Supplementary

Table S1 Search Strategy

Databases	CINAHL, PubMed, Cochrane Library
Search Terms	Hospital Organizational Culture Organizational Health Communication Adverse Events Error System-Level
Inclusion Criteria	Published between 2009-2019 Peer-reviewed articles concerning humans Written in English
Exclusion Criteria	Books Book Reviews Commentaries Literature Reviews Letters to the Editor Non-English Articles Presentation Abstracts

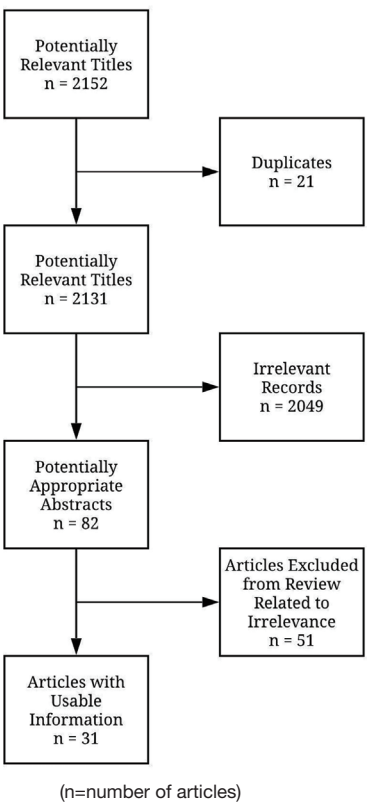

Figure S1 Flow Chart of Article Selection.

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Table S2 Summary of Communication of Organizational Events

