



Organizational health and patient safety: a systematic review

Angela C. Brittain^{1^}, Jane M. Carrington^{2^}

¹College of Nursing, Washington State University, Vancouver, WA, USA; ²College of Nursing, University of Florida, Gainesville, FL, USA

Contributions: (I) Concept and design: AC Brittain; (II) Administrative support: JM Carrington; (III) Provision of study materials or patients: AC Brittain; (IV) Collection and assembly of data: AC Brittain; (V) Data analysis and interpretation: AC Brittain; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Angela C. Brittain, PhD, RN. 14202 NE Salmon Creek Ave, Vancouver, WA 98686, USA. Email: angela.brittain@wsu.edu.

Background: Demise from preventable medical errors has been described as the third leading cause of death in the United States. Many mitigating efforts have been applied unsuccessfully at the point of care. Further recognition of these errors as symptoms of underlying organizational-level issues is needed in order to provide safe patient-centered care. The objective of this systematic review was to describe current knowledge regarding the communication of organizational-level issues that influence organizational health and compromise patient safety.

Methods: A comprehensive literature review was done to discover pertinent scientific literature regarding organizational-level factors that impact organizational health and patient safety. The literature search was done in August of 2019 using the CINAHL, PubMed, and Cochrane Library databases using the key terms “hospital”, “organizational culture”, “organizational health”, “communication”, “adverse events”, “error”, and “system-level”. Inclusion criteria included articles which were peer-reviewed, published between 2009–2019, concerned humans, and written in English. Findings that were books, book reviews, commentaries, literature reviews, letters to the Editor, non-English, or presentation abstracts were excluded. Thematic analysis was applied to literature sources that fit inclusion criteria and held pertinence to the delineated area of research. Bias was limited through bracketing of values and preconceived opinions to promote neutrality.

Results: A total of 31 articles were reviewed. Analysis revealed that hospitals are complex and evident of changes that are unpredictable and nonlinear. Organizational-level factors such as communication, environment, human factors, interdisciplinary collaboration, leadership, and culture influence patient safety. Limitations of the evidence included the finding that less than half of the studies used a guiding theory, only two quantitative studies accounted for confounding variables, the majority of the qualitative studies did not address issues of trustworthiness or bias, and there was not a standardized definition of adverse events used across studies.

Conclusions: Further research regarding personnel perceptions, communication methods and content, and distinguishable features of organizational-level events are needed.

Keywords: Hospital; organizational health; system-level; communication; adverse events

Received: 30 April 2020; Accepted: 06 November 2020; Published: 25 March 2021.

doi: 10.21037/jhmhp-20-57

View this article at: <http://dx.doi.org/10.21037/jhmhp-20-57>

[^] ORCID: Angela C. Brittain, 0000-0001-9518-1788; Jane M. Carrington, 0000-0002-6263-0337.

Introduction

Over 400,000 deaths and millions of injuries from preventable medical errors occur every year in the United States (US) (1). These errors have been cited as the third leading cause of death in the US and mitigating efforts have missed the mark, as preventable deaths and adverse events have persisted at worrying rates (2-4). Many interventions have been applied at the frontlines, suggesting that the impetus of these errors lies at the bedside (1,5-12). An understanding that these preventable medical errors may be symptoms of underlying organizational factors is lacking (13).

The World Health Organization (WHO) notes that overall system characteristics are poorly studied and evaluated yet impact every intervention that is done within hospital systems (14). It has been noted that years of linear analyses and regulatory mandates have not altered the rates of adverse events for the last 50 years and suggest that a systems approach be adopted for the furtherance of patient safety (13). In this context, “linear” refers to the conceptualization of clear cause and effect without consideration of complex confounding variables. The objective of this systematic review is to describe the current state of the science regarding the communication of organizational-level issues that influence organizational health and compromise patient safety. Patient safety is an important consideration in the provision of patient-centered care (15). This will illuminate gaps in knowledge that future research endeavors can then address. We present the following article in accordance with the PRISMA reporting checklist (available at <http://dx.doi.org/10.21037/jhmhp-20-57>).

