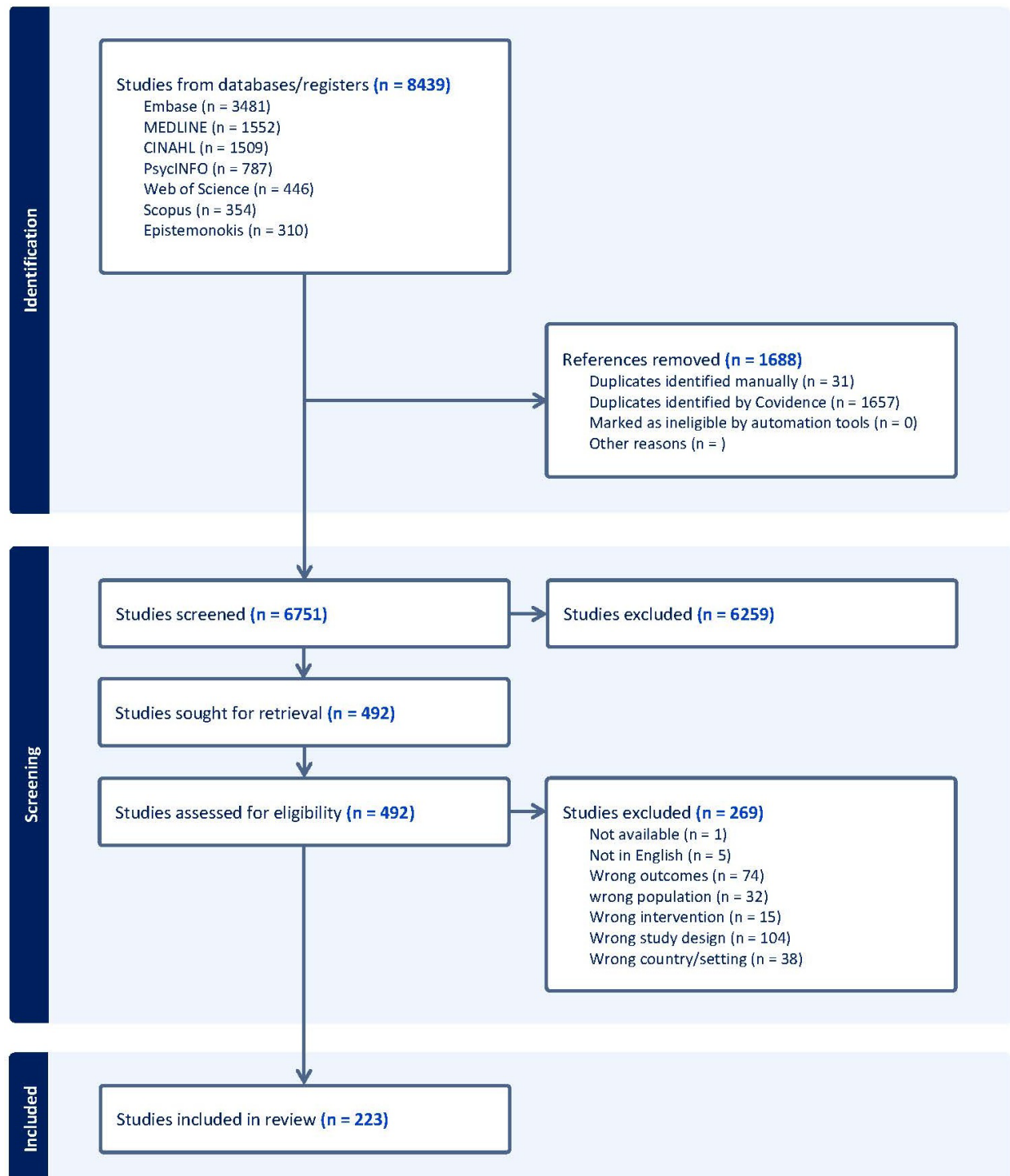
Table 9: Final inclusion and exclusion criteria

Category	Inclusion criteria	Exclusion criteria
General/initial	- English language - Peer-reviewed - Full text available - Published on or after 1 January 2010	
Study design	- Systematic reviews/Meta analyses (Tag) - Case control studies - Randomised control trials - Cohort studies - Cross-sectional studies - Pre-post - Quasi-experimental - Difference-in-difference - Cluster randomised control - Prospective - Longitudinal - Clinical trial - Mixed methods studies (using above designs)	- No outcomes reported - No comparator - Conference abstracts - Editorials - Case series - Case reports - Narrative review - Scoping review - Protocol
Population	- Healthcare personnel including doctors, nurses, allied health staff, paramedics, clinical support staff, Non-clinical staff embedded within health services (e.g., administrative officers), Junior and senior staff across hospital, community and Local Health District or Sydney Health Network settings - Health professional students on clinical placement - Public Safety Personnel (PSP) – in the Canadian context this includes paramedics	- Contracted non-clinical workers such as cleaners and building services staff. - Employed in private community services such as aged care, disability services (not under the oversight of NSW Health) - General community workforce and where outcomes for HP cannot be extracted separately and have a comparison - Health professional students in non-clinical (academic) setting - Community pharmacists and private dentists, dental nurses
Intervention(s)	Include any intervention—individual, team- or system-level—intended to improve staff wellbeing, such as: Individual level - Resilience-building and psychological wellbeing programs	Work Health and Safety programs eg Vaccination programs, work-related physical (eg strains and sprains) and chemical injury prevention (eg occupational

Category	Inclusion criteria	Exclusion criteria
	- Staff exercise or physical wellbeing programs - Reflective practice or clinical debriefing - Access mechanisms to existing support services (e.g., EAP) - Reducing moral distress - smoking cessation Team-level - Peer support programs - Mentoring and capability building opportunities (both formal and informal) - Leadership development opportunities (both formal and informal) - Team dynamics interventions; team culture interventions - Simulation activities where teamwork measure is an outcome of interest System-level - Hierarchy or organisational structure reforms - Rostering models to address fatigue, shift patterns, and flexibility - Administrative process changes (reducing burden; addressing micro-aggressions) - Policy-level interventions (centralised vs LHD-led) - Physical environment or structural modifications (lighting, greenery, break spaces) - Models of care or clinical workflow changes that influence wellbeing	dermatitis) and physical rehabilitation Simulation or education that only reports skill acquisition or confidence in performing a skill
Context	High-income, including • Australia • Canada • Switzerland • Finland • Iceland • New Zealand • Norway • Sweden • United Kingdom • United States of America	- Not comparable with Australia/NSW Health - Private services eg Aged Care - Commonwealth services eg NDIS group homes - Asia - Middle East (except for South Korea, Japan, Israel)

Category	Inclusion criteria	Exclusion criteria
	• Canada • Denmark • Finland • Germany • Italy • The Netherlands • Belgium • France • Israel • Japan • South Korea (Americas, Western Pacific, European) – World Health Organization Plus Japan, South Korea and Israel - in Institute of Global Health Innovation's Global State of Patient Safety 2025 top 20 But tag interesting studies that look as though they could have application NSW-specific health system environments, including public hospitals, community health, rural and remote services.	
Outcomes of interest	Primary: - Burnout, fatigue, emotional exhaustion - Psychological wellbeing and resilience, - Engagement, job satisfaction, morale - Retention, turnover, absenteeism - Safety culture - Critical incidents or adverse event rates - Ill-being, stress Secondary: - Patient experience or patient safety indicators - Include abstracts where wellbeing is implicit, but note to ensure wellbeing measured at full text review, else exclude	Where only useability or feasibility of an intervention is assessed Where not engagement in work, eg engagement in an education program