Article	Aim or Focus	Method	Major Findings
(21) Ammouri *et al.* (2015)	• Investigate perceptions of nurses regarding safety culture • Identify necessary elements for the development and maintenance of safety culture in Oman	• Descriptive and cross-sectional design • Hospital Survey on Patient Safety & Culture used • Descriptive statistics and linear regression used to determine association between patient safety culture and demographic variables • Information gathered from 414 registered nurses from four governmental hospitals	• Higher nurse perceptions of supervisor/manager expectations, communication regarding errors, collaboration across units, and transitions, seen with higher perceptions of patient safety • Higher nurse perceptions of teamwork within units with feedback regarding errors seen with higher frequency of event reporting • Data relied on self-reports and held the potential for bias
(22) Brewer *et al.* (2018)	• Compare patient safety outcomes with advice and information sharing networks	• Social network analysis • Web-based questionnaires • Information gathered over seven months from patient care units from three hospitals	• Positive correlation found between medication errors, node count, and average distance • Density and weighted density negatively correlated with falls and medication errors • Eigenvector and total degree centrality negatively correlated with falls and medication errors • Betweenness centrality positively correlated with falls in information sharing network • Issues of potential bias not addressed
(28) Chen *et al.* (2016)	• Identify systems-level characteristics correlated with preventable readmission after major surgeries	• Retrospective analysis of California discharge records from patients who had coronary artery bypass, colectomy, or hip or knee arthroplasty • Hierarchic logistic regression used to estimate readmission odds related to hospital characteristics	• Adjustments made for patient factors • Rural location was found to be predictive of colectomy readmissions • Low-volume and minority-serving hospitals associated with arthroplasty readmissions • Issues of potential bias not addressed
(17) Chesluk *et al.* (2015)	• Document everyday practices that hospitalists use to overcome barriers of teamwork	• Ethnographic observation of hospitalists from a range of hospitals	• Hospitals rely on teamwork but do not support it • Hospitalists must overcome internal barriers to coordinate patient care • Fragmented information, siloed care delivery, and unreliable processes impact safety of patient care • Hospitalists rely heavily on personal presence and memory to deal with noted challenges • Research relied on informant perspective and held potential for bias.
(36) Edwards (2017)	• To present a framework that can be used to identify areas that can benefit from the application of organizational learning theory • Apply framework to current controversies and practice	• Description of proposed framework	• Proposed that attention to underdeveloped approaches to organizational learning may benefit patient safety • Issues of potential bias not addressed
(6) Finn *et al.* (2018)	• Determine impact of increased supervision by attending physician on educational outcomes and patient safety	• Randomized clinical trial in academic medical center • Took place over 9-months in an inpatient general medical service unit • Used a crossover design	• Medical error rates were not significantly different from standard versus increased supervision • Interns felt they had less autonomy and efficiency with increased supervision • Authors acknowledge potential for selection bias related to study of high-performing residents of one facility
(46) Gerrish *et al.* (2016)	• Report multifaceted knowledge translation intervention to facilitate improved communication between healthcare professionals and nutritional care of malnourished patients	• Mixed method knowledge translation study • Data collection over 18 months in England hospital • Data included patient record audits, observations of meals, survey of nurses, semi-structured interviews with nutrition champions, and knowledge translation facilitators (nurse managers and senior ward nurses).	• Nutrition champions successfully increased timely assessment of individuals at-risk for malnutrition • Nutrition champions successfully promoted nutritional care innovation • Knowledge from translation facilitators helped nutrition champions work collaboratively to implement nutrition action plans • Issues of potential bias not addressed
(7) Kalisch *et al.* (2009)	• Report results of a study of missed nursing care (error of omission) and factors involved in missed care	• Descriptive design to determine frequency of missed nursing care in three hospitals in Michigan • Surveys were distributed to nurses who worked on in-patient units • 459 (38.6%) of nurses responded • Gender and educational levels were collected • ANOVA used to look at differences between hospitals and nurses • Mixed Model analysis was used to examine differences between services	• Significant amount of missed care transpires in acute care hospitals • Reasons cited for missed care included lack of personnel, materials, and poor communication • Care delivered to patients often less than what is needed by patients for healing • Issues of potential bias not addressed
(37) Kemper *et al.* (2013)	• Description of how family engagement can improve patient safety	• Educational article	• Discusses elements and rationale of using family engagement to improve hospital systems
(27) Kirwan *et al.* (2013)	• Explore relationship between unit variables, nurse variables, and patient outcomes	• Cross-sectional quantitative study using outcome variables of nurse-reported safety levels and formal adverse event reports • Questionnaire provided to nurses in 30 study hospitals	• Positive practice environment found to correlate with patient safety outcomesAuthors describe application of multiplier to standard errors to correct potential negative biases
(31) McHugh and Ma (2013)	• Determine relationship between nurse staffing levels, nurse work environment, and 30-day readmission rates of Medicare patients with acute myocardial infarction, heart failure, and pneumonia	• Logistic regression used to estimate relationship between 30-day readmission rates and nursing factors • Data gathered from nurse surveys, patient discharge notes, and American Hospital Association Annual Survey data	• Care in hospitals with good (as opposed to poor) work environments were correlated to better patient outcomes and lower rates of readmissions • Improved work environments may help prevent readmissions • Authors conducted a secondary survey of initial non-responders to rule out potential response bias
(18) Mehta *et al.* (2018)	• Examine the role of failure-to-rescue in general emergency surgery	• Risk-adjusted mortality rates calculated for each hospital using multivariable logistic regression and post estimation • Hospitals ranked by risk-adjusted mortality rates • Comparisons were made between risk-adjusted mortality rates and failure-to-rescue rates	• Complication rates were similar across hospitals • Higher-mortality hospitals had significantly higher failure-to-rescue rates • Authors note that all disclosed conflicts of interest were well managed to eliminate bias
(41) Mira *et al.* (2015)	• Identify and analyze organizational-level strategies used by primary care and hospitals in Spain to address impacts of adverse events in second and third victims	• Cross-sectional study done in Spanish healthcare organizations to assess safety culture, transparent communication plans, crisis management plans, support for second victims (health professionals), and safeguards for reputations of third victims (organizations) • Surveys provided to patient safety coordinators and managers	• Poor support for second victims prevalent in primary care and hospitals • 35% of hospital personnel described no crisis management plan for adverse events • Authors acknowledge potential for survey responder bias
(23) Nicotera *et al.* (2014)	• Evaluate an educational intervention done to help nurses effectively cope with structurational divergence (characterized by compelling contradictory obligations)	• Quantitative pre- and posttests given with a comparison sample • Qualitative discussions regarding evaluations of educational program	• Educational course reduced negative conflict attitudes and behaviors • Course increased necessary attitudes for conflict management and productive dialogue • Participants perceived better understanding and empowerment to handle workplace relationships and conflicts • Issues of potential bias not addressed
(45) O'Connell *et al.* (2018)	• To examine role of process variance in pediatric medical errors	• Process variance events were organized by type • Data analyzed with descriptive statistics to assess incident type and frequency	• Process variance events accounted for 15.4% of the event reports • Contributing factors included human factors and system-level errors • Issues of potential bias not addressed
(24) Panagos and Pearlman (2017)	• Review numerous ways that safety framework can be applied to neonatal care	• Educational article	• Systematic approach to bolstering patient safety can help reduce patient harm • Authors acknowledge presence of studies that challenge biases of kangaroo care for ventilated neonates
(19) Parsons and Cornett (2011)	• Identify barriers and facilitators for sustenance of Magnet Recognition	• Qualitative study using semi-structured interviews with convenience sample of 15 Chief Nursing Officers from magnet hospitals in the United States.	• Multiple system-level factors were found to play a role in Magnet Recognition stability • Issues of potential bias not addressed
(25) Pavlish, Brown-Saltzman, Fine, *et al.* (2015)	• Examine circumstances and challenges surrounding ethically difficult situations occurring in oncology	• Focus groups with 30 nurses from the United States • Interviews of key informants	• Many individuals in healthcare do not voice ethical concerns until a crisis occurs • System-level, interactional, and individual factors promoted a culture of avoidance and decreased care quality • Issues of potential bias not addressed
(20) Pavlish, Brown-Saltzman, So, *et al.* (2015)	• Explore nursing leaders' experience with situations of an ethically difficult nature • Describe risk factors and actions for ethically difficult situations	• Qualitative descriptive design with a critical incident technique (brief description of event that includes circumstances, actions, and outcomes) for inductive coding • 4-part questionnaire	• Three most common incident types involved end-of-life care, shared decision making with patients, and unsafe care • Culture of fear, poor communication, cultural differences, and inadequate collaboration were noted as precipitators • Issues of potential bias not addressed
(32) Perry *et al.* (2018)	• Describe causes and outcomes of nurse job satisfaction for the furtherance of conditions that foster satisfaction and reduce adverse events	• Individual nurse responses to Practice Environment Scale-Nursing Work Index • Aggregated data entailing patient satisfaction records, and system-level adverse events	• Nurse satisfaction was found to be the most consistent predictor of adverse events and patient satisfaction • Issues of potential bias not addressed
(26) Rasmussen *et al.* (2014)	• Investigate adverse events and study correlations of adverse events with the stressors and safety culture in an emergency department	• Nurses and physicians from a Danish emergency department completed a questionnaire with linear regression analysis	• Adverse events were significantly correlated to poor patient safety climate, poor team climate, and inadequate inter-departmental working relationships • Study data are self-reported and hold potential of reporting bias
(38) Shapiro *et al.* (2014)	• Describe development of the Center for Professionalisms and Peer Support • To provide education regarding professionalism	• Educational article	• Environments that do not embrace professionalism or acceptable behaviors can result in adverse events, medical errors, and unsafe work conditions • Issues of potential bias not addressed
(35) Shekelle *et al.* (2011)	• Report findings of international group assembled by Agency for Healthcare Research and Quality regarding patient safety	• Educational article	• Safety culture, leadership, and teamwork likely impact the implementation and sustenance of interventions • Must weigh costs of safety interventions versus the benefits • Issues of potential bias not addressed
(42) Stalter and Jauch (2019)	• To determine Systems Thinking education in current RN-BSN curricula	• Descriptive, cross-sectional design with survey	• Systems Thinking part of most curricula, but Systems Theory largely lacking • Theory base necessary to enable nurses to synthesize, analyze, and act • Issues of potential bias not addressed
(11) Starmer *et al.* (2014)	• To assess an intervention geared toward improving handoffs in hospitals	• Prospective intervention study in 9 hospitals • Error rates measured through active surveillance • Workflow evaluated through time-motion observations	• From 10,740 patient admissions, medical errors decreased by 23% • Site-level analyses showed significant reduction of errors in 6 of the 9 hospitals • Issues of potential bias not addressed
(39) Taylor and Taylor (2018)	• Reframe horizontal violence in order to categorize as quality improvement concern	• Education article	• It is suggested that existing quality improvement measures be used to research systems-level issues that contribute to horizontal violence • Factors that contribute to horizontal violence also compromise environments and patient safety • Issues of potential bias not addressed
(30) Topaz *et al.* (2016)	• To fill the knowledge gap regarding nurses' usability issues of electronic health records	• Quantitative Chi-square and t-tests to assess demographic variables • Qualitative thematic analysis • Cross-sectional international survey design • Online data collection	• Electronic health record usability issues can lead to medical errors and adverse events • Lack of organizational support, siloed care delivery, and regulatory expectations perpetuate electronic health record issues • Issues of potential bias not addressed
(33) Wagner *et al.* (2013)	• Describe differences and similarities of patient safety culture between United States, Netherlands, and Taiwan	• Cross-sectional survey, using the Hospital Survey on Patient Safety Culture	• Most hospitals scored high on in-unit teamwork • Differences were seen between countries in organizational learning, communication openness, communication regarding errors, and management for patient safety • Authors acknowledge potential of positive selection bias
(34) Wegner and Neri Rubim Pedro (2012)	• Analyze family caregivers' perceptions regarding adverse events	• Qualitative case study of family caregivers from Brazil • Semi-structured interviews with thematic analysis	• Institutions that prioritize patient safety approach errors systemically to look at the whole system • Failures in planning, performance, collaboration, monitoring, and evaluation result in compromised patient safety • Issues of potential bias not addressed
(40) Wiig and Tharaldsen (2012)	• Discuss relationship between trust and risk regulation • Discuss how trust and regulation are linked to control risk in socio-technical systems	• Secondary analysis of three mixed-method studies related to trust and risk regulation in Norway	• Trust is a moderator between control mechanisms and control level • Control strategies based on communication increase trust levels • Issues of potential bias not addressed
(12) Woodward *et al.* (2010)	• Provide broad perspective on effective strategies to reduce medical errors	• Educational article	• Medication errors are the most common preventable source of patient harm • Punitive environments discourage error reporting • Medical errors may go undetected in the absence of an adverse event • Culture change is challenging and must be done with attention to staff morale • Authors acknowledge potential of study bias inherent in quality improvement efforts

