

Promoting a Culture of Safety as a Patient Safety Strategy

A Systematic Review

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Developing a culture of safety is a core element of many efforts to improve patient safety and care quality. This systematic review identifies and assesses interventions used to promote safety culture or climate in acute care settings. The authors searched MEDLINE, CINAHL, PsycINFO, Cochrane, and EMBASE to identify relevant English-language studies published from January 2000 to October 2012. They selected studies that targeted health care workers practicing in inpatient settings and included data about change in patient safety culture or climate after a targeted intervention. Two raters independently screened 3679 abstracts (which yielded 33 eligible studies in 35 articles), extracted study data, and rated study quality and strength of evidence. Eight studies included executive

walk rounds or interdisciplinary rounds; 8 evaluated multicomponent, unit-based interventions; and 20 included team training or communication initiatives. Twenty-nine studies reported some improvement in safety culture or patient outcomes, but measured outcomes were highly heterogeneous. Strength of evidence was low, and most studies were pre-post evaluations of low to moderate quality. Within these limits, evidence suggests that interventions can improve perceptions of safety culture and potentially reduce patient harm.

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THE PROBLEM

Developing a culture of safety is a core element of many efforts to improve patient safety and care quality in acute care settings (1, 2). Several studies show that safety culture and the related concept of safety climate are related to such clinician behaviors as error reporting (3), reductions in adverse events (4, 5), and reduced mortality (6, 7). Accreditation bodies identify leadership standards for safety culture measurement and improvement (8), and promoting a culture of safety is a designated National Patient Safety Foundation Safe Practice (9). A search of the Agency for Healthcare Research and Quality (AHRQ) Patient Safety Net (www.psnet.ahrq.gov) yields more than 5665 articles, tips, and fact sheets related to improving safety culture. Although much work has focused on promoting a culture of safety, understanding which approaches are most effective and the implementation factors that may influence effectiveness are critical to achieving meaningful improvement (10).

Drawing on the social, organizational, and safety sciences, patient safety culture can be defined as 1 aspect of an organization's culture (11, 12). Specifically, it can be personified by the shared values, beliefs, norms, and procedures related to patient safety among members of an organization, unit, or team (13, 14). It influences clinician and staff behaviors, attitudes, and cognitions on the job by providing cues about the relative priority of patient safety compared with other goals (for example, throughput or efficiency) (11). Culture also shapes clinician and staff perceptions about "normal" behavior related to patient safety in their work area. It informs perceptions about what is praiseworthy and what is punishable (either formally by work area leaders or informally by colleagues and fellow team members). In this way, culture influences one's motivation to engage in safe behaviors and the extent to which this motivation translates into daily practice.

Patient safety climate is a related term—often inadvertently used interchangeably with culture—that refers specifically to shared perceptions or attitudes about the norms, policies, and procedures related to patient safety among members of a group (for example, care team, unit, service, department, or organization) (11). Climate provides a snapshot of clinician and staff perceptions about the observable, surface-level aspects of culture during a particular point in time (10, 15). It is measured most often using a questionnaire or survey. Clinicians and staff are asked about aspects of their team, work area, or hospital, such as communication about safety hazards, transparency, teamwork, and leadership. Because climate is defined as a characteristic of a team or group, individual responses to survey items are usually aggregated to form unit-, department-, or higher-level scores. The difference between culture and climate is often reduced to a difference in methodology. Studies involving surveys of clinicians and staff are categorized as studies of safety climate, and ethnographic studies involving detailed, longitudinal observations are categorized as studies of safety culture. The terms are often used interchangeably in practice, but it is important to remember that there are conceptually meaningful differences in their scope and depth. For the purpose of this review, studies of both patient safety culture and climate were included. We use the term *patient safety culture* in discussion only to simplify the reporting of results.

Given that safety culture can influence care processes and outcomes, efforts to evaluate patient safety climate

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Key Summary Points

Safety culture is foundational to efforts to improve patient safety and may respond to intervention.

Bundling multiple interventions or tools is a common strategy to improve safety culture.

Many programs include a form of team training or implementation of communication tools, executive walk rounds or another form of interdisciplinary rounding, or unit-based improvement strategies that target clinical microsystems (for example, teams, units, or service lines) and are owned by front-line clinicians and staff.

Low-quality, heterogeneous evidence derived primarily from pre–post evaluations suggests that bundled, multi-component interventions can improve clinician and staff perceptions of safety culture.

Low-quality, limited evidence derived primarily from pre–post evaluations suggests that multifaceted interventions aimed at improving patient safety can also improve care processes and patient outcomes.

