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Relationship between Patient Safety Culture and Safety Performance in Nursing: the role of safety behaviour

Abstract

Objectives: The aim of this work is to test the mediator role of patient safety behaviour between safety culture and safety performance among nurses.

Methods: This cross-sectional study was carried out between September and December 2017 in the nursing units of 10 primary hospitals, two secondary hospitals and two tertiary hospitals in Anhui Province, China

Results: The study participants comprised 79 RNs from primary hospitals, 147 RNs from secondary hospitals and 242 RNs from tertiary hospitals. Most were female (97.6%) and married (73.1%), and their ages ranged from less than 25 years to retirement age. The sample included nurses working in several departments, including medicine (27.1%), surgery (14.3%), emergency (11.5%) and ICU (9%). Structural equation model analysis results showed that espoused values directly affected safety performance, and practised values affected safety performance through safety behaviour.

Conclusions: Our hypothetical model noted that safety behaviour is a positive mediating factor of practised safety values affecting safety performance, suggesting that Chinese nursing managers should construct a patient safety culture that is guided and driven by appropriate values, which will ultimately be externalized as nurses' daily behaviour.

Keywords: patient safety behaviour, patient safety culture, patient safety performance / nursing

INTRODUCTION

Medical institutions are committed to providing high-quality healthcare service, and ensuring patient safety is at the core of this commitment. Patient safety is a global challenge that involves all areas of medicine and healthcare (Vincent, 2010). In a study on the frequency and preventability of adverse events across 26 low- and middle-income countries (LMIC), the rate of adverse events was approximately 8%, of which 83% could have been prevented, and 30% led to death. Approximately two-thirds of all adverse events occur in LMICs (WHO, 2018). In China, approximately 400,000 people die of unnatural causes every year due to medical malpractice, and a large number of patients are disabled due to medical malpractice (Wang, 2012). In a report, the Institute of Medicine (IOM) stated that changing hospital culture represents the greatest challenge to transformation into a safer medical system (Colla et al., 2005). Building a patient safety culture is an effective way to reduce or avoid safety incidents, and medical institutions are recommended to evaluate patient safety culture on a regular basis to promote the ongoing transformation (Kohn et al., 2000). Patient safety culture is also closely related to medical results, such as complications and infections (DiCuccio, 2015; Muething et al., 2012). Safety performance is the operation of patient safety management system in medical institutions and the occurrence of safety (adverse) events, which includes safety management, safety facilities, safety training, safety (adverse) events analysis (Li et al., 2015). Medical staff, especially nurses, play the most critical role in complicated medical care systems (Groves et al., 2011). Nurses, first-line health care professionals, clearly play important roles in handling patient safety issues (Nie et al., 2011); therefore, nurse-based patient safety culture evaluation is the primary step towards building a patient safety culture. Medical care institutions throughout the world have conducted many studies on patient safety issues, but in China, such studies have had a late start. In recent years, the Chinese government has introduced relevant policies to promote patient safety, and different levels of medical institutions have organized patient safety activities in various

forms. The investigation of patient safety culture in nursing has revealed that although considerable work has been accomplished towards building a patient safety culture by hospital administrators and nursing administrators, the expected results of patient safety management remain unrealized. Why? This may be because administrators and nurses at all levels are unaware of the correlation between patient safety culture and safety performance. Thus, prominent patient safety researchers and leaders have called for further examination of the link between safety culture and patient outcomes (DiCuccio, 2015; Pronovost et al., 2009). Safety behaviour is considered as a mediation variable of safety culture and performance in the coal mining safety accident field. Scholars have begun to pay attention to the relationship between these three variables in patient safety (Groves, 2014; Reiter et al., 2012). A safety environment will support and strengthen the safety behaviour of hospital medical staff (Eland et al., 1999). Based on Neal's theory of safe behaviour, patient safety behaviour in our research consists of individual safety compliance behaviour and participative behaviour (Neal & Griffin, 2006). Safety compliance refers to the observation of regimes and procedures to maintain patient safety. If the organization is implemented in accordance with safety work requirements, the staff will be more willing to comply. The safety culture is the overall perception that employees pay attention to and are affected by organizational policy, their personal traits and attitudes, which affects employees' safety behaviour and organizational safety performance (Campbel & Thompson, 2007). Some Chinese researchers have focused on the impact of individual nurses' culture of patient safety on performance, and few scholars have studied these three variables in a model. Consequently, there is an advantage in empirically testing models in real settings in China. Therefore, this study aimed to test the mediator role of patient safety behaviour between safety culture and safety performance among nurses.