Appendix 4 – PRISMA flow diagram



Appendix 5 – Summary of included studies

Table 10: Summary of team-level interventions

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
Positive workplace culture				
Cooper et al. 2025 Australia	16 x 1-hr peer group sessions over 11 months - Structured, supportive environment to share stressors and successes, and build collaborative, nurturing, and supportive relationships. - Run by two facilitators and drew on the foundations of Clinical Pastoral Education and utilised processes to develop self-awareness through an action-reflection approach. - Multimodal approaches were used to introduce topics and actively engage participants, including group discussions, motivational image cards, musical reflections, silent reflections, and brief formal presentations	Nurses (n=15)	- Connor-Davidson Resilience Scale (CD-RISC10),(77) Depression, Anxiety and Stress Scale (DASS), (78) Maslach Burnout Inventory,(79) Well-being Index,(80) WHOQOL-SPRB BREF (81) - Reported statistical improvements in stress (0.6), depression (0.4), depersonalisation (2.2) but no statistical improvement in resilience, anxiety, distress, spiritual wellbeing	The intervention was generally well received but participants noted it did not address modifiable workplace conditions
Ginsberg et al. 2017 Canada	- National Accountability Framework - Multifaceted 7-month intervention to Speak Up for safety, included a role-playing simulation workshop, teamwork climate data feedback and facilitated discussion with the interprofessional team and other department-led initiatives to	Mixed (n= 83;38)	- Teamwork climate survey(82) 20% increase in staff perception that team input was well-received - Elements of confidence to question, support, receptiveness,	Changing communication behaviours and creating a climate that supports speaking up is immensely challenging.

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
	promote trust, teamwork, and speaking up among interprofessional team members.		disagreement, trended toward improvement, but not with statistical significance	Need to assess the intervention's fit and likelihood of success in the unique context of the proposed setting. The field would also benefit from research that examines more distal outcomes including longer-term changes in communication/ speak up behaviours and, ultimately, patient and system outcomes
Gupta et al. 2015 United States	- TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) - Curriculum-based, tools selected by internal change team included in-person structured debriefings and demonstrations - Implemented over 2 months	Mixed (n = 63) physicians, radiologists, sonographers, nurses, technologist aides/administ rative personnel	- Safety Attitudes Questionnaire (82) - Teamwork and safety climate improvements most notable in communication and role clarification 11/16 individual items improved significantly - positive effect for mean Teamwork climate scores (19.9) and Safety Climate scores (11.8)	TeamSTEPPS model is applicable in imaging practice; can provide blueprint for Practice and Quality Improvement (PQI) program

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
Hata et al. 2022 United States	- Three x one-monthly self-facilitated groups for faculty - with and without a discussion guide - Doctors, nurses and nurse practitioners - Three themes to guide and focus relevant discussion	Mixed: Doctors (19) Nurses (6)	- Physicians' Reaction to Uncertainty Scale,(83) Maslach Burnout Inventory,(79) Utrecht Work Engagement Scale,(84) Empowerment at Work Scale(85) - Rates of emotional exhaustion and depersonalization decreased significantly (56%–36%; $P < .001$; and 20%–15%; $P = .006$) and overall burnout decreased from 56% to 41% of faculty ($P = .002$) - The percentage of faculty who felt engaged in their work increased from 80% to 96% ($P = .03$) - Differences in empowerment at work or in reaction to uncertainty were seen.	A short series of self-facilitated dinner meetings for an interprofessional group of clinical faculty is a low-cost intervention to reduce burnout, increase engagement, and increase faculty sense of connection to colleagues. The therapeutic benefit of the intervention may be related to the relationships strengthened with colleagues, rather than any specific assigned curricular content, making this a practical and sustainable strategy for departments. [Discrete items taken from scales]
Haughland et al. 2023 United States	An ongoing program of relaxation and mindfulness serenity room (massage chair, aromatherapy diffuser, LED candles, wall art), using structured debriefing	Nurses (96)	Connor-Davidson Resilience Scale,(86) Perceived Stress Scale(87)	Staff commented the serenity room is of no use if there is no time to use it

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
			Slight improvement found in resilience when Means Ranked - 43.44(6.16)-33.44 (4.96) $p=0.03$, but effects diminished at T3	The resilience bundle provided emergency nurses with new tools to foster and enhance resilience, but ongoing effort is required
Hessler et al. 2025 United States	- The intervention was Interpersonal Development for Nurses (IDN), an enhanced leadership course in 3 x 1 hour sessions - All leaders attended a live kick-off session about leadership skills that focused on empathetic communication, while education for the additional topics was provided by email - The expectation was that leaders would educate themselves and then cascade the content to their teams during scheduled staff meetings. - There was pre-work for each session consisting of articles, assessments, or videos and post-work to ensure effective skill practice between sessions - Course topics included emotional intelligence, psychological safety, trust, generous listening, and powerful questions.	Nurses (36)	- Speaking Up about Patient Safety Questionnaire (SUPS-Q)(88) - The enhancement of leadership classes only had a statistically significant effect on Psychological safety scores, adjusted estimate -0.008 (-0.012, -0.005), but there were no significant crude or adjusted predictor effects for the Speak Up (SU), Withholding Voice (WV), and Perceived Concerns (PC) subscales	Leadership interventions that focus on the tenets of psychological safety and include methods of being present, such as nurse leader rounding, can foster a sense of a psychologically safe environment for clinical registered nurses.

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
Kobritz et al. 2023 United States	- Used the Mentoring and Professionalism in Training (MAP-IT) program, a longitudinal curriculum designed to nurture humanism and professionalism through mentoring. - Resident wellness online program comprising 10 x monthly 60-minute mentoring sessions - Each session comprised critical reflection, readings, and open discussion focused on specific humanistic mentoring skills: appreciative inquiry, active role modeling, coaching and feedback, diversity and inclusion, disclosing medical error (two sessions), enhancing well-being, mindfulness, as well as one session for reflection and feedback	Doctors (57;38)	- Connor-Davidson Resilience Scale (CD-RISC10),(77) Maslach Burnout Inventory(79) - Frequency of burnout was reduced from 64.1% to 46.1% p=0.035, Emotional exhaustion improved over 3 timepoints with MAP-IT participation (6 (15.4); 11 (28.2); 21 (53.8) vs 6 (15.4); 11 (28.2); 21 (53.8) p=0.038 - Improvements in personal accomplishment, depersonalisation and resilience were not statistically significant	A humanistic mentorship program involving RAT can be effectively implemented in surgical residency, is well-received by residents, and addresses a need in surgical training by building skills and improving resident well-being
Leiter et al. 2011;2012 Canada	Six-month Civility, Respect, and Engagement in the Workplace (CREW) program – in person meetings for targeted discussion and exercises	Mixed: (907) At 12-month follow-up n= 210, matched across all three survey timepoints	- CREW Civility Scale,(89) Effort-Reward Imbalance Questionnaire, (90) Workplace Incivility Scale,(91) Maslach Burnout Inventory,(79) Instigated workplace incivility scale,(92) Turnover intentions,(93) Affective Commitment Scale,(94) Maslach Burnout Inventory-GS(84) - Respect improved by 0.52 standard deviations (compared with 0.12 SD in the contrast group) p<0.01 - Cynicism improved 0.35%, job satisfaction improved by 1.5%, Trust in management (0.91%), Supervisor incivility (1.26%), Exhaustion	CREW has the potential to increase reciprocity in social relationships through its focus on developing the social behaviour of all members of a working group. By improving these social behaviours, the process has a potential to further positive work interactions that are self-sustaining.