Future research should consider investigation of safety culture as a cross-cutting contextual factor that can moderate the effectiveness of other patient safety practices.

over time are being widely implemented (16). Measurement and feedback are necessary—although likely insufficient—means to effectively promote a culture of safety. One previous systematic review found strong face validity for interventions to promote safety culture in health care, but heterogeneity among studies, measures, and settings limited conclusions about intervention effectiveness (17). Results suggested possible positive effects for leadership walk rounds and multifaceted, unit-based interventions on survey measures of safety climate. However, the review did not assess effects on patient outcomes or care processes. Another review done by the Cochrane Collaboration (18) examined organizational culture–change interventions designed to improve patient outcomes and quality of care. Only 2 studies were identified for inclusion, both of which evaluated different outcomes, and results were inconclusive. We attempted to address these gaps by conducting a systematic review of the peer-reviewed literature to identify interventions used to promote safety culture in health care, assess the evidence for their effectiveness in improving both safety culture and patient outcomes, and describe the context and implementation of these interventions.

PATIENT SAFETY STRATEGIES

Promotion of patient safety culture can best be conceptualized as a constellation of interventions rooted in

principles of leadership, teamwork, and behavior change, rather than a specific process, team, or technology. Strategies to promote a culture of patient safety may include a single intervention or several interventions combined into a multifaceted approach or series. They may also include system-level changes, such as those in governance or reporting structure. For example, team training, interdisciplinary rounding or executive walk rounds, and unit-based strategies that include a series of interventions have all been labeled as interventions to promote a culture of safety. Team training refers to a set of structured methods for optimizing teamwork processes, such as communication, cooperation, collaboration, and leadership (19, 20). Previous reviews show that the term has been applied to a range of learning and development strategies, but the critical defining element is a focus on attaining the knowledge, skills, or attitudes that underlie effective teamwork (20).

Executive walk rounds is an interventional strategy that engages organizational leadership directly with front-line care providers. Executives or senior leaders visit front-line patient care areas with the goal of observing and discussing current or potential threats to patient safety, as well as supporting front-line staff in addressing such threats (21, 22). Walk rounds aim to show leadership commitment to safety, foster trust and psychological safety, and provide support for front-line providers to proactively address threats to patient safety. However, walk rounds have been operationalized in diverse ways, making comparison across studies difficult (21). For example, not all rounding interventions use a structured format, and time intervals between rounds vary widely across studies.

Improvement strategies that combine several intervention techniques have also been used to promote safety culture. For example, the Comprehensive Unit-Based Safety Program (CUSP) is a multifaceted strategy for culture change that pairs adaptive interventions (such as continuous learning strategies or team training) with technical interventions (such as translation and use of best available evidence-based clinical care algorithms) to improve patient safety and quality (23, 24). The CUSP methodology includes elements of executive engagement and team training, along with specific strategies for translating clinical evidence into practice. Other interventions have combined unit-based interventions with broader organizational changes, including restructuring patient safety governance (25, 26).

REVIEW PROCESSES

This review examines the evidence for interventions that articulate improvement in patient safety culture as a primary outcome and intervention goal. We identified relevant articles through searches of 5 databases from 1 January 2000 through 31 October 2012: PubMed, CINAHL, Cochrane, EMBASE, and PsycINFO. Key search terms included *patient safety culture*, *safety climate*, and *safety at-*

titudes (see the **Supplement**, available at www.annals.org, for a description of the search strategies, an article flow diagram, and evidence tables). The searches found 3679 records, all of which were independently screened by 2 reviewers. One hundred sixty-two articles were identified for full screening. Of these, 33 studies (in 35 articles) were identified for final inclusion. Two studies each contributed 2 papers to the review (26–29).

Studies were included if they targeted health care professionals or paraprofessionals practicing in adult or pediatric inpatient settings, explicitly indicated that the purpose of the intervention was promoting or improving a culture or climate of patient safety, used a psychometrically valid measure to assess patient safety culture that had previous evidence of sound psychometric properties published in a peer-reviewed outlet (15, 30, 31), assessed culture over at least 2 time points, and included adequate data to assess change in patient safety culture or climate. Only English-language studies conducted in the United States, the United Kingdom, Canada, or Australia were included. Although a growing number of studies have translated English-language surveys of culture into other languages, evidence that their construct validity is comparable across samples remains limited. Studies were excluded if they examined interventions aimed at medical or nursing students, targeted other aspects or types of culture (for example, general organizational culture), or were primarily focused on survey development or establishing the psychometric properties of a culture assessment. Qualitative studies were also excluded. Each article was abstracted by a primary reviewer and checked by a second reviewer.

Strength of evidence, including risk of bias, was evaluated by both reviewers using the Grading of Recommendations Assessment, Development and Evaluation Working Group criteria adapted by AHRQ (32). Interventions and reported outcomes were highly heterogeneous, and meta-analyses were not done. We present results from thematic analysis and qualitative summaries of individual studies.