Methods

A comprehensive review of the literature was done to isolate pertinent studies that address the communication of organizational-level events that influence organizational health and compromise patient safety. The literature search was done in August of 2019 using the CINAHL, PubMed, and Cochrane Library databases to isolate studies that were published between 2009–2019. The key terms used were “hospital”, “organizational culture”, “organizational health”, “communication”, “adverse events”, “error”, and “system-level”. The inclusion criteria used were: peer-reviewed articles concerning humans and written in English from 2009 to 2019. Exclusion criteria applied were books, book reviews, commentaries, literature reviews, letters to

the editor, non-English articles, and presentation abstracts. These were excluded related to their representation of less rigorous evidence and in the case of non-English articles, related to their incomprehensibility by the primary researcher. Please see [Table S1](#) for a depiction of the search strategy. After 21 duplicates were removed, 2,131 titles were manually evaluated by one researcher for their alignment with matters concerning organizational health and patient safety. Of these, a total of 82 remained for abstract review, and 31 articles were manually chosen for evaluation by one researcher via thematic analysis related to their fit with the inclusion criteria and the delineated area of research concerning organizational health and patient safety (16). Issues of bias were mitigated via bracketing of values and personal opinions to promote neutrality. Peer review by second researcher was sought to bolster rigor and rule out the presence of implicit bias. Please see [Figure S1](#) for a flow chart showing the process of article selection and [Table S2](#) for a visual summary of the articles used in the systematic review.

Results

Thematic analysis was used to identify themes and categories within the textual data of the chosen articles (16). The identified themes included: nature of change, communication, impact of environment, human factors, interdisciplinary collaboration (IC), role of leadership, organizational and team culture, patient safety, and system-level factors. Nearly half (15 of the 31) of the articles discussed the role of communication and almost all (30 of 31) addressed patient safety.

Nature of change

A review of the literature reveals that change within the realm of healthcare is unpredictable and non-linear (17-19). Meaning that because of the complex nature of hospital systems and the convoluted interconnections between subsystems, interventions may have outcomes that are not straightforward or expected (17). Parsons and Cornett (2011) describe that a multiplicity of dynamic and shifting factors over time is the impetus for these unpredictable effects (19). Furthermore, it is suggested that the very health of hospitals hinges on an ongoing evolution and transformation (19). Individualized resistance to change is described as an inhibitor to safety implementation efforts (18)

and organizational-level factors are noted as both precarious and difficult to change (20). Finally, practice change holds the potential to negatively impact staff morale, however, the presence of effective communication can help mitigate this effect (12).

Effects of communication

Communication is a well-represented theme within the reviewed literature. Effective communication is portrayed as an integral component of bolstering patient safety and ineffective communication is described as a significant contributor to patient harm (11,20-26). More specifically, poor communication is regarded as something that damages relationships and organizational processes, in addition to potentiating ethical conflicts (20,23). Communication is complex and hindered by unclear policies and conflict avoidance (23,25,27). Although poor communication patterns are difficult to reverse, efforts of change can be supported by relationships, delineation of clear expectations, and organizational dimensions (23,24). Effective communication informs a systems approach to patient safety and supports organizational goals, while transparent communication regarding adverse events helps organizational learning for the betterment of patients (23,27).

Impact of environment

The internal and external environments of hospitals are regarded as influencers of patient safety (18,21,26-28). Review of the literature suggests that psychosocial work environments and team culture have strong associations with patient complications and preventable medical errors (18,26). Positive work environments that support transparency are associated with higher rates of adverse event reporting (27). Preliminary data reveal that failure-to-rescue rates of patients with similar demographics and disease states vary widely from hospital to hospital, suggesting that mortality is a nonlinear event impacted by the environment in which patients find themselves (18). Some environmental factors cannot be modified—such as rural hospitals or those serving minorities being associated with poor outcomes (28).

Human factors

Issues pertaining to human factors impact matters of patient

care. The term human factors refer to the limitations and needs of humans as they interact with machines and technology. Pertinent considerations include anthropometric, motor, perceptual, cognitive, social, cultural, and psychological needs (29). People are described as being as unique as their varied backgrounds. In turn, organizations are filled with a plethora of diverse people (23). Systems do not always accommodate the needs of these users, necessitating the creation of innovative workarounds. Heavy reliance on workarounds and poor use of working memory hold the potential to impact the safety of patient care (17). One such issue was described by Topaz and colleagues (2016), who noted that electronic health record usability issues can lead to medical errors and adverse events (30).