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Table S3 Summary of Factors Impacting Organizational Health and Patient Safety

Variable	Description
Change	• Evolution and transformation cultivate hospital organization health; resistance to change diminishes it (18,19) • Change without communication reduces staff morale (12)
Communication	• Effective communication bolsters patient safety; ineffective communication precipitates patient harm (11,20-26)
Environment	• Supported transparency increases reporting of adverse events (27) • Failure-to-rescue rates of similar patients varies widely by location (18) • Hospitals serving minorities or situated in rural areas associated with poor patient outcomes (28)
Human Factors	• Systems not designed for unique users perpetuates workarounds that compromise patient safety (17,23,29,30)
Interdisciplinary Collaboration	• Interdisciplinary collaboration challenging but vital to safe patient care (17,24,31-34) • Interdisciplinary collaboration promotes positive change; lack of interdisciplinary collaboration associated with increased adverse events (18,20,24,26,34,35)
Leadership	• Leaders responsible for supporting positive change and safety culture (20,21,24,26,30,31,33,35,38) • Frequent leadership turnover linked to compromised patient safety and organizational health (19,21)
Culture	• Organizational and team culture hold the potential to influence occurrence of adverse events (12,18,21,24,26,27,32) • Organizational learning promotes patient safety; entrenched hierarchical structures stifle organizational learning (20,21,24,33,36) • Shared governance promotes safety culture (17,19,20,34) • Siloed care delivery compromises patient safety (17,30) • Poor employee satisfaction and rampant unprofessionalism though to perpetuate preventable errors (32,36,38) • Safety culture supported by teamwork, interdisciplinary collaboration, and communication (21-24)

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