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BENEFITS AND HARMS

Study Characteristics

Of the 33 studies reviewed, 24 were pre–post studies; 3 were concurrent control or pre–post with concurrent control studies; 3 were time-series studies; 2 were cluster randomized, controlled trials (RCTs); and 1 had a quasi-stepped wedge design. The clinical care areas studied included intensive care, perioperative, labor and delivery, radiology, and general medical and surgical floors. Twenty-one studies measured patient safety culture or climate with the Safety Attitudes Questionnaire (33), 10 studies used the AHRQ Hospital Survey on Patient Safety (34), and 2

studies used the Patient Safety Climate in Healthcare Organizations survey (35). Most studies operationalized culture at the level of the hospital unit or work area; that is, individual survey responses from clinicians and staff in a given work area were aggregated to form group-level patient safety climate scores for each work area surveyed. Survey sample sizes ranged from 5461 persons working in 144 units in a single hospital to 28 individuals working within a single hospital unit. The response rate—the number of individuals who complete and return surveys out of the total invited to complete the survey—is an important factor influencing the validity of survey results. Survey response rates ranged from 23% to 100%.

Intervention Types

Heterogeneity among interventions was substantial. Most (19 studies) were multicomponent interventions combining several improvement strategies under a single overarching initiative to promote safety culture. For example, Blegen and colleagues (36) used a 3-component approach that included team training, unit-based safety teams, and strategies for engaging patients in daily goal setting. Thematic analysis identified 3 broad categories of intervention that emerged across multiple studies: 20 studies explicitly included team training or tools to improve team communication processes, 8 explicitly included some form of executive walk rounds or interdisciplinary rounding, and 8 explicitly used CUSP.

Benefits

Team Training

Twenty studies explicitly examined team training or tools to support team communication as interventions to promote safety culture. Of these, 10 were conducted in perioperative care areas, 5 in labor and delivery or pediatrics, 2 in medical general floors or intensive care, and 3 in other care areas or a mix of care areas. Seventeen had pre–post or pre–post with concurrent control designs. One study was a quasi-cluster RCT; however, only 3 organizations were randomly assigned to 3 conditions. Sixteen of the 20 studies reported statistically significant improvement in staff perceptions of safety culture. In addition, 5 reported improvements in care processes (for example, decreased care delays or increased use of structured communication) and 7 reported improvements in patient safety outcomes (for example, errors resulting in harm or reductions in adverse outcomes index).

Executive Walk Rounds

Eight studies evaluated walk rounds (either executive or interdisciplinary), including 1 cluster RCT. All reported improvement in staff perceptions of safety culture. One study, however, showed improvement on only 2 of 30 survey items and did not report domain scores (37). Three reported improvements in perceptions of care processes (for example, quality of collaboration) or patient safety outcomes (for example, improvement in mean number of

days since last event). One study (27, 28) found that adjusted care costs were \$24.01 lower for intervention work areas despite an adjusted length of stay that was 0.19 days longer. However, neither of these indices were statistically significantly different from control work areas. The study included only 4 units (2 intervention, 2 control) and was underpowered to detect differences in these outcomes.

CUSP

Eight studies specifically evaluated the effects of CUSP. Most used medium- to larger-sample pre-post designs in intensive care unit settings, although 1 used a quasi-stepped wedge design. Overall, 6 of the 8 studies reported statistically significant improvements in staff perceptions of safety culture, including perceptions of teamwork. Two studies reported improvements in care processes, such as second-stage labor care (38) and timely resolution of safety concerns (39). Two studies reported improvements (although statistically nonsignificant or not statistically tested) in nursing turnover (40, 41), 1 reported a reduction in length of stay (41), and 1 reported greater reductions in infection rates (although not statistically significant) (42). Other studies of CUSP have shown sustained improvements in infection rates and mortality after implementation (23, 27).

Outcomes

Regarding effectiveness, 23 of 32 reviewed studies reported a statistically significant effect of the intervention on the overall safety culture score, the safety climate score, or at least half of reported survey domains or items (if analyzed at the item level). Several studies reported improvements in teamwork climate but did not find similar improvements in safety culture or safety climate (27, 43).

Additional outcomes included changes in care processes, patient outcomes (for example, indices of harm), and clinician outcomes (for example, turnover or burnout). Nineteen studies also reported the effect of interventions on such outcomes. Statistically significant improvements were reported in 6 of 11 studies reporting on patient outcomes. Five studies found reductions in indices of patient harm (25, 26, 43–45), and 1 study reported improvements in length of stay (41). One study found a decrease (0.56 vs. 0.15; $P < 0.01$) in the rate of reported errors that resulted in patient harm after a multifaceted suite of interventions that included both cultural (for example, feedback on errors in the form of posters) and system-focused changes (for example, medication management protocols) (43). A cluster RCT that found a marginal increase in teamwork culture (45) also found that the experimental unit's weighted adverse outcome score (an index of patient harm) decreased by 37% after implementation of a team training program designed to promote patient safety culture, compared with a 43% increase in a control unit ($P < 0.05$).