Interdisciplinary collaboration

Collaboration within and across disciplines is a recurrent theme in the literature. Interdisciplinary work is described as an essential element for effective and safe patient care delivery, but something that is challenging and not supported in most hospitals (17,24,31-34). Furthermore, IC is described as a necessary component for the promotion of change and something that influences patient care environments (18,24,26,34,35). Inadequate IC is explained as being positively associated with ethical conflicts and increased adverse events (20,26). Workarounds and negotiation are noted as sometimes necessary to accommodate IC, however, organizational-level change is expressed as something that can support IC (17,24). Adequately supported IC is associated with transparency and increased patient safety perceptions (21).

Role of leadership

Leadership is described as a behavior rather than a prescribed role (36). Leaders are shown as the ones who set the tone of an organization and whose actions reveal the etiology of system-level priorities and processes (19,24,33,37). Leaders are responsible for nurturing ethical patient care environments and supporting sustained changes that promote quality nursing care and a safety culture (20,21,24,26,30,31,33,35,38). Supportive and committed management processes have been shown to increase patient safety, whereas poor leadership or frequent leadership turnover have been respectively linked to compromised patient safety and organizational impacts (19,21).

Organizational and team culture

Elements pertaining to culture are heavily represented in the literature. Organizational and team cultures are described as complex, difficult to change, and instrumental influencers of nurse satisfaction, health care quality, and the occurrence of adverse events (12,18,21,24,26,27,32). When wishing to promote change within a hospital environment, culture and prevalent behaviors must be considered (35,39).

Organizational learning is discussed as a key feedback loop and promoter of patient safety (21,24,33,36). Prevalent hierarchical structures tend to perpetuate ethical conflicts and stifle organizational learning (20,36). Ingrained power differentials encourage conflict avoidance, impact moral actions, and affect patient care (25). Although sometimes challenging to establish, shared governance provides a foundation upon which safety culture can be built (17,19,20,34).

Although perceptions of conflict and horizontal violence can be insidious, they hold the potential to impact hospital organizations (23,25,39). Hospitals are ripe with competing expectations, where efficiency and ethicality are often at odds (23,25). Such incompatible expectations can lead to fragmented care with reduced nurse efficacy, increased medication errors, and compromised patient safety (17,23,25,30). Siloed care delivery is viewed as a hindrance, rendering patient care ineffective and compromised (17,30).

Although the effects of a blame culture are not fully understood, it is associated with stifled communication, perpetuated errors, and hindered patient safety (12,21,25,36). Despite the knowledge that individuals should not be blamed for poor communication or conflict, sanctions aligned with a blame culture persist (21,23,40). Conversely, trust has been described as influencing organizational factors such as communication, system functionality, organizational learning and performance, and safety culture (17,40). Trust is approached differently from one organization to the next but should be sought in moderation, as excessive blind trust can be as detrimental as inadequate trust (40).

Patient safety

Patient safety largely involves freedom from preventable medical errors that pose the risk of death or harm to individuals or the public (11,12,21,34). It is thought that adverse events from errors are perpetuated by system-level issues, such as employee satisfaction or unprofessional environments or attitudinal patterns, and are largely

underreported (32,36,38). Other pertinent contributors include horizontal violence and staff who feel their levels of autonomous control are waning while responsibilities escalate (38,39). Although missed nursing care is a frequent issue, medication errors are one of the most common preventable medical errors documented to date (7,12). Incident reporting and personal attention to detail have been found ineffective tools in mediating the occurrence of adverse events (24,34). Although much attention has been given to the patients who have been personally affected by adverse events, healthcare providers who have executed preventable medical errors also experience negative consequences such as anxiety, and reduced confidence in performance and professional skills (41).

Perception of patient-safety culture includes elements of mission and vision and has been shown to be cultivated by academic facilities and through on-the-job experience (21). Academic hospitals with over 200 beds, increased nurse-to-patient ratios, and enhanced technology, have been associated with lower failure-to-rescue rates (18). Patient safety cultures are multifactorial and supported by teamwork, IC, and communication (21,24). Safety research studies are challenging to conduct; however, new solutions are waiting to be discovered and should include a systems-level approach with attention to cost-benefit analyses (12,35,42). Nurses may be at the helm of such efforts (20).