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
			(2.25%), Efficacy (0.81%), Organisational commitment (0.34%), Turnover intention (1.85%) - Absences improved by .15 standard deviations (compared with .01 SD in the contrast group). $p < 0.01$ - The gains in civility, incivility, workplace distress, were sustained at 12-month follow-up, but improvements in self-reported absences were not. - The results for job attitudes followed a Steady State Model.	These studies provide promising evidence of the validity and sustainability of the effects of the CREW civility intervention. [Discrete items taken from different scales]
Livni et al.[†] 2012 Australia	- Six-month clinical supervision programme (individual and group modalities) based on the "objectives approach to clinical supervision" and strengths/values-based coaching - Individual supervision (60-minute sessions) and small group supervision (90-minute sessions) - Supervisors received training workshops and monthly support meetings. - Fortnightly sessions planned; actual attendance ranged from 2–8 sessions per supervisee, totalling 70–480 minutes	Mixed: Nurses (16) psychologists (5) case workers (3) addictions counsellors (2) social workers (1) other	- Maslach Burnout Inventory,(84) Scales of Psychological Well-Being,(95) Intrinsic Job Satisfaction Scale,(96) - Direction was opposite to hypothesised — burnout INCREASED during supervision period; wellbeing REDUCED during supervision period	Although an increase in burnout and decrease in wellbeing was observed during the period of supervision, these changes are hypothesised to be related to extraneous organizational issues

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
		(4) not identified (6)		
Menzin et al. 2020 United States	10-month mentoring & professionalism in training (MAP-IT) program (10 modules) - Training conducted in groups of 10-12 participants, with each group facilitated by 2-3 leaders	Mixed: Doctors (46) Nurses (42) Pharmacist (3) Psychologist (1) Chaplain (3) Social work (3) Physician assistant (3) PhD/EdD (3) Laboratory educator (1)	- Maslach Burnout Inventory,(84) Connor-Davidson Resilience Scale,(86) - Slight changes in personal accomplishment Mean 6.1(0.8) to 6.4 (0.5) p=0.1 and resilience 79.3 (11.9) to 82.8 (9.9) p=0.3 - Emotional exhaustion and depersonalization remained unchanged	The MAP-IT program has a shown effectiveness both in fostering resilience and a sense of personal accomplishment in the workplace. Individual factors (eg, sex, age, as well as professional designation and work setting) will create variations in the manifestation of burnout and these factors and their interaction reflect the complex environment that is modern health care. Analysis of long-term impact required.

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
Meurling et al. 2013 Sweden	• ~2 years • Simulation-based team training (SBTT) using the A-TEAM (All Team Members' Behaviour) programme • In-person; four-hour interactive seminar followed by one day of in-situ high-fidelity simulation with structured debriefing • Four-hour introductory seminar (repeated 16 times over 2007–2009), followed by one day SBTT with 3–4 scenarios per team (repeated 28 times). Training period Nov 2007–Nov 2009).	Mixed: Doctors (51) Nurses (75) Nurse assistants (25) Control group comprised Nurses and nurse assistants in a reference ICU at same hospital (for turnover/sick leave only; no control for SAQ/self-efficacy outcomes)	• Safety Attitudes Questionnaire, (82) % staff turnover and sick leave • Results reported by profession — overall aggregate figures mask important professional differences. • Teamwork effect size (3.5), safety climate (7.46), self-efficacy of work (0.28) • Nursing turnover reduced 2.2% per year (95% CI -0.05 to 0.01, p=0.06) • Sick leave for nurse assistants improved 4.85% per year (95% CI -7.70% to -2.01%, p=0.012)	All team members benefited from SBTT but responded differently by profession. Nurse assistants showed broadest improvements (teamwork climate, safety climate, working conditions, sick leave). Nurses improved in safety climate and self-efficacy. Physicians improved in self-efficacy only. Recommend multilevel, multimodal evaluation of team training. [SAQ Swedish translation had lower Cronbach's α than benchmarking data (0.43–0.71 pre, 0.61–0.75 post), so SAQ

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
				factor results should be interpreted with caution.] [Multiple concurrent improvement projects limit attribution to SBTT alone. Reorganisation before project may confound nurse assistant results.]
Myers et. al. 2025 United States	12 months - Individual coaching sessions. Participants were given the option to select their coach; otherwise, coaches were matched with participants based on the lead coach's assessment of the best fit - Individual sessions were completed one-on-one, either in person, virtually, or by phone. Coaching meetings were scheduled based on the preferences of both the coach and the participant - Four initial sessions plus follow-up sessions at nine and 12 months (dyads). Four group coaching sessions, available to the entire department on Leadership, Niche Development, Bedside Teaching, and Burnout/Moral Injury.	Doctors - (31;30)	- Maslach Burnout Inventory,(79) Physician Worklife Survey (97) - No significant improvements in burnout or job satisfaction measures	No reduction in burnout or increase in job satisfaction found following the implementation of our pilot coaching program. However, individual physicians noted benefits, particularly through the exchange of diverse experiences, and expressed concerns about the use of faculty coaches. Future research should explore system-level impacts on burnout and job satisfaction during coaching program

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
				implementation as well as cost-effectiveness [The before and after comparison included people who did not participate in coaching, likely due to an underpowered t-test analysis]
Parris et al. 2025 United States	- Coaching - Online coach training, for those unsure for coaching - Two-hour training with faculty coaches; $\leq 4 \times 60$-minute dyad meetings over 15 months - Physicians only	Physician Trainees (n=83), Faculty (n=77)	- Stanford Professional Fulfillment Index,(98) Connor-Davidson Resilience Scale,(86) Clinician Self-Valuation Scale(99) - Statistically significant improved burnout (mean score difference, -0.37; 95% CI, -0.64 to -0.09) and professional fulfillment (mean score difference, 0.50; 95% CI, 0.16–0.83) scores among coachees compared with control trainees during the intervention but not in resilience or self-valuation. - There were no differences in burnout, fulfillment, resilience, and self-valuation between control and coach faculty at baseline or after the intervention	This study provides evidence to support a coaching program that mitigates trainee burnout while also promoting faculty development. [No differences in faculty outcomes]

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
Ravalier et al. 2022 United Kingdom	Working with healthcare workers to codesign of a series of multi-level initiatives. Designed interventions included a smartphone app and a wellbeing toolkit.	Mixed: (786;129) no roles reported	- Warwick–Edinburgh Mental Wellbeing Scale (100) - Significant differences were found between the two times in demands ($t = -2.28$), managerial support ($t = -3.08$, $p < 0.005$), and peer support ($t = -2.28$, $p < 0.05$). - All differences represented positive changes in working conditions, but no statistical differences in work engagement, vigour, dedication or absorption	Co-produced initiatives which focus on improving either the organisation or resilience of the workforce may be useful in supporting employee health and wellbeing. Future studies should build upon these findings through a full RCT to determine utility of the interventions.
Rutherford et al. 2025 Canada	- Mentoring - Four stages: 1) a large-group virtual education session with baseline surveys; 2) an in-person mentor-mentee matching process; 3) meetings of mentor-mentee pairs in-person or virtually approximately once every two months over six months; and 4) a large-group in-person wrap-up session with post-intervention assessments of burnout and workplace engagement. All data collection was conducted using a secure on-line platform. - Mentee pairs were encouraged to meet at least once every two months over the course of 6 months. These meetings took place in-person or virtually at the discretion of the pairs. A toolkit was provided to help guide the relationship,	Mixed: (9 mentors, 14 mentees) No roles reported	- Maslach Burnout Inventory,(79) Utrecht Work Engagement Scale,(84) - Personal accomplishment improved (paired $t=2.12$) - There were positive trends in burnout dimensions (reduced Emotional Exhaustion - 17(11.1) vs 15.7 (13.3) and Depersonalization - 4(5.9) vs 3.3(5.1)), as well as in improved work engagement (4.76(0.91) vs 4.88(0.77)), but not to significance.	A low intensity, pragmatic mentorship intervention in a community hospital setting can have positive effects on reducing burnout. Ensuring an interdisciplinary and diverse participant pool with equitable access to such programs will be essential in maximizing their benefits across demographic groups

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
	which consisted of written material intended to reinforce the educational session.			and professional settings.
Uchiyama 2013 Japan	- To improve psychosocial work environment, subchief nurses in each intervention unit were appointed as key persons to facilitate activities within their own units over 6 months - During a three-month intensive intervention period, key persons attended 30-minute group meetings and exchanged views on their unit's intervention activities. - Task sheets after every 30-minute group meeting to clarify the problems, needs, and progress of their unit and to help plan execution of the activities. - Two months after the intensive intervention period (one month before the end of the 6-month intervention), a booster session was provided to check how activities proceeded in each unit. - In total, the authors held key person meetings (including the booster session) 4 times. - In second three months, nurses in the intervention group commenced activities to improve their psychosocial work environment based on the action plans proposed in the development phase.	Nurses (434)	- Center for Epidemiologic Studies Depression Scale, (CES-D60) (101) Job Content Questionnaire (102) - No improvement in mental health status of staff. - Significant intervention effects were observed in psychosocial work environment items, such as Coworker Support (0.5) and Goals (0.3), and borderline significance was observed for Job Control (0.4).	A 6-month participatory intervention is effective in improving psychosocial work environment, but not mental health

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
Young et al. 2024 United States	- Six-month <i>Positively Energizing Leadership</i> training program 15 modules organised into 5 principles: 1) inspire and provide meaning by highlighting the larger impact of employees' work; 2) demonstrate trustworthiness and trust of others; 3,) engage with others in an authentic, genuine, and accessible way; 4) expect and foster high standards in clinical work, scholarship, and citizenship; and 5) gather and encourage the involvement of employees who elevate and support others. - Three phases: 1) Faculty and physician leaders and staff leaders in the department were introduced to the concept of positive energizing leadership. Each leader was provided the book <i>Positively Energizing Leadership</i> (22) with the expectation that it be read in the month prior to a virtual one-hour author presentation in December 2021. 2) 10-minute presentations on each of the 15 attributes of positive leadership were presented to a smaller group of faculty and high-level staff leaders (approximately 15 per session) during the first part of the standing weekly leadership meeting. The content for these presentations was curated by three faculty members; 3) Daily mentoring, coaching, and modelling of these positive leadership principles by the division director	Mixed: (88;85) comprising technologists, clerical staff, doctors, nurses, and unit leaders	- Various questions from unnamed scales - Positive workplace climate (0.68) and a positive workplace climate was associated with improved engagement (0.41), reduction in burnout (0.51), and reduction in intent to leave (0.56).	Future research is needed to validate the findings from this pilot in one unit and should be conducted with a control group [surveys not matched across pre- and post-; Items selected from validated scales]

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
Improving safety culture/climate				
Bradley et al.; Curry et al. 2018; 2017 United States	• <i>Leadership Saves Lives</i> quality collaborative - improve hospital culture and reduce 30-day risk-standardised mortality rate(RSMR) after acute myocardial infarction (AMI) over two years. • Five key dimensions relevant to hospital performance (learning environment, psychological safety, senior management support, commitment to the organisation, and time for improvement efforts). • A coalition of 15 multidisciplinary staff members at each hospital: three forums, four x one-day, on-site workshops, and web-based platform for sharing experiences.	Mixed (223)	• Organisational Culture Survey(37) • Six hospitals that had substantial culture shifts, evidence-based strategies increased 1.5, RSMR decreased significantly (mean difference 1.07, p=0.003) • Four hospitals without substantial culture change (mean difference 0.23, p=0.40)	Longer follow-up would provide greater understanding about how the intervention effects change over time. Mixed methods (incorporating qualitative data) best for detecting culture change
Bronkhorst et al. 2018 Netherlands	• Multifaceted strategy to improve safety climate over 6 months • Senior management safety rounds, safety-leadership training, and online discussion platform for team members to give their opinion on health and safety issues, followed by regular team-meetings to discuss the online results • Three consecutive two-month rounds with different themes	Mixed (n=258)	• Psychological Safety Climate (103) • Improvements for Safety climate 3.41 (0.59) to 3.46 (0.50) (Effect = 0.52) and Safety behaviour 3.30 (0.63) to 3.36 (0.55), (Effect 0.3) p<0.01 • no significant effect on increasing supervisor commitment to safety or safety compliance	Activities are more successful when supervisors show positive actions and attitudes towards the intervention and changes are made to daily procedures relevant to employee health and safety
Paine et al. 2010 United States	• Comprehensive Unit-Based 2-year Safety Programme (CUSP)	Mixed (n=150;170)	• Safety Attitudes Questionnaire (82)	Hospital-wide structured interventions were associated with

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
	- multiple components - coaching, safety climate assessment, training, grand rounds, dashboards, infrastructure investments, budget, executive sponsorship, reporting tools - The coach partnered a hospital senior leader with the CUSP team and met with the team leader to review the unit's climate scores and develop a strategic plan. The coach stayed with the CUSP team to support implementing the programme	Roles not provided, but >75% Female	- Mean differences for Safety climate (8.36) and Job satisfaction (5.6) (p=0.000) - Mean difference for stress recognition (0.48) did not reach significance (p=0.67)	improvements in safety climate over 3 years [but not with decreased stress]. Further research is needed to better understand how to measure, improve and utilise climate data in ways that maximise the extent to which they are diagnostic and actionable in monitoring and facilitating quality-improvement efforts.
Yuce et al. 2020 United States	- A 2-year surgical quality improvement collaborative comprising 55 hospitals including major academic centres, community and rural hospitals - Hospitals were divided into four quartiles from lowest (1) to highest (4) safety culture at baseline - All adopted a common registry for monitoring - Formal quality and process improvement training, collaborative-wide funded quality improvement projects, leadership engagement, surgeon mentors provide guidance,	Mixed - 36 hospitals: (n=1024 respondent - 5-30 respondents per hospital)	- Safety Attitudes Questionnaire (82) - The largest increases in perceived hospital safety culture for those hospitals in the lowest quartile of the baseline survey occurred in the domains of safety climate (3.2%) teamwork climate (3.9%) and - The largest improvements occurred in individual measures within domains, including physician-nurse collaboration (change, 7.2%; $P =$	Overall greatest improvement in safety culture was in hospitals with poorest baseline

Author Year Country	Intervention	Study participants (n)	Measure and main outcome(s)	Author comments [Reviewer note]
	benchmarked reporting including adherence to process measures and postoperative outcomes		.004), reporting of concerns (change, 4.7%; $P = .009$), and reduction in communication breakdowns (change, 8.4%; $P = .005$). Hospitals in the highest quartile at baseline experienced minimal change in the perception of safety culture among their employees, with the exception of less positive perceptions of both institutional management (84.5% vs 75.4%; $P < .001$) and working conditions (90.9% vs 83.1%; $P = .04$)	

T - Public sector drug and alcohol health services, else all hospital-based.

Table 11: Summary of System-level interventions grouped by intervention purpose

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
Improving hours of work/reducing impact of shift work				
Bilimoria et al. 2016 United States	- Six-month trial - Flexible-policy (intervention) group - limiting work to 80 hours per week, 1 day off in 7 days, and on-call duty no more frequently than every third night, but they were granted a waiver by the ACGME to waive four duty-hour requirements concerning maximum shift length and minimum time off between shifts (to facilitate continuity of care) - Standard-policy group - PGY1 (≤ 16 hr duties), PGY2-5 (≤ 28 hrs); ≥ 8 hrs off between shifts, but ideally 10 hrs, and ≥ 14 hr after 24 hr shift; mean < 80 h/week over 4 weeks; 1 day off in 7 from education and clinical duties; $\leq 1:3$ on call.	Doctors (4330)	- Patient safety indicators and perceptions - No statistical differences in wellbeing or morale perceptions, job satisfaction or fatigue. - No difference in perceived impact of fatigue on patient safety, no change in 30-day rate of postoperative death or serious complication - resident dissatisfaction with patient safety improved I-223/1782 (12.5);S-491/1891 (26.0) $p < 0.001$	Flexible duty-hour policies for surgical residents were non-inferior to current ACGME duty-hour policies with respect to patient outcomes. Residents' satisfaction regarding their overall well-being and education quality was similar in the flexible-policy and standard-policy groups.
Cooper et al. 2025 United Kingdom	- Three month trial - Electronic team rostering (ETR) - allows self-rostering	Nurses (130)	- Self-report on 5-point Likert - Raw measures of Worklife balance and Wellbeing had	This service evaluation supports the positive effects of rostering autonomy on healthcare staff

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	The project leads held engagement meetings throughout to address any staff concerns and provide training in the ETR – for nurses on how to make shift requests electronically, and for managers on how to transition to a solely electronic rostering system.		improved (31%) at end of intervention	[no statistical analysis reported]
Fratissier et al. 2021 France	7-9 month trial 12-hour shifts	Nurses Nurse auxiliary (177;162)	- French - EVREST (Evolutions et relations en santé au travail, Changes and Relationships in Occupational Health) questionnaire - Fewer night staff were in favour of 12-hr shifts after the trial (62.5%) than prior to the trial (77.5%) p=0.508 - More day shift staff were in favour after the trial (93.4%) than before (88.2%) p=0.227 - The differences were not statistically significant	12-hr shifts in studied units led to an improvement for day staff, who are generally in favour of working 12-hr shifts. Benefits with work organization, with less time pressure, improved work–life balance and better job satisfaction. Night workers are generally dissatisfied and not in favour of working 12-hr shifts: they describe a deterioration in working conditions, greater dissatisfaction with handovers and a deterioration in their work–life balance.
Hong et al. 2021 South Korea	- Two months - Two x 12-hr shifts	Nurses (113;114)	Occupational Fatigue Exhaustion Recovery	Two-shift nurses had lower chronic fatigue and higher quality of life compared with three-shift nurses

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	Nurses from 49 departments		Scale,(104) Korean QoL scale - Statistically significant improvements in recovery between shifts (47.58 (18.65) vs 38.22(17.53)) p<0.001, quality of life (3.02 (0.47) vs 2.79 (0.47)) p<0.001, leisure activity 3.05 (0.80) vs 2.53 (0.79) p<0.001 - There was no significant improvement in fatigue, self-esteem, emotional status, family relationships - Turnover intention increased, but not to statistical significance - No differences in reported needlestick injuries, medication errors or near misses	[Self-reported questionnaire administered at one time point, using usual shifts as control]
Hoshi et al. 2022 Japan	- Four months - A dark condition and well- lit condition at the nurses desk on night duty	Nurses (17)	- Subjective Symptoms (Industrial Fatigue Research Committee of the Japan Association of Industrial Health, 2002) - The study ward had significantly more incident	Lighting did not interfere with work performance in a dark environment. No significance due to low sample sizes.

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
			reports for the night shift in well-lit condition than for the whole hospital $p < 0.05$	
Kubo et al. 2022 Japan	- Comparison between nurses working two-shift system at three hospitals and nurses working three-shift system at two hospitals - Survey of demographic and wellbeing measures prior to 6-month period - After six months, self-reported adverse events resulting in patient harm	Nurses (37)	- Maslach Burnout Inventory,(79) Recovery Experience Questionnaire,(105) Kessler Psychological Distress Scale [K6],(106) Utrecht Work Engagement Scale,(84) hair and saliva cortisol samples, sleep log and shift schedule evaluation - Nurses in the intervention group recorded more sleep (21.8 (2.9) vs 13.7 (2.2) $p < 0.001$) and better sleep quality (2.9 (0.6) vs 2.0 (0.7) $p < 0.001$, lower fatigue (2.2 (0.4) vs 3.4 (0.6) $p < 0.001$) and lower stress (2.2 (0.7) vs 3.2 (0.6) $p < 0.001$) - There was no significant difference in wellbeing measures of exhaustion, psychological distress, and vigour although they trended downward	Significantly better outcomes for fatigue, stress, sleepiness, quality of sleep, satisfaction with days off, and work satisfaction were found in the intervention condition than in the control condition, but no obvious benefit of the intervention was found in objectively measured stress, sleep, or vigilance

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
Tanaka et al. 2010 Japan	- Comparison between nurses working two-shift system at three hospitals and nurses working 3-shift system at two hospitals - Survey of demographic and wellbeing measures prior to six-month period - After six months, self-reported adverse events resulting in patient harm	Nurses (1470)	- Nursing Stress Scale (NSS), Effort-Reward Imbalance (ERI) questionnaire(113), Hospital anxiety and depression scale(134) - Mean numbers (SE) of perceived adverse events of the two- and three-shift systems were 1.05 (0.12) and 0.74 (0.09), respectively, and the effect size (95% confidence interval) was 0.30 (0.15 to 0.46) in the model adjusted for all variables. - The main differences between groups were for nurses with 3-6 years experience.	Fatigues is known to contribute to error. Nurses in the 2-shift system worked fewer night shifts, had a longer nap during night shifts worked, and did not work afternoon shifts
Zion et al. 2019 Israel	- Four nights - A scheduled 30-min nap at 4am with 10 mins to settle and 10 mins to awake either side (50 mins total) during an 8-hour night shift (23:00–7:00). - On no-nap nights, they continued their work as usual.	Nurses (119)	- Karolinska Sleepiness Scale(107) - Perceived sleepiness decreased with the intervention $F(1,1757) = 17.3, p < 0.001$; $F(1,103) = 31.0, p < 0.001$ - Little effect on cognitive performance	A scheduled nap may provide a useful countermeasure against the negative consequences of night-time shift work in female nurses above and beyond interpersonal differences. The implementation of this strategy is cost-effective but requires a change in managers' attitudes and the establishment of policies that allow nurses to nap in a safe environment without compromising the quality of patients' care.