Two studies also reported reductions in nurse turnover after interventions to promote safety culture (40, 41).

Overall, the strength of evidence was low. Risk of bias was generally high because of study design issues; for example, we identified only 1 true cluster RCT (22). Core issues affecting risk of bias for reviewed studies included low survey response rates and incomplete reporting (not reporting full results for all units or hospitals where interventions were conducted, or not reporting results for all domains measured as part of culture surveys). Results were inconsistent, with 56% of studies reporting statistically significant findings. Regarding directness, or the extent to which findings generalize to different organizations or populations, few studies discussed the logic model or conceptual foundation underlying the intervention design. Only 2 studies comparatively evaluated the effects of different intervention strategies, and patient safety outcomes were infrequently and heterogeneously reported. Regarding precision, many survey instruments were used across reviewed studies and results were often reported differently.

Harms

We did not identify any data on patient harms.

IMPLEMENTATION CONSIDERATIONS AND COSTS

Studies differed in the characteristics of the organizations in which they were implemented, the level of leadership support and engagement reported, and the tools and strategies used to support implementation into daily care processes. Thirteen studies were done in academic hospital settings, 4 in community-based hospitals, 6 in a mix of academic and community hospitals, and several did not address the hospital mix in their sample. One study reported that the gain in safety climate scores was larger for faith-based hospitals (14%) than for non-faith-based hospitals (8%) but reported no direct statistical test of these findings (46). Only 1 study (28) examined costs of care among intervention and control work areas. No statistically significant differences in mean care costs between control and intervention work areas at follow-up were found.

DISCUSSION

Our review identified 33 studies in 35 articles that evaluated interventions to promote safety culture in inpatient care settings. Although these interventions varied greatly and often included multiple components, 3 common types of intervention emerged: team training and team communication tools, executive walk rounds and interdisciplinary rounding, and CUSP. These interventions were implemented across various care areas in both academic and community hospital settings. Most were evaluated in either perioperative or intensive care areas.

Overall, results suggest evidence to support the effectiveness of such interventions in improving clinician and staff perceptions of elements of safety culture (for example,

general perceptions of safety climate and teamwork). A few studies provide evidence that interventions aiming to improve safety culture may meaningfully improve clinical care processes (28, 47–49) and suggest the potential to improve aggregate indices of patient harm (29, 45). However, these conclusions are tempered by the limitations of the current evidence. Although 1 true cluster RCT was identified (22), most studies had pre–post designs with relatively small to moderate samples (particularly at the unit or work area level of analysis) that did not include control participants. In addition, few studies examined potential variation in perceptions of safety culture by care provider type.

Although this review offers a systematic analysis of strategies to promote safety culture, clear limitations must be considered. Only studies in acute care settings using established survey measures were included. Although qualitative studies of safety culture may offer insight into nuances of implementation, they were outside the scope of this review. Because several studies in outpatient settings were not included, results may not generalize beyond inpatient settings. Relevant studies may also have been inadvertently excluded despite extensive searches. Publication bias and selective reporting of positive findings also may limit conclusions about the effectiveness and generalizability of the interventions evaluated. Finally, traditional criteria for evaluating the effectiveness of clinical interventions for individual patients are not well-suited to assessing the effectiveness of quasi-experimental study designs conducted at the unit level of analysis. This may have introduced systematic bias into our ratings for strength of evidence. As noted by Pizzi and colleagues in the original “Making Health Care Safer” report (50); “the threshold for evidence may need a different yardstick than is typically applied in medicine.”

In summary, this review suggests that evidence to support the potential effectiveness of interventions to promote safety culture is emerging. In particular, the best evidence to date seems to include strategies comprising multiple components that incorporate team training and mechanisms to support team communication and include executive engagement in front-line safety walk rounds. Organizations should consider incorporating these elements into efforts to promote safety culture but also robustly evaluate such efforts across multiple outcomes. Future research should also consider thorough investigation of safety culture as a cross-cutting contextual factor that can moderate the effectiveness of other patient safety practices, such as implementation of rapid response systems. The strength of evidence for patient safety culture would be improved if theoretical models (31, 51, 52) were meaningfully used in the development of interventions for improvement and those interventions were robustly evaluated. Finally, work is needed to better understand the contextual role that safety culture plays in implementation of other patient safety practices, as well as how efforts to promote safety

culture can best be implemented to enhance the effectiveness of complementary or supplementary interventions for safety and care quality.

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