System-level factors

Hospitals are complex adaptive systems with many interacting subsystems that impact patient care and adaptively produce more than the mere sum of their parts (17,19,20,43,44). As the number of interacting subsystems rises, the risk for adverse events, such as medication errors, increases (22). However, this risk can be mitigated by the effective integration of these subsystems (17). Hospital organizational-level factors, such as communication, impact staff, patients, care quality, ethical dilemmas, and the occurrence of preventable medical errors. To address this, a system approach is necessary, as efforts to improve systemic issues such as patient care and safety cannot be accomplished by isolated individuals (17,19-21, 24,27,28,34,37,39,45). It has also been suggested that organizational factors, as opposed to individuals, can perpetuate horizontal violence, ethical conflicts, and moral compromise (12,20,24,39). Likewise, positive care characteristics that set apart magnet facilities are supported

by organizational-level factors (19). It is important that nurses are educated about Systems Theory in order to analyze, act, and promote organizational-level initiatives for the betterment of patients (42). Please see [Table S3](#) for a summary of the factors thought to impact organizational health and patient safety.

Discussion

A review of literature from the last decade suggests that consideration should be given to the unpredictability and nonlinearity of change as well as the impacts of system-level factors such as culture, communication, human factors, and the environment on staff, patients, and the occurrence of preventable medical errors. Given the complex nature of hospitals, well-intended interventional efforts may have unforeseen consequences (14,43,44). Effective communication that is bolstered by trust can improve system functionality and breakdown the propensity for (and impacts of) siloed care delivery (17,30,40). It is clear that leadership's embrace and assistance with a system-level approach and IC is key to the furtherance of patient safety (17,18,21,24,26,31-35,37). This hinges on leadership as a behavior that prioritizes and supports processes that optimize system-level health and a culture of safety (21,24,36,37). In this way, leadership can set the tone of their respective organizations by nurturing environments that work toward these goals (19,21). This can be largely helped by fostering opportunities for open and frequent communication between both individuals and systems within hospital organizations (21-24,27).

Strengths and limitations

The synthesized results are tempered by methodological limitations in the reviewed studies. Only 12 of the 31 articles used a guiding theory or framework (6,19,20,23,24,30-32, 36,37,42,46). Merely two of the quantitative studies considered confounding variables, adjusting for age (18) and time of year (11). Just one qualitative study reviewed issues pertaining to trustworthiness (19,47) and less than half discussed issues of bias (6,12,17,18,21,24,26,27,31,33,41). Finally, it was not clear that all studies ascribed to a standardized definition of adverse events or preventable medical errors. Trustworthiness of this systematic review was bolstered through the detailed description of the article selection process and analysis to support consistency and

transferability. Although manual thematic analysis holds the potential for bias, this was limited through bracketing of values and preconceived opinions to promote neutrality (47).

Conclusions

Demise from preventable medical errors have been cited as the third leading cause of death in the US (3). Many efforts to allay risks from these errors have been applied at the bedside and have been largely unsuccessful (2,48). Literature suggests that organizational-level factors are the impetus for preventable medical errors, and as such, mitigating efforts should be crafted with an organizational approach in mind (12,17,19,21,22,24,27,28,39,45,46). Although strides have been made in recognizing the impact that organizational-level factors have on patient care, many interventional efforts continue to be applied with a parochial focus (2).

Conducting this systematic review revealed areas for further investigation. Only one article directly discussed the effects of preventable medical errors on staff, and the ultimate impact such effects have on patient care (41). Further research is needed to learn the perceptions of hospital personnel regarding the impetus and effects of medical errors on them and the delivery of patient care. Additionally, much focus in the literature is given to the role of communication, however, the content and methods of communication are largely unknown. Specifically, how are threats to organizational health communicated and to whom? What communication channels and technology are used? Lastly, it is clear that general organizational-level elements have an impact on patient safety and the occurrence of preventable medical errors. Continued research is needed to elucidate details regarding the distinguishable features of these elements and how they impact organizational health so that future interventional work may be pursued. This article was completed in accordance with the AME Publishing Company Submission Guideline.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editors (Naleef Fareed, Ann Scheck

McAlearney, and Susan D Moffatt-Bruce) for the series “Innovations and Practices that Influence Patient-Centered Health Care Delivery” published in *Journal of Hospital Management and Health Policy*. The article has undergone external peer review.

Reporting Checklist: The authors have completed the PRISMA reporting checklist. Available at <http://dx.doi.org/10.21037/jhmhp-20-57>

Peer Review File: Available at <http://dx.doi.org/10.21037/jhmhp-20-57>

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jhmhp-20-57>). The series “Innovations and Practices that Influence Patient-Centered Health Care Delivery” was commissioned by the editorial office without any funding or sponsorship. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Open Access Statement: This is an Open Access article distributed in accordance with the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International License (CC BY-NC-ND 4.0), which permits the non-commercial replication and distribution of the article with the strict proviso that no changes or edits are made and the original work is properly cited (including links to both the formal publication through the relevant DOI and the license). See: <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

References

1. James JT. A new, evidence-based estimate of patient harms associated with hospital care. *J Patient Saf* 2013;9:122-8.
2. Kobewka DM, van Walraven C, Turnbull J, et al. Quality gaps identified through mortality review. *BMJ Qual Saf* 2017;26:141-9.
3. Makary MA, Daniel M. Medical error: The third leading cause of death in the US. *BMJ* 2016;353:i2139.
4. Zhang E, Hung SC, Wu CH, et al. Adverse event and error of unexpected life-threatening events within 24 hours of ED admission. *AM J Emerg Med* 2017;35:479-83.
5. Berdot S, Roudot M, Schramm C, et al. Interventions to reduce nurses' medication administration errors in inpatient settings: A systematic review and meta-analysis. *Int J Nurs Stud* 2016;53:342-50.
6. Finn KM, Metlay JP, Chang Y, et al. Effect of increased inpatient attending physician supervision on medical errors, patient safety, and resident education: A randomized clinical trial. *JAMA Intern Med* 2018;178:952-9.
7. Kalisch BJ, Landstrom G, Williams RA. Missed nursing care: Errors of omission. *Nurs Outlook* 2009;57:3-9.
8. Marvanova M, Henkel PJ. Collaborating on medication errors in nursing. *Clin Teach* 2018;15:163-8.
9. Nuckols TK, Smith-Spangler C, Morton SC, et al. The effectiveness of computerized order entry at reducing preventable adverse drug events and medication errors in hospital settings: a systematic review and meta-analysis. *Syst Rev* 2014;3:56.
10. Raban MZ, Westbrook JI. Are interventions to reduce interruptions and errors during medication administration effective? A systematic review. *BMJ Qual Saf* 2014;23:414-21.
11. Starmer AJ, Spector ND, Srivastava R, et al. Changes in medical errors after implementation of a handoff program. *N Engl J Med* 2014;371:1803-12.
12. Woodward HI, Mytton OT, Lemer C, et al. What have we learned about interventions to reduce medical errors? *Annu Rev Public Health* 2010;31:479-97.
13. Braithwaite J, Wears RL, Hollnagel E. Resilient health care: Turning patient safety on its head. *Int J Qual Health Care* 2015;27:418-20.
14. World Health Organization. *Systems Thinking for Health Systems Strengthening*. Albany, Switzerland: World Health Organization, 2009.
15. Mazurenko O, Andraka-Christou BT, Bair MJ, et al. Balancing patient-centered care and safe pain care for nonsurgical inpatients: Clinical and managerial perspectives. *Jt Comm J Qual Patient Saf* 2019;45:241-8.
16. DeSantis L, Ugarriza DN. The concept of theme as used in qualitative nursing research. *West J Nurs Res* 2000;22:351-72.
17. Chesluk B, Bernabeo E, Reddy S, et al. How hospitalists work to pull healthcare teams together. *J Health Organ Manag* 2015;29:933-47.
18. Mehta A, Efron DT, Stevens K, et al. Hospital variation in mortality after emergent bowel resections: The role of failure-to-rescue. *J Trauma Acute Care Surg*

- 2018;84:702-10.
19. Parsons ML, Cornett PA. Sustaining the pivotal organizational outcome: Magnet recognition. *J Nurs Manag* 2011;19:277-86.
 20. Pavlish C, Brown-Saltzman K, So L, et al. Avenues of action in ethically complex situations. *J Nurs Adm* 2015;45:311-8.
 21. Ammouri AA, Tailakh AK, Muliira JK, et al. Patient safety culture among nurses. *Int Nurs Rev* 2015;62:102-10.
 22. Brewer BB, Carley KM, Benham-Hutchins MM, et al. Relationship of staff information sharing and advice networks to patient safety outcomes. *J Nurs Adm* 2018;48:437-44.
 23. Nicotera AM, Mahon MM, Wright KB. Communication that builds teams: Assessing a nursing conflict intervention. *Nurs Adm Q* 2014;38:248-60.
 24. Panagos PG, Pearlman SA. Creating a highly reliable neonatal intensive care unit through safer systems of care. *Clin Perinatol* 2017;44:645-62.
 25. Pavlish C, Brown-Saltzman K, Fine A, et al. Culture of avoidance: Voices from inside ethically difficult clinical situations. *Clin J Oncol Nurs* 2015;19:159-65.
 26. Rasmussen K, Pedersen AH, Pape L, et al. Work environment influences adverse events in an emergency department. *Dan Med J* 2014;61:A4812.
 27. Kirwan M, Matthews A, Scott PA. The impact of the work environment of nurses on patient safety outcomes: A multi-level modelling approach. *Int J Nurs Stud* 2013;50:253-63.
 28. Chen JC, Shaw JD, Ma Y, et al. The role of the hospital and health care system characteristics in readmissions after major surgery in California. *Surgery* 2016;159:381-8.
 29. Boy GA. A human-centered design approach. The handbook of human-machine interaction: A human-centered design approach. 1st edition. Burlington, VT: Ashgate Publishing Company, 2011:1-20.
 30. Topaz M, Ronquillo C, Peltonen LM, et al. Nurse Informaticians Report Low Satisfaction and Multi-level Concerns with Electronic Health Records: Results from an International Survey. *AMIA Annu Symp Proc* 2017;2016:2016-25.
 31. McHugh M, Ma C. Hospital nursing and 30-day readmissions among Medicare patients with heart failure, acute myocardial infarction, and pneumonia. *J Nurs Adm* 2013;43:S11-8.
 32. Perry SJ, Richter JP, Beauvais B. The effects of nursing satisfaction and turnover cognitions on patient attitudes and outcomes: A three-level multisource study. *Health Serv Res* 2018;53:4943-69.
 33. Wagner C, Smits M, Sorra J, et al. Assessing patient safety culture in hospitals across countries. *Int J Qual Health Care* 2013;25:213-21.
 34. Wegner W, Neri Rubim Pedro E. Patient safety in care circumstances: Prevention of adverse events in the hospitalization of children. *Revista Latino-Americana de Enfermagem (RLAE)* 2012;20:427-34.
 35. Shekelle PG, Pronovost PJ, Wachter RM, et al. Advancing the science of patient safety. *Ann Intern Med* 2011;154:693-6.
 36. Edwards MT. An organizational learning framework for patient safety. *Am J Med Qual* 2017;32:148-55.
 37. Kemper C, Blackburn C, Doyle JA, et al. Engaging patients and families in system-level improvement: A safety imperative. *Nurs Adm Q* 2013;37:203-15.
 38. Shapiro J, Whittemore A, Tsen LC. Instituting a culture of professionalism: The establishment of a center for professionalism and peer support. *Jt Comm J Qual Patient Saf* 2014;40:168-77.
 39. Taylor RA, Taylor SS. Reframing and addressing horizontal violence as a workplace quality improvement concern. *Nurs Forum* 2018;53:459-65.
 40. Wiig S, Tharaldsen JE. In regulation we trust. *Work* 2012;41:3043-50.
 41. Mira JJ, Lorenzo S, Carrillo I, et al. Interventions in health organisations to reduce the impact of adverse events in second and third victims. *BMC Health Serv Res* 2015;15:341.
 42. Stalter AM, Jauch A. Systems thinking education in RN-BSN programs: A regional study. *Nurse Educ* 2019;44:112-5.
 43. Begun JW, Zimmerman B, Dooley K. Health care organizations as complex adaptive systems. In: Mick SM, Wyttenbach M. editors. *Advances in health care organization theory*. 1st edition. San Francisco, CA: Jossey-Bass, 2003:253-88.
 44. Capra F, Luisi PL. *The systems view of life: A unifying vision*. New York, NY: Cambridge University Press, 2014.
 45. O'Connell KJ, Shaw KN, Ruddy RM, et al. Incident Reporting to Improve Patient Safety: The Effects of Process Variance on Pediatric Patient Safety in the Emergency Department. *Pediatr Emerg Care* 2018;34:237-42.
 46. Gerrish K, Laker S, Taylor C, et al. Enhancing the quality of oral nutrition support for hospitalized patients: a mixed

- methods knowledge translation study (The EQONS study). *J Adv Nurs* 2016;72:3182-94.
47. Lincoln YS, Guba EG. Establishing trustworthiness. *Naturalistic inquiry*. Beverly Hills, CA: SAGE

- Publications, Inc., 1985:289-331.
48. Zhang SW, Yan XY. Some Remarks on Prediction of Drug-Target Interaction with Network Models. *Curr Top Med Chem* 2017;17:2456-68.

doi: 10.21037/jhmhp-20-57

Cite this article as: Brittain AC, Carrington JM. Organizational health and patient safety: a systematic review. *J Hosp Manag Health Policy* 2021;5:2.

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

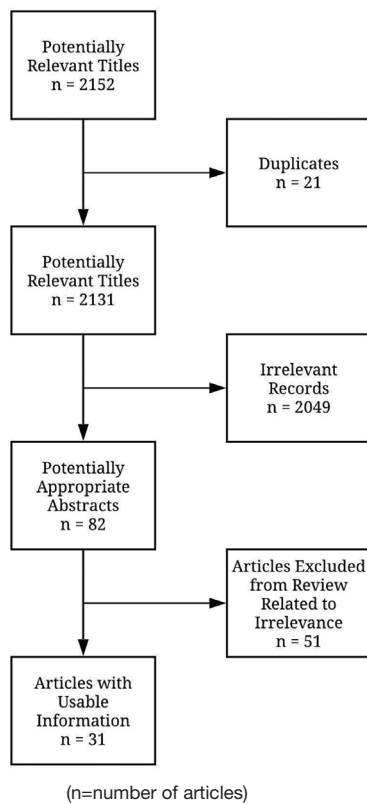


Figure S1 Flow Chart of Article Selection.

Table S2 Summary of Communication of Organizational Events

Article	Aim or Focus	Method	Major Findings
(21) Ammouri <i>et al.</i> (2015)	<ul style="list-style-type: none"> Investigate perceptions of nurses regarding safety culture Identify necessary elements for the development and maintenance of safety culture in Oman 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Higher nurse perceptions of supervisor/manager expectations, communication reporting 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 <i>et al.</i> (2018)	<ul style="list-style-type: none"> Compare patient safety outcomes with advice and information sharing networks 	<ul style="list-style-type: none"> Social network analysis Web-based questionnaires Information gathered over seven months from patient care units from three hospitals 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2016)	<ul style="list-style-type: none"> Identify systems-level characteristics correlated with preventable readmission after major surgeries 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2015)	<ul style="list-style-type: none"> Document everyday practices that hospitalists use to overcome barriers of teamwork 	<ul style="list-style-type: none"> Ethnographic observation of hospitalists from a range of hospitals 	<ul style="list-style-type: none"> Hospitalists 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)	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Description of proposed framework 	<ul style="list-style-type: none"> Proposed that attention to underdeveloped approaches to organizational learning may benefit patient safety Issues of potential bias not addressed
(6) Finn <i>et al.</i> (2018)	<ul style="list-style-type: none"> Determine impact of increased supervision by attending physician on educational outcomes and patient safety 	<ul style="list-style-type: none"> Randomized clinical trial in academic medical center Took place over 9-months in an inpatient general medical service unit Used a crossover design 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2016)	<ul style="list-style-type: none"> Report multifaceted knowledge translation intervention to facilitate improved communication between healthcare professionals and nutritional care of malnourished patients 	<ul style="list-style-type: none"> 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). 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2009)	<ul style="list-style-type: none"> Report results of a study of missed nursing care (error of omission) and factors involved in missed care 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2013)	<ul style="list-style-type: none"> Description of how family engagement can improve patient safety 	<ul style="list-style-type: none"> Educational article 	<ul style="list-style-type: none"> Discusses elements and rationale of using family engagement to improve hospital systems
(27) Kirwan <i>et al.</i> (2013)	<ul style="list-style-type: none"> Explore relationship between unit variables, nurse variables, and patient outcomes 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Positive practice environment found to correlate with patient safety outcomes Authors describe application of multiplier to standard errors to correct potential negative biases
(31) McHugh and Ma (2013)	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2018)	<ul style="list-style-type: none"> Examine the role of failure-to-rescue in general emergency surgery 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2015)	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2014)	<ul style="list-style-type: none"> Evaluate an educational intervention done to help nurses effectively cope with structural divergence (characterized by compelling contradictory obligations) 	<ul style="list-style-type: none"> Quantitative pre- and posttests given with a comparison sample Qualitative discussions regarding evaluations of educational program 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2018)	<ul style="list-style-type: none"> To examine role of process variance in pediatric medical errors 	<ul style="list-style-type: none"> Process variance events were organized by type Data analyzed with descriptive statistics to assess incident type and frequency 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Review numerous ways that safety framework can be applied to neonatal care 	<ul style="list-style-type: none"> Educational article 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Identify barriers and facilitators for sustenance of Magnet Recognition 	<ul style="list-style-type: none"> Qualitative study using semi-structured interviews with convenience sample of 15 Chief Nursing Officers from magnet hospitals in the United States. 	<ul style="list-style-type: none"> 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, <i>et al.</i> (2015)	<ul style="list-style-type: none"> Examine circumstances and challenges surrounding ethically difficult situations occurring in oncology 	<ul style="list-style-type: none"> Focus groups with 30 nurses from the United States Interviews of key informants 	<ul style="list-style-type: none"> 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, <i>et al.</i> (2015)	<ul style="list-style-type: none"> Explore nursing leaders' experience with situations of an ethically difficult nature Describe risk factors and actions for ethically difficult situations 	<ul style="list-style-type: none"> Qualitative descriptive design with a critical incident technique (brief description of event that includes circumstances, actions, and outcomes) for inductive coding 4-part questionnaire 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2018)	<ul style="list-style-type: none"> Describe causes and outcomes of nurse job satisfaction for the furtherance of conditions that foster satisfaction and reduce adverse events 	<ul style="list-style-type: none"> Individual nurse responses to Practice Environment Scale-Nursing Work Index Aggregated data entailing patient satisfaction records, and system-level adverse events 	<ul style="list-style-type: none"> Nurse satisfaction was found to be the most consistent predictor of adverse events and patient satisfaction Issues of potential bias not addressed
(26) Rasmussen <i>et al.</i> (2014)	<ul style="list-style-type: none"> Investigate adverse events and study correlations of adverse events with the stressors and safety culture in an emergency department 	<ul style="list-style-type: none"> Nurses and physicians from a Danish emergency department completed a questionnaire with linear regression analysis 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2014)	<ul style="list-style-type: none"> Describe development of the Center for Professionalism and Peer Support To provide education regarding professionalism 	<ul style="list-style-type: none"> Educational article 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2011)	<ul style="list-style-type: none"> Report findings of international group assembled by Agency for Healthcare Research and Quality regarding patient safety 	<ul style="list-style-type: none"> Educational article 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> To determine Systems Thinking education in current RN-BSN curricula 	<ul style="list-style-type: none"> Descriptive, cross-sectional design with survey 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2014)	<ul style="list-style-type: none"> To assess an intervention geared toward improving handoffs in hospitals 	<ul style="list-style-type: none"> Prospective intervention study in 9 hospitals Error rates measured through active surveillance Workflow evaluated through time-motion observations 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Reframe horizontal violence in order to categorize as quality improvement concern 	<ul style="list-style-type: none"> Education article 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2016)	<ul style="list-style-type: none"> To fill the knowledge gap regarding nurses' usability issues of electronic health records 	<ul style="list-style-type: none"> Quantitative Chi-square and t-tests to assess demographic variables Qualitative thematic analysis Cross-sectional international survey design Online data collection 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2013)	<ul style="list-style-type: none"> Describe differences and similarities of patient safety culture between United States, Netherlands, and Taiwan 	<ul style="list-style-type: none"> Cross-sectional survey, using the Hospital Survey on Patient Safety Culture 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Analyze family caregivers' perceptions regarding adverse events 	<ul style="list-style-type: none"> Qualitative case study of family caregivers from Brazil Semi-structured interviews with thematic analysis 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Discuss relationship between trust and risk regulation Discuss how trust and regulation are linked to control risk in socio-technical systems 	<ul style="list-style-type: none"> Secondary analysis of three mixed-method studies related to trust and risk regulation in Norway 	<ul style="list-style-type: none"> 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 <i>et al.</i> (2010)	<ul style="list-style-type: none"> Provide broad perspective on effective strategies to reduce medical errors 	<ul style="list-style-type: none"> Educational article 	<ul style="list-style-type: none"> 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

Table S3 Summary of Factors Impacting Organizational Health and Patient Safety

Variable	Description
Change	<ul style="list-style-type: none">• Evolution and transformation cultivate hospital organization health; resistance to change diminishes it (18,19)• Change without communication reduces staff morale (12)
Communication	<ul style="list-style-type: none">• Effective communication bolsters patient safety; ineffective communication precipitates patient harm (11,20-26)
Environment	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Systems not designed for unique users perpetuates workarounds that compromise patient safety (17,23,29,30)
Interdisciplinary Collaboration	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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)