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
Improving workload				
Eklund et al. 2025 Sweden	9-12 months including 20 days learning activities in Region I and 16 in Region II - Transition to practice program 9-12 months including 20 days learning activities in Region I and 16 in Region II - Developed regionally but share similar learning activities and supervision.	Nurses (799)	- Items developed for project, Moral Distress Scale (MDS-R), The Survey of Perceived Organizational Support, (109) Copenhagen Psychosocial Questionnaire (COPSOQ-II), (110) Intention to leave (111) - No significant changes in burnout, job satisfaction, ethical values conflicts, perceived organizational support or intention to leave resilience, wellbeing, positive and negative affect, secondary trauma, compassion satisfaction, job satisfaction, coping or attrition	Unexpectedly, no significant differences. Need further exploration of programs to support longer lasting effects on retention and learning [Surveying nurses two years after transition to practice may have hidden shorter term effects. Those with strong intention to leave likely to have left within 2 years]
Rickard et al. 2012 Australia	<i>Jobs Demand-Resources</i> model used to conceptualise demands and required resources - Over two years, a nursing workload tool with best practice rostering principles, additional nursing positions, long term	Nurses and midwives (178;306)	General Health Questionnaire (GHQ-12), (112) Maslach Burnout Inventory, (79) Nursing Stress Scale, (113) Psychosocial safety climate (PSC), Copenhagen Psychosocial Questionnaire	Nurses in both hospitals showed significant improvement in psychological health outcomes and job satisfaction, and turnover was reduced in H2. The improved psychological health outcomes could be attributed to the intervention strategy implemented by the NT DoH that included strategies to improve

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	funded recruitment strategy, expanded graduate program, access to continuing professional development Rosters were audited for compliance		(COPSOQ-II),(110) Turnover % - Surveys matched to individuals two years apart in two hospitals - Statistically significant improvements in psychological distress emotional exhaustion, psychological safety, job control and workload	system factors, and reduce job demands and increase job resources. While there was a reduction in workplace stress overall, the levels of job stress in hospital nurses and midwives remains high and sustained organisational level interventions are needed. [While turnover results increased in hospital 1, overall turnover remained stable compared to years prior to intervention]
van Kraaij et al. 2025 Netherlands	- Differentiated nursing practices, in which nursing roles and responsibilities were assigned based on each nurse's education level, work experience, and expertise. - Differentiated practices focused on supported and facilitated professional governance by establishing structures that promote work autonomy and strategically positioning nurses within the organisation through shared governance structures	Nurses and nursing students (5411)	- Practice Environment Scale of Nursing Work Index (PES-NWI) (114) - Slight increase in perception of practice environment (2.87 (0.38) vs 2.91 (0.36) p=0.002) No impact on turnover intention ($\beta = 0.069$, 95% CI - 0.113 to 0.252)	Differentiating nursing practices can improve the nursing work environment, especially staffing adequacy, nurse–physician relationships, and participation in hospital affairs. The nursing work environment had no effect on turnover intention suggesting the work environment does not mediate the impact of differentiated practice on turnover intention.
Koh et al. 2023 Singapore	24-month transition to practice program - Year 1 – knowledge and skill development	Nurses (124)	- Casey-Fink Graduate Nurse Experience Survey(115) - Practice confidence improved, $F=62.03$ $p<0.001$	Factors that were associated with nurses' attrition within 24 months of clinical practice were practice confidence at 6

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	Year 2 – 1:1 mentorship with senior nurse leader		Perceived patient safety improved from 11.83 (2.09) at T0 to 14.75 (1.78) at T3; $F=82.41p<0.001$	months and an extension to their probation period. Transition-to-practice programs should tailor their curriculum to meet nurses' changing learning needs in the early years to increase their confidence in clinical practice.
Improving the organisation of work				
Bloemhof et al. 2021 Netherlands	- Ongoing - Magnet's Excellent Care Program tailored to setting, involved integrating nursing in EHR, professional development, leadership, research and innovation, ownership - The program involves collecting baseline measurements of the three pillars (Nurses, Organisation, Patient) and then collecting the same measurements every three years to monitor the effect of interventions. - Participating organisations develop their own interventions based on research outcomes.	Nurses (799)	- Dutch Essentials of Magnetism (D-EOMII) (116) - Increases in overall job satisfaction (7.3 vs 8.0 $p,0.001$) and professional job satisfaction (278.3 vs 299.7 $p\leq0.001$) - Increase in clinical autonomy not statistically significant	The nurse work environment, job satisfaction, and perception of quality of care improved significantly after interventions were implemented

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	Hospitals that are prepared to create a Magnet culture have to invest in transformational leadership, structural empowerment, exemplary professional practice, new knowledge, innovations and improvements, and empirical outcomes			
Nguyen et al. 2023 United States	- Digital scribe (DS) in examination rooms to record visit discussion. Recording transmitted to vendor server and The DS's artificial intelligence components organised the recorded information into the structure of a visit note, and the vendor's staff completed preliminary editing of the note before releasing the notes to the clinician. Clinicians then review and edit the raw note before signing it. Once signed, the note could be viewed and printed. - DS smartphone app, Dragon Ambient experience versions 3.0.5, 3.0.6, and 3.0.7 (Nuance: Burlington, MA)	Doctors, assistant and nurse practitioner	- Mini Z work-life and burnout reduction instrument (117) - Significant improvement in perceived documentation time (2.1 (0.4) vs 3.6 (0.3) p=0.005), but no significant effect on measures of job satisfaction, burnout, job stress, job control, or sleep	Preliminary findings that DS implementation is acceptable, appropriate, and usable. Additional implementation strategies are needed to support future implementation, such as individualised training and on-site support. [a single NCI-designated Comprehensive Cancer Center]

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	participants received web training through the vendor.			
Scheepers et al. 2021 Netherlands	- Two months - Addition of nurse assistants on evening shifts - Nurse assistants complete two-year training and are able to do routine tasks e.g., bathing, cleaning	Nurses (28)	- Questionnaire on the Experience and Evaluation of Work (QEEW) (118) - Recovery difficulties and sleep problems trended downward - Emotional exhaustion, depersonalisation, personal accomplishment, and wellbeing all trended toward improvement	Pilot study provided initial evidence that the addition of a nurse assistant to ward staffing during evening shifts may reduce workload, physical demands and sleep problems among nurses. [Single site, small sample, pre/post self-reported survey, no statistical analysis]
Stevens et al. 2020 United States	32 weeks - Two hours per week of protected nonclinical time. - Chief residents were instructed to assign this time when clinical learning opportunities were lowest.	Doctors (19)	- Maslach Burnout Inventory,(79) Resident and Fellow Well-Being Index (WBI) (119) - Job satisfaction, and wellbeing improved but not to significance (small sample)	Two hours of protected, nonclinical time were associated with clinically meaningful decreased burnout and increased wellbeing in a small sample of otolaryngology resident physicians. The preliminary results of this intervention are encouraging and warrant further investigation in larger resident cohorts with randomized clinical trials to confirm effectiveness of the protected time intervention to decrease burnout and increase well-being. [small sample, single department]

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
Ventura-Silva et al. 2024 Portugal	Ongoing	Nurses (48)	- No changes in perceptions of patient safety - Structural empowerment increased slightly with statistical significance, small but not significant increase in psychological empowerment	The Primary Nursing Care Model shows the potential to ensure greater continuity of care, reduce omitted care, enable personalised interventions, and improve communication between patients, nurses, and the multidisciplinary team. NB Only wellbeing outcomes reported here. Primary Nursing used in Australia for some years - effective if skill mix appropriate for acuity, but some moving back to team nursing due to workforce shortages
Improving the work environment				
Abel et al. 2020 United States Australia	5.4 hours - Curriculum-based <i>Frontline Leaders</i> program - Blended self-study - Learner development plan and workbook, self-study, interviews with leaders to gain practical tips, Interactive scenarios to improve communication skills	Nurses (29) (Australian nurses n = 3)	- Conditions of Work Effectiveness (I) Scale, (120) Psychological Empowerment Scale (PES), 2 x questions on intention to stay - Structural empowerment increased slightly (18.5 (1.7) vs 19.5 (1.7) p=0.002 - No change in psychological empowerment or intent to stay	Front-line leaders identified that this course helped prepare them for their role and increased their sense of empowerment. [Leaders had not received any previous training. Small sample, across two countries, different settings, 5.4 hour intervention, no control group]
[†] Calamassi et. al. 2022 Italy	Two months	Nurses and healthcare collaborators	STAI X1 (State-Trait Anxiety Inventory) (121)	Any break is important, but music (particularly if tuned at 432Hz), reduced anxiety more than other activities.

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	- Listening to music during breaks at 440 Hz vs 432 Hz - Music during 10-minute pre-specified day shift work breaks - Group 1 (experimental – double blind): operators randomised to listening to music tuned to 440 Hz - Group 2 (experimental – double blind): operators randomised to listening to music tuned to 432 Hz - Group 3 (Control intervention): operators randomised to routine break activities.	(54)	Statistically significant improvement in anxiety (34.5 (29-40.75) vs 32 (25.25-37 p=0.000) but no physiological changes (heart rate, blood pressure)	
Vaag et al. 2013 Norway	- Five months - Departmental choirs aimed primarily at strengthening the workers' motivation, job satisfaction, and psychosocial work environment and, in the long-term, reducing sickness absenteeism - The exercises took place on the hospitals' premises after work hours in the period March–November 2011, with a break for summer vacation from June to August. In addition, various activities were undertaken,	Mixed (1431)	- DCS 5,(102) Organisational Commitment Questionnaire (122) - Engagement improved (5.66(1.04 vs 5.44 (1.20) p=0.001) and Organisational Commitment (3.50 (0.41) vs 3.35 (4.9) p=0.000) improved - No statistical change in demand or perceived health	The intervention showed promising results for incorporating cultural activities in the work environment, but further investigation of the effectiveness of organisational-level interventions using a pre–post design is needed.

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	including the making of several music videos featuring the different choirs (which can be viewed online: http://www.youtube.com/user/nordtrondelag). - The best music video was picked out in an informal competition and announced through regional television. Four concerts, which were arranged at concert arenas in Namsos and Levanger in October/November 2011, were the finale of the initiative. All concerts were sold out, reaching a total audience of 1200 spectators. - Three professional performing artists (within the pop/rock genre) instructed, advised, and accompanied the choirs with guitar, piano, and lead vocals. The repertoire was selected by the musicians and consisted of five well-known pop and rock songs. Further, a conductor, a choreographer, students from the media department of the university college, and various suppliers of sound, light, and			

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	film were available to the artists and choirs.			

T – Community emergency service workers

Table 12: Summary of multi-level interventions

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
Acevedo et al. 2025 United States	- One hospital department motivated by evidence of drivers of burnout among peers - Face to face, online, on the job and offsite	Medical residents (n = 20)	- Maslach Burnout Inventory scale(79) 5% reduction in Burnout, 10% reduction in Ineffective, 10% increase in Engaged, 5% increase in Overextended	Initial effort to address burnout proved to be somewhat narrow in scope, as it was focused on the obvious driver of overwork and a lack of work–life balance. Led to discovery of the vast body of knowledge and research that exists in the field of occupational burnout. Efforts to prevent burnout and promote well-being produced the concept of comprehensive wellness frameworks. Use of frameworks showed gaps between initial effort at a wellness program, and the domains where we fell short in creating a comprehensive program.
De Wijn et al. 2022 Netherlands	- High cost of stress - The “psychosocial risk management approach” (PRIMA) to effectively tackle psychosocial risks in four steps over 18 months – 2 years: 1) Risk assessment, the most prominent risks within an organization and fitting actions. 2) Action plans - what will be targeted, by whom and within what time frame,	Although all employees involved in the intervention, only nurses surveyed over 2.5 years at 3 timepoints Nurses (n = 578;831;861)	- Utrecht Work Engagement Scale (UWES-3)(84) ; Maslach Burnout Inventory Human Services Survey (MBI-HSS)(79) - Significant positive effects in scales of Perceived staffing levels (0.07), Worktime demands (0.06), Within worktime recovery (0.05), aggression (0.02), emotional demands (0.03), Work engagement (0.12),	Participative action research in which the organisations were empowered to design and implement their own actions, shows an improvement in most job demands and job resources. The results showed that the quality of the intervention project in terms of taking fitting actions to the psychosocial risk factors at hand, communication on the (process) of the project and employee participation in the design and development of actions, is of greater importance than the number of actions taken.

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	3) Execution, 4) The outcomes and the process are evaluated. - A multidisciplinary project group was established consisting of two researchers, two project managers from "Stichting IZZ" (a member collective of healthcare workers) and one ED manager - The project group was responsible for the design and execution of the intervention project and met every 2–3 months to evaluate the process and prepare next steps. - Individual ED project managed at each site, monitored by overarching project group		Depersonalisation (0.02), and emotional exhaustion (0.01).	Future research may focus on the effect of higher quality multilevel interventions (including professional support for those with existing stress related complaints) and a longer follow-up period to understand how stress management interventions can effectively increase well-being.
Pierce et al. 2021 United States	Coordinated structured conversations were held with >40 organisations and came up with 3 steps: 1. Change dialogue from individual failure to system in distress;	Mixed - included all workforce (158 pre; 142 post)	- Maslach Burnout Inventory scale(79) - Emotional exhaustion improved (43.12 v 36.42) – 7% improvement overall, overall and by more than	Although this approach took considerable investment of time and effort, it demonstrated meaningful results in less than one year. Although the intervention did not meet the predetermined aim of improving emotional

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	2. Adopt metric focusing on understanding causes and consequences of emotional thriving and recovery rather than deficit measurement (burnout); 3. Create blueprint for change that supports systematic shift toward human-centred system. - The pilot intervention (nine months) involved three phases: (1) assessment and feedback using three well-being scales to ascertain not only sources of burnout but also thriving; (2) cultural transformation sessions using a skills-based approach focused on human-centered leadership, teamwork, and one-on-one interactions; and (3) redesign of daily work through process and experience mapping as well as user-centred design of “Always” events, which allowed participants to identify removable hassles and opportunities to amplify joy- producing events in daily work. - Faculty Team Delivering Program facilitated all sites -		10% for physicians, NPs, PAs, and nurses; Emotional recovery (76.6 v 79.53); Emotional thriving (76.7 v 79.23); Likely to recommend workplace (7.66 v 8.20)	thriving and emotional recovery by at least 5% for all participants, these did show encouraging early trends toward improvement. Barriers included lack of sufficient leadership support, absence of a budget, organisational priorities that were deemed more pressing, poor understanding of the link between well-being and organisational performance metrics, perceived lack of financial ROI, and a belief that less time intensive interventions such as brief online modules or short classes could adequately address well-being.

Author Year Country	Duration intervention	Study participants (n) Pre/Post (n;n)	Main outcome(s)	Author comments [Reviewer note]
	305 hours total across 12 months.			
Sprang et al. 2021 United States	- Seven organisations within one state department of health and human services - Survey identified secondary traumatic stress (STS) - Each organisation elected a team of 5-10 volunteers who (with coaching and consultation from STS and organisational change experts) created goals toward becoming more STS informed and monitoring progress toward completion of goals. Each team directed and assisted with enactment of strategies within their representative units	Mix (n = 2345 - T0-1034; T1-898; T2-422)	- Secondary Traumatic Stress Informed Organisational Assessment (STSI-OS) (64); Secondary Traumatic Stress Scale (STSS) for DSM-5(123); Professional Quality of Life (ProQOL) Burnout subscale(124) - Mean scores of subscales from baseline to 5-month follow up of Resilience (4.8), Safety (5.0), Policies (5.1), Leadership practices (5.4), Routine practices (9.4), with an increase in overall STS Informed Organisational - There was a slight reduction (0.8) in the Burnout subscale.	Organisational efforts can improve an individuals perceived level of distress [controlled for age, female and implementation activity]

Appendix 7 – Catalogue of wellbeing measures

Table 13: Wellbeing scales used in reviewed papers

Measure	Items, scale	Reference
Affective Commitment Scale	8 items, 5-pt Likert	Allen et al (1990)(94)
Brief symptom inventory	53 items, 5-pt Likert	Derogatis (1993)(125)
Casey-Fink Graduate Nurse Experience Survey	41 items, 4-pt Likert	Casey (2006)(115)
Center for Epidemiologic Studies Depression Scale (CES-D60)	20 item, 4-point Likert	Radloff (1977)(101)
Checklist Individual Strength	20 items, 7-pt Likert	Vercoulen et al (1994)(108)
Clinician Self-Valuation Scale	4 items, 5-pt Likert	Trockel et al, (2019)(99)
Conditions of Work Effectiveness (I) Scale	Items, 5-pt Likert	Laschinger et al (2004)(120)
Connor-Davidson Resilience Scale (CD-RISC)	25 items, 5-pt Likert	Connor et al (2003)(86)
CD-RISC10 - abbreviated	10 items	Campbell et al, (2007)(77)
Copenhagen Psychosocial Questionnaire (COPSOQ)	141 items, 30 scales	Kristensen (2002)(126)
Civility, Respect, Engagement in the Workforce (CREW) Scale	8-items, 5-pt Likert	Meterko et al (2007)(89)
Depression, Anxiety and Stress Scale (DASS)	21 items,	Lovibond et al (1995)(78)
Dutch Essentials of Magnetism (D-EOMII)	58 items, 4-pt Likert	Kramer et al (2004)(116)
Effort-Reward Imbalance Questionnaire	5-pt Likert	Siegrist et al (2014)(90)
Ego-resilience scale	14 items, 4-pt Likert	Block et al (1996)(127)
Empowerment at Work Scale	12 items, 8-pt Likert	Spreitzer (1995)(85)
General Health Questionnaire (GHQ-12)	12 items,	Goldberg (1978)(112)
Hospital Anxiety and Depression Scale		Zigmond et al (1983)(134)
Instigated workplace incivility	21 items, 7-pt Likert	Blau et al (2005)(92)
Intent to quit	4 items, 7-pt Likert	Becker (1992) Becker, 1992 #248}
Intention to Leave	3-items, 5-pt Likert	Cohen et al (1998)(111)
Interpersonal Trust at Work Scale	12 items, 7-pt Likert	Cook et al (1980)(128)

Measure	Items, scale	Reference
Intrinsic Job Satisfaction Scale	15 items, 7-pt Likert	Warr et al (1979)(96)
Job Content Questionnaire	18 items, 4-pt Likert	Karasek (1985)(102)
Job Satisfaction Assessment Scale for Nurses	40 items, 5-pt Likert	da Silva et al,(2017)(129)
Karolinska Sleepiness Scale	9-grades	Akerstedt et al (1990)(107)
Kessler Psychological Distress Scale (K6)	6 items, 5-pt Likert	Kessler et al (2002)(106)
Maslach Burnout Inventory - Human Services Survey for Medical Personnel (MBI-HSS)	22-item, 7-pt Likert	Maslach et al. (2018)(79)
Maslach Burnout Inventory for General Use (MBI-GS)	22 items, 7-pt Likert	Schaufeli et al. (1996)(84)
Mini Z	10 items,	Linzer et al (2022)(117)
Moral Distress Scale-Revised (MDS-R)	21 items, 5-pt Likert	Hamric et al (2012)(130)
Motivated Strategies for Learning Questionnaire (MSLQ)	81 items, 7-pt Likert	Pintrich et al (1993)(131)
Negative Acts Questionnaire-Revised (NAQ-R)	22 items, 5-pt Likert	Einarsen et al (2009)(132)
Nursing Stress Scale	34 items, 4-pt Likert	Gray-Toft et al (1981)(113)
Occupational Fatigue Exhaustion Recovery Scale	15 items, 7-pt Likert	Winwood et al (2005)(104)
Oguri-Shirakawa-Azum Sleep Inventory MA Version	16 items, 4-pt Likert	Yamamoto et al 1999(133)
Organizational Commitment Questionnaire (OCQ)	5-pt Likert	Mowday et al (1979)(122)
Organisational Culture Survey	31 items, 5-pt Likert	Bradley et al (2017)(37)
Perceived Stress Scale	4 items, 4-pt Likert	Warttig et al (2013)(87)
Physicians' Reaction to Uncertainty Scale	61 items, 6-pt Likert	Gerrity et al (1995)(83)
Physician Worklife Survey	38 items,	Williams et al (1999)(97)
Practice Environment Scale of Nursing Work Index (PES-NWI)		Lake (2002)(114)
Pre-Sleep Arousal Scale-Somatic and Cognitive Subscales -	16 items, 5-pt Likert	
Professional Quality of Life (ProQOL) Burnout subscale	5 items, 5-pt Likert	Stamm (2010)(124)
Psychosocial safety climate (PSC)	12 items, 4-pt Likert	Hall et al (2010)(103)
Questionnaire on the Experience and Evaluation of Work (QEEW)	19 scales	Van Veldhoven et al (1994)(118)
Quality Work Competence Questionnaire	11 work characteristics,	Van der Doef et al (1999)(75)
Recovery Experience Questionnaire	20 items, 5-pt Likert	Sonnentag et al (2007) (105)

Measure	Items, scale	Reference
Resident and Fellow Well-Being Index(WBI)	7 items	Dyrbye (2014)(119)
Safety Attitudes Questionnaire (SAQ)	60 items, 5-pt Likert	Sexton et al(82)
Scales of Psychological Well-Being	5 x 8 item scales, 6-pt Likert	Ryff (1989)(95)
Speaking Up about Patient Safety Questionnaire (SUPS-Q)	22 items, 5-pt Likert	Richard et al (2021)(88)
Stanford Professional Fulfillment Index burnout subscale (SPFI)	16 items, 5-pt Likert	Trockel et al (2018)(98)
STAI X1 (State-Trait Anxiety Inventory)	4-pt Likert	Spielberger (1970)(121)
Survey of Perceived Organizational Support	8 items, 7-pt likert	Eisenberger et al (1986)(109)
Teamwork climate survey	6-items, 5-pt Likert	Sexton, 2006
Turnover Intentions	22-items, 5-pt Likert	Kelloway et al (1999)(93)
Utrecht Work Engagement Scale (UWES-9) instrument	9-item, 7-pt Likert	Schaufeli (2004)
Warwick–Edinburgh Mental Wellbeing Scale	14 items, 5-pt Likert	Tennant et al (2007)(100)
Well-Being Index (WBI)	9-items	Dyrbye et al (2016)
WHOQOL-SPRB BREF	20 items, 9 items	Skevington et al (2013)(81)
Instigated Workplace Incivility Scale	129 items, 4-6-pt Likert	Cortina et al (2001)(91)