RESEARCH HYPOTHESES

According to the pyramid conceptual model proposed by Patankar and Sabin (Patankar & Sabin, 2010), safety culture is an adjustable dynamic equilibrium resulting from the coordination of values, leadership strategies and attitudes shared by employees in medical institutions in order to realize patient safety. Safety performance can be assessed from the four aspects of safety management, safety facilities, safety training and accident analysis (Li et al., 2015). Patient safety behaviour refers to adherence to institutional procedures to maintain patient safety and to behaviour that does not directly affect patient safety, but helps to develop and support patient safety (e.g., adverse events reporting and learning). Based on Neal's theory of safe behaviour, patient safety behaviour in our research consists of individual safety compliance behaviour and participative behaviour (Neal & Griffin, 2006). Safety participation refers to the behaviour that helps develop and support patient safety but does not have a direct impact on patient safety. Safety compliance refers to the observation of regime and procedures so as to maintain patient safety. Empirical evidence has indicated that safety behaviour has a positive correlation with safety culture and safety performance (Griffin & Neal, 2000; Li et al., 2015; Zohar, 1980). For example, positive safety culture has a positive effect on awareness of safety behaviour and perceived safety performance among railway drivers (Yang, 2013). Therefore, we hypothesized that safety culture among nurses is the independent variable and that safety performance is the dependent variable; safety behaviour is the mediating variable.

METHODS

Design and Setting

A descriptive correlational design was used. To test the universality of the research model, the researcher selected 10 primary hospitals, two secondary hospitals and two tertiary hospitals in Anhui Province to increase the sample size and scope. These hospitals are located in the cities of Hefei and Anqing and the counties of Wangjiang and Lixin in

Anhui Province and are long-term cooperation institutions involved in the patient safety research project of our research team.

Sampling Method and Procedures

The inclusion criteria for the study were full-time RNs working in hospitals. In each hospital, two liaison officers were selected and trained to be responsible for on-site quality control and scale collection and mailing. The selected liaisons were nurses with a bachelor's degree or above who had mastered basic knowledge of nursing research and had experience with questionnaire surveys. The official survey was conducted from September 2017 to December 2017. To avoid selection bias, the researchers and liaison officers issued notices and explained the purpose of the study to recruit nurses willing to voluntarily fill out the questionnaire. The survey was conducted mainly in two ways. The first was a field survey, which was mainly carried out in Hefei. The researcher instructed the trained liaison officers to distribute the questionnaires on the spot and to watch as the questionnaires were filled out; the second was a commissioned survey, which was administered in Anqing City, Wangjiang County Town and Lixin County Town. The questionnaire was mailed to the hospital liaison officers (with the Questionnaire Distribution Description and Notice). The liaison officers assisted in the distribution and supervised the respondents in filling out the questionnaires. Then, the questionnaires were mailed to the researcher following collection. A total of 510 questionnaires were distributed (primary hospitals: 90 copies; secondary hospitals: 160 copies; tertiary hospitals: 260 copies) to those nurses who were full-time RNs working in hospitals, and 482 were collected. After excluding 14 questionnaires with incomplete general data, 468 valid questionnaires were collected. Among the valid questionnaires, 79 were from primary hospitals (the valid response rate was 87.78%), 147 were from secondary

hospitals (the valid response rate was 91.88%) and 242 were from tertiary hospitals (the valid response rate was 93.08%).

Instruments

Four instruments were used in the survey: 1) a safety culture questionnaire, 2) a safety behaviour questionnaire, 3) a safety performance questionnaire, and 4) a demographic tool. The demographic tool included questions about age, marital status, highest level of education, level of hospital where the respondent worked, organizational tenure, professional tenure, professional categories, professional title, employment contract, and main working area or department.

Four instruments were used in the survey: (1) a safety culture questionnaire, (2) a safety behaviour questionnaire, (3) a safety performance questionnaire and (4) a demographic tool. The demographic tool included questions about age, marital status, highest level of education, level of hospital where the respondent worked, workload per week, organizational tenure, professional tenure, professional categories, professional title, employment contract and main working area or department. Safety culture was measured with a self-designed questionnaire that includes a safety value sub-questionnaire, a safety strategy sub-questionnaire and a safety climate sub-questionnaire. From the literature review no existing scale has a comprehensive cover of nursing work in Chinese settings, so self-designed questionnaires were set up. The questionnaire framework was developed based on books including: Safety culture: Building and sustaining a cultural change in aviation and healthcare (Patankar et al., 2015), the Jinchuan 'Five-Stage' integrated model for safety culture management and control (Yang et al., 2014), and Research on safety culture system of coal mining enterprises (Li & Liu, 2009), as well as the Chinese version of the Gershon Hospital Safety Climate Scale (C-HSCS) (Xu, 2013). The item pool was formed with a total of 139 items, including 25 items of patient safety values, 79 items in patient safety strategy and 35 items of patient safety climate. Experts in hospital

management, medical management, nursing management and scale compilation were invited to participate in the evaluation of content validity. The acceptable standard for expert content validity is item-level content validity index (I-CVI) $\geq .78$ and scale-level content validity index/average (S-CVI/Ave) $\geq .90$. Twenty nurses from tertiary hospitals in Anhui Province were selected to carry out a pre-test of the questionnaire. All respondents answered questions on the difficulty of items, accuracy of expression, reasonableness of items, and whether there is better wording. The items were not modified after the pre-test, and the ultimate Chinese version of the questionnaire came into shape. The safety values subquestionnaire consists of 15 items, with seven items on 'espoused values' and eight items on 'practised values'. The safety strategy subquestionnaire consists of 34 items, with eight items on 'leadership strategy', six items on 'organizational structure', 12 items on 'rules and regulations' and eight items on 'positive incentive'. The safety climate sub-questionnaire consists of 25 items, including seven items on management support, three items on safety work obstacles, five items on feedback and training, six items on safety environment, and four items on conflict and communication. The questionnaire was completed using a 6-point Likert scale from 1 for strongly disagree to 6 for strongly agree. The factor analysis method was used to evaluate the validity of the scale, including confirmatory factor analysis and exploratory factor analysis. Internal consistency was used to evaluate the reliability of the scale. The results are summarized in Table 1. Each model in the study had a good fit index and good reliability and convergent validity. Safety behaviour was measured using the Medical Staff Patient Safety Behaviour Scale (Tang et al., 2016). The scale consists of 31 items, adopted a six-point Likert scale, and the answers reflected the frequency of the behavioural occurrence, with 1 meaning never, 2 occasionally, 3 sometimes, 4 often, 5 usually and 6 always. Good fit index and good reliability and convergent validity were shown in the study in Table 1.

Statistical Analysis

Data analysis proceeded in two phases. In the first phase, descriptive statistics were used to assess the sample characteristics using SPSS 23. In the second phase, AMOS 7 software was used to test the robustness of the variables and the theoretical model and finally establish a structural equation model (SEM) of the relationship between patient safety culture and safety performance in nursing. In this study, the researcher tended to adopt cut-offs (Hu & Bentler, 1998; Schermelleh-Engel et al., 2003), namely, $CFI \geq .90$, $TLI \geq .90$, $RMSEA \leq .08$ and $SRMR \leq .06$. The sample size of the study was large, and the chi-square measurement was prone to deviation. Therefore, when the value did not reach the threshold, it had to be dealt with appropriately (Hair et al., 2010). Additionally, we measured reliability based on Cronbach's alpha, which should range from .70 to .80 except when measures are novel or have never been tested in the setting, in which case a lower value of .60 is acceptable (Nunnally & Bernstein, 1994).

ETHICS

This study was approved by the Committee on Medical Ethics of the First Affiliated Hospital of Anhui Medical University (NO: Quick-PJ 2019-02-18), and all nurses who satisfied the inclusion criteria were given comprehensive explanations of the study purpose and method. Researchers explained the content of the research and the questionnaire survey to the participants and explained that if the participants felt discomfort while filling out the questionnaires, they could stop at any time.

RESULTS

Sample Characteristics

Most of the participants were female (97.6%) and married (73.1%), and their ages ranged from less than 25 years to retirement age. The largest percentage of the sample reported an organizational tenure of 10 years or less (65%) and

a professional tenure of 10 years or less (67.3%). The majority of participants (54.3%) ranked functionally as charge nurses, followed by head nurses (12.2%). The participants' reported workload per week ranged considerably from 10 to 77 hr, and the average reported weekly workload was 42.6 hr (sd = 6.1). The nature of the participants' employment contract varied, with the majority contracted either through formal establishment (36.3%) or internal hiring (34.2%). The sample included nurses working in several departments, including medicine (27.1%), surgery (14.3%), emergency (11.5%), ICU (9%) and many others.

The relationship between safety culture and safety performance

The means, SDs, and correlations for major study variables are summarized in Table 2. According to the literature review, values are closely related to the nature of culture, which is also consistent with the findings of previous research and questionnaires relating to organizational culture (De Witte & Van Muijen, 1999). Therefore, in the test model, safety value was regarded as a predictive variable, and safety climate and strategy were considered dependent variables. The safety value → safety climate model showed acceptable fit indices (CMIN/DF = 2.776 $p < .001$; CFI = .918; TLI = .909; PCFI = .824; RMSEA = .062, Lo90 = .056, Hi90 = .067, PCLOSE < .001; SRMR = .0638), and all paths were significant, $p < .01$. The safety value → safety strategy model showed comfortable fit indices (CMIN/DF = 2.653 $p < .001$; CFI = .911; TLI = .904; PCFI = .839; RMSEA = .059, Lo90 = .055, Hi90 = .064, PCLOSE < .001; SRMR = .0522), and all paths were significant, with $p < .01$. The SEM for the overall model comprehending the 1st order safety values factors (espoused and practised) linked to the secondorder safety performance factor both directly and indirectly via safety behaviour. This model had acceptable fit indices (CMIN/DF = 2.385 $p < .001$; CFI = .913; TLI = .906; PCFI = .847; RMSEA = .054, Lo90 = .051, Hi90 = .058, PCLOSE = .016; SRMR = .0551). Espoused safety values had a significant direct effect on safety performance, and practised values had a predictive effect on safety performance through safety behaviour. (see Figure 1 and Table 3).

DISCUSSION

This study is first to develop a patient safety assessment questionnaire based on the organizational culture structure theory and the safety culture pyramid model to provide assessment tools for the current status and continuous improvement of patient safety culture. The descriptive data illustrated that nurses had positive self-reported culture, behaviour and outcomes, which are similar to the result of Li et al (Li et al., 2015; Li & Liu, 2009). Traditional cultural values have both productive and counterproductive influences on staff attitudes towards healthcare delivery and the processes that need to be in place to ensure patient safety. There is a big change trend on patient safety research published in Chinese in the recent years, it is also necessary to implement effective policies to improve patient safety and quality outcomes in China (Cui et al., 2017; Zhou et al., 2015). The results of this study using questionnaire measures showed that safety culture and behaviour has been shows to be related to safety outcomes in hospital settings, which are similar to those from other countries (Agnew et al., 2013; Göras et al., 2017; Ko & Yu, 2017). It emphasized the need to develop a culture that encourages all staff members to raise concerns regarding practices that place patients at risk, or said a different way, to engage in advocacy, and nurses were important one of their core responsibilities activities to keep patients safe (DiCuccio, 2015). The results of this study showed that safety values are the core of the patient safety culture. The espoused values of the hospital directly affect safety performance, and the practised values indirectly affect safety performance through safety behaviour. According to Deal et al (Deal & Kennedy, 1982), values are considered the core of culture, and in the safety pyramid, values are considered the foundation of culture (Patankar et al., 2015). For organizational leaders or managers in the 21st century, it is highly important to learn how to put values into practice (Dolan, 2009). Therefore, it is believed that hospitals should build a patient safety culture that is guided and driven by appropriate values and promote the

transformation of the patient safety culture into a more satisfactory state of dynamic equilibrium. The pyramid conceptual model clearly explains the relationship between different levels and within a level of the culture structure of organizations. All organizations have organizational values, leadership strategies, and employee attitudes beliefs and behaviours, and they exist in a balanced state: Behaviour is the result of a dynamic balance between value orientation, practised strategies and employee attitudes. Yang found that safety behaviour is the mediating variable of safety system culture and safety material culture affecting safety results in Chinese construction enterprises (Yang, 2013). In recent years, the Chinese government has adopted a series of patient safety promotion strategies, and medical institutions at all levels have attached great importance to providing training for on-the-job nurses to improve patient safety knowledge. However, most of the training content is relatively fragmented and disorganized. The establishment and implementation of training courses are also limited by the time constraints of clinical nurses and difficulties related to scheduling manpower (Mei, 2012). In 2014, the Chinese Hospital Association established the 'China Patient Safety Education and Research Collaboration Network', but only 37 large hospitals nationwide participated. Nurses in Chinese hospitals rarely receive encouragement regarding their behaviours related to improving patient safety performance (Zeng, 2015). Thus, we must pay attention to the facilitating role of practice in the promotion of behaviours. Appropriate behaviours that promote patient safety performance should be strengthened through reasonable incentive measures.

LIMITATIONS

The main limitation of the study was related to the convenience sample of nurses in hospitals in Anhui Province that have research cooperation relationships with the author, while no surveys were conducted with other hospitals in Anhui or in other provinces. Due to the anonymous nature of the data collection (in which only the institution where

the participant worked was identified), we did not have the ability to evaluate the extent to which answers pertaining to safety culture were sufficiently common within the same unit to rigorously assess the relevance of unit. .

CONCLUSIONS

This research tested mediator role of patient safety behaviour between safety culture and safety performance. Our findings noted that safety behaviour is a positive mediating factor of practised safety values affecting safety performance, suggesting that Chinese nursing managers should construct a patient safety culture that is guided and driven by appropriate values. In management practice, we should first focus on refining espoused values and then promoting change among nurses by encouraging the adoption of specific management strategies. These strategies will then be internalized by nurses and become practised values, which will ultimately be externalized as nurses' daily habits.

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CONFLICT OF INTEREST

All authors report no conflict of interest related to this manuscript.

AUTHORSHIP STATEMENT

S.H.H, T.W., N.C.R., and D.Z. designed the study. S.H.H, T.W., H.X., and Z.H. collected the data. S.H.H, T.W., N.C.R., and D.Z analyzed the data. S.H.H, T.W., and N.C.R. prepared the manuscript. All authors approved the final version for submission.

AUTHOR CONTRIBUTIONS

Study design: S.H.H., T.W., N.J.C.R. and D.Z.

Data collection: S.H.H., T.W., H. X. and Z.H.

Data analysis: S.H.H., T.W., N.J.C.R. and D.Z.

Manuscript writing and revisions for important intellectual content: S.H.H., T.W. and N.J.C.R.

REFERENCES

- Agnew, C., Flin, R., & Mearns, K. (2013). Patient safety climate and worker safety behaviours in acute hospitals in Scotland. *Journal of Safety Research*, 45, 95– 101. <https://doi.org/10.1016/j.jsr.2013.01.008>
- Campbel, D. A., & Thompson, M. (2007). Patient safety rounds: Description of an inexpensive but important strategy to improve the safety culture. *American Journal of Medical Quality*, 22(1), 26– 33. <https://doi.org/10.1177/1062860606295619>
- Colla, J. B., Bracken, A. C., Kinney, L. M., & Weeks, W. B. (2005). Measuring patient safety climate: A review of surveys. *Qual Saf Health Care*, 14(5), 364– 366. <https://doi.org/10.1136/qshc.2005.014217>
- Cui, Y., Xi, X., Zhang, J., Feng, J., Deng, X., Li, A., & Zhou, J. (2017). The safety attitudes questionnaire in Chinese: Psychometric properties and benchmarking data of the safety culture in Beijing hospitals. *BMC Health Services Research*, 17(1), 590. <https://doi.org/10.1186/s12913-017-2543-2>
- De Witte, K., & Van Muijen, J. J. (1999). Organizational culture. *European Journal of Work and Organizational Psychology*, 8(4), 497– 502. <https://doi.org/10.1080/135943299398122>
- Deal, T. E., & Kennedy, A. A. (1982). *Corporate cultures*. Reading: Addison-Wesley Publishing Company.
- DiCuccio, M. H. (2015). The relationship between patient safety culture and patient outcomes: A systematic review. *Journal of Patient Safety*, 11(3), 135– 142. <https://doi.org/10.1097/PTS.0000000000000058>
- Dolan, S. L. (2009). *Values management-survival of enterprises in the 21st century*. Beijing: China Renmin University Press.

- Eland, I. A., Belton, K. J., Grootheest, A. C., Meiners, A. P., Rawlins, M. D., & Stricker, B. H. (1999). Attitudinal survey of voluntary reporting of adverse drug reactions. *British Journal of Clinical Pharmacology*, 48(4), 623–627. <https://doi.org/10.1046/j.1365-2125.1999.00060.x>
- Göras, C., Unbeck, M., Nilsson, U., & Ehrenberg, A. (2017). Interprofessional team assessments of the patient safety climate in Swedish operating rooms: A cross-sectional survey. *BMJ Open*, 7(9), e015607. <https://doi.org/10.1136/bmjopen-2016-015607>
- Griffin, M. A., & Neal, A. (2000). Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge, and motivation. *Journal of Occupational Health Psychology*, 5(3), 347–358. <https://doi.org/10.1037/1076-8998.5.3.347>
- Groves, P. S. (2014). The relationship between safety culture and patient outcomes: Results from pilot meta analyses. *Western Journal of Nursing Research*, 36(1), 66–83. <https://doi.org/10.1016/j.ppedcard.2011.12.007>
- Groves, P. S., Meisenbach, R. J., & Scott-Cawiezell, J. (2011). Keeping patients safe in healthcare organizations: A structuration theory of safety culture. *Journal of Advanced Nursing*, 67(8), 1846–1855. <https://doi.org/10.1111/j.1365-2648.2011.05619.x>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis*. Harlow: Pearson.
- Hu, L. T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to under parameterized model misspecification. *Psychological Methods*, 3(4), 424–453. <https://doi.org/10.1037/1082-989X.3.4.424>
- Ko, Y., & Yu, S. (2017). The relationships among perceived Patients' safety culture, intention to report errors, and leader coaching behavior of nurses in Korea: A pilot study. *Journal of Patient Safety*, 13(3), 175–183. <https://doi.org/10.1097/PTS.0000000000000224>
- Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (2000). *To err is human: Building a safer health system*. Institute of Medicine Report. Washington, DC: National Academy Press.
- Li, L., & Liu, X. Q. (2009). The assessment and analysis of hospital patient safety culture by nursing personnel. *Chinese Journal of Nursing*, 44(4), 304–307. <http://kns.cnki.net/kns/detail/detail.aspx?FileName=ZHHL200904007&DbName=CJFQ2009>
- Li, Y., Guo, S. J., Jiang, N. H., Liu, X., Li, S. W., Zhao, H., Wu, G. S., Zhao, L., & Mao, J. F. (2015). Construction of patient safety culture and safety performance correlation questionnaire. *Chinese Hospital Management*, 35(1), 48–50. http://www.wanfangdata.com.cn/details/detail.do?_type=perio&id=zgyygl201501018

- Mei, H. (2012). Research on the safety training content system of clinical nurses. Master thesis, Shanghai, China, Second Military Medical University.
- Muething, S. E., Goudie, A., Schoettker, P. J., Donnelly, L. F., Goodfriend, M. A., Bracke, T. M., Brady, P. W., Wheeler, D. S., Anderson, J. M., & Kotagal, U. R. (2012). Quality improvement initiative to reduce serious safety events and improve patient safety culture. *Pediatrics*, 130(2), e423– e431. www.pediatrics.org/doi/10.1542/peds.2011-3566
- Neal, A., & Griffin, M. A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. *Journal of Applied Psychology*, 91(4), 946– 953.
- Nie, Y., Li, Y., Ning, J., Hou, Y., Huang, Y., & Zhang, M. (2011). Patient safety research in China: A literature review. *Journal of Evidence-Based Medicine*, 4(2), 66– 72. <https://doi.org/10.1111/j.1756-5391.2011.01123.x>
- Nunnally, J. C., & Bernstein, I. H. (1994). Psychological theory. New York: MacGraw-Hill.
- Patankar, M. S., Brown, J. P., Sabin, E. J., & Bigda-Peyton, T. G. (2015). Safety culture: Building and sustaining a cultural change in aviation and healthcare. Beijing: China Worker Publishing House.
- Patankar, M. S., & Sabin, E. (2010). The safety culture perspective. In E. Salas & D. Maurino (Eds.), *Human factors in aviation* (2nd ed.). Chennai: Elsevier.
- Pronovost, P., Goeschel, C. A., Marsteller, J. A., Sexton, J. B., Pham, J. C., & Berenholtz, S. M. (2009). Framework for patient safety research and improvement. *Circulation*, 119(2), 330– 337. <https://doi.org/10.1161/CIRCULATIONAHA.107.729848>
- Reiter, C. E., Pichert, J. W., & Hickson, G. B. (2012). Addressing behavior and performance issues that threaten quality and patient safety: What your attorneys want you to know. *Progress in Pediatric Cardiology*, 33(1), 37– 45. <https://doi.org/10.1016/j.ppedcard.2011.12.007>
- Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, 8(2), 23– 74.
- Tang, P., Xiao, M. C., & Ren, H. Y. (2016). Establishment and evaluation of patient safety behavior scale in medical staff. *Chongqing Medicine*, 45(5), 614– 616. <http://kns.cnki.net/kns/detail/detail.aspx?FileName=ZHHL200904007&DbName=CJFQ2009>
- Vincent, C. (2010). Patient safety. Blackwell: Wiley.

- Wang, Y.B. (2012). Cause Analysis and Countermeasures of Medical Malpractice Events. Doctoral dissertation, Xi An, China, The Fourth Military Medical University.
- WHO. (2018). 10 facts on patients safety. World Health Organization. Available at: http://origin.who.int/features/factfiles/patient_safety/en/, 2018
- Xu, N. (2013). Investigation on the influence of hospital safety climate on sharp injuries among nurses. Master thesis, Taiyuan, Shanxi, China, Shanxi Medical University.
- Yang, S.J. (2013). Empirical analysis and comparative study on the relationship between safety culture and safety performance of construction enterprises. Doctoral dissertation, Chengdu, China, Southwest Jiaotong University.
- Yang, Z. Q., Pei, W. T., Wang, Y. Q., Zhou, M., & Zhao, Q. L. (2014). Five stages of Jinchuan's integrated mode for safety culture control. Beijing: China Coal Industry Publishing House.
- Zeng, Z.Y. (2015). Research on safety culture construction strategy of the third people's hospital of Chengdu, Master thesis, Chengdu, China, Southwest Jiaotong University.
- Zhou, P., Bundorf, M. K., Gu, J., He, X., & Xue, D. (2015). Survey on patient safety climate in public hospitals in China. *BMC Health Services Research*, 15, 53. <https://doi.org/10.1186/s12913-015-0710-x>
- Zohar, D. (1980). Safety climate in industrial organizations: Theoretical and applied implications. *The Journal of Applied Psychology*, 65(1), 96–102. <https://doi.org/10.1037/0021-9010.65.1.96>