

# Identifying Critical Factors of Patient Safety Culture – A Case of a Regional Hospital in Taiwan

Yii-Ching Lee, Chih-Hsuan Huang, Shao-Jen Weng, Liang-Po Hsieh, and Hsin-Hung Wu

**Abstract**—The Chinese version of hospital survey on patient safety culture from Taiwan Joint Commission on Hospital Accreditation is used to assess employees' safety attitudes for this case regional hospital. This study surveys the importance values of the question items from the Chinese version of hospital survey on patient safety culture from the upper management of this case hospital. Through importance and agreement values, an importance-agreement analysis plot revised from importance-performance analysis was constructed to classify questions into four different types. The results show that thirteen question items are major strengths and should be maintained in order to provide better patient safety culture. It is worth noting that staff's stress management is critically important and should be monitored relentlessly in order to set up a positive patient safety culture. On the contrary, five question items are major weaknesses and should be improved immediately since these five items indicate poor patient safety culture. Cooperation among hospital units should be further strengthened, and a good working environment toward a positive patient safety culture should be established. Importance-agreement analysis helps the hospital management deploy resources effectively and efficiently to enhance patient safety culture in this case hospital.

**Index Terms**—Employees' safety attitude, importance-performance analysis, patient safety culture, importance-agreement analysis.

## I. INTRODUCTION

Patient safety has become a critical issue in healthcare organizations. Better attitude toward patient safety would result in shorter stay, fewer prescription errors, lower ventilator-associated pneumonia rates, fewer blood-stream and urinary tract infections, and lower mortality [1]-[5]. In order to improve patient safety and reduce medical errors, healthcare organizations should regularly measure employees' safety attitudes [4], [6]. Bodur and Filiz [3] stated that safety culture surveys can be used to measure employees' safety attitudes in healthcare organizations. In addition, Deilkas and Hofoss [7] pointed out that conducting

safety culture surveys is very useful to measure patient safety.

Allen *et al.* [2] believed that reviewing and improving safety culture in healthcare organizations is a key strategy to improve patient safety. That is, patient safety starts with the enforcement of system safety of healthcare organizations, and, more importantly, an organization's safety culture is a fundamental factor to influence system safety [8]. Wagner *et al.* [9] also highlighted that healthcare organizations with a more open culture and reflective attitude toward errors and patient safety reduce the number of accidents and failures. When healthcare organizations strive to improve relentlessly, establishing a positive patient safety culture has become a growing recognition of importance [6], [10], [11]. In fact, a positive patient safety culture implies that patient safety is placed in one of the highest priorities in healthcare organizations [12].

The hospital survey on patient safety culture, originally developed by Sexton *et al.* [13], can be a very useful tool to assess the safety culture of a healthcare organization [14], [15]. Through the surveys, staffing deficits of patient safety culture enable the management to improve healthcare quality and safety [1], [15]. Besides, the overall strengths and weaknesses of a healthcare organization perceived by its staff can be found [2]. Importance-performance analysis (IPA) can be further applied to identify major strengths and weaknesses of patient safety culture in a healthcare organization where agreement replaces performance and can be evaluated by staff. The importance, on the other hand, is measured by the upper management of this case hospital. By applying IPA, the areas of needing improvement and effective performance can be identified for improvement opportunities and strategic planning efforts [16].

This paper is organized as follows. Section II reviews patient safety culture and importance-performance analysis. A case study of applying importance-performance analysis to identify critical items based on hospital survey on patient safety culture is depicted in Section III. Finally, conclusions are summarized in Section IV.

## II. LITERATURE REVIEW

### A. Patient Safety Culture

The hospital survey on patient safety culture with good validity and reliability has six dimensions and thirty questions [4], [8], [13]. Six dimensions are teamwork climate, safety climate, job satisfaction, stress recognition, perception of management, and working conditions. The definitions of six dimensions are as follows [13]. Teamwork climate is

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perceived quality of collaboration between personnel. Safety climate is defined as the perceptions of a strong and proactive organizational commitment to safety. Job satisfaction is related to the positivity of the work experience. Stress recognition is how performance is influenced by stressors. Perception of management is the approval of managerial action. Working conditions is from the perceived quality of the work environment and logistical support such as staffing and equipment. Respondents who are healthcare organizations' staff are required to answer each question based on a Likert scale with five levels, ranging from strongly agree to strongly disagree, or frequency such as never, rarely, sometimes, most of the time, and always [9], [13].

TABLE I: TEAMWORK CLIMATE OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Teamwork Climate	
1	Nurse input is well received in this clinical area.
2	In this clinical area, it is difficult to speak up if I perceive a problem with patient care.
3	Disagreements in this clinical area are resolved appropriately (i.e., not who is right, but what is best for the patient).
4	I have the support I need from other personnel to care for patients.
5	It is easy for personnel here to ask questions when there is something that they do not understand.
6	The physicians and nurses here work together as a well-coordinated team.

TABLE II: SAFETY CLIMATE OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Safety Climate	
7	I would feel safe being treated here as a patient.
8	Medical errors are handled appropriately in this clinical area.
9	I know the proper channels to direct questions regarding patient safety in this clinical area.
10	I receive appropriate feedback about my performance.
11	In this clinical area, it is difficult to discuss errors.
12	I am encouraged by my colleagues to report any patient safety concerns I may have.
13	The culture in this clinical area makes it easy to learn from the errors of others.

TABLE III: JOB SATISFACTION OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Job Satisfaction	
14	I like my job.
15	Working here is like being part of a large family.
16	This is a good place to work.
17	I am proud to work in this clinical area.
18	Morale in this clinical area is high.

TABLE IV: STRESS RECOGNITION OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Stress Recognition	
19	When my workload becomes excessive, my performance is impaired.
20	I am less effective at work when fatigued.
21	I am more likely to make errors in tense or hostile situations.
22	Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure).

Taiwan Joint Commission on Hospital Accreditation developed the Chinese version of patient safety culture survey by using forward and backward translation to evaluate the quality of the translation, and the questionnaire was pilot-tested and discussed by an expert panel for intelligibility and applicability of the items [8], [9]. In

addition to the original six dimensions, Taiwan Joint Commission on Hospital Accreditation takes into account three hospital-level aspects of safety culture from Agency for Healthcare Research and Quality. That is, three dimensions were incorporated into the Chinese version of patient safety culture survey with three items from hospital management support for patient safety, four items from teamwork across hospital units, and four items from hospital handoffs and transitions [17]. Therefore, the Chinese version of hospital survey on patient safety culture has nine dimensions and forty one questions. Tables I-IX summarize the information of nine dimensions and forty one questions.

TABLE V: PERCEPTION OF MANAGEMENT OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Perception of Management	
23	Management supports my daily efforts.
24	Management doesn't knowingly compromise patient safety.
25	I get adequate, timely info about events that might affect my work.
26	The levels of staffing in this clinical area are sufficient to handle the number of patients.

TABLE VI: WORKING CONDITIONS OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Working Conditions	
27	Problem personnel are dealt with constructively by our unit.
28	This hospital does a good job of training new personnel.
29	All the necessary information for diagnostic and therapeutic decisions is routinely available to me.
30	Trainees in my discipline are adequately supervised.

TABLE VII: HOSPITAL MANAGEMENT SUPPORT FOR PATIENT SAFETY OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Hospital Management Support for Patient Safety	
31	Management is doing a good job.
38	The actions of hospital management show that patient safety is a top priority.
39	Hospital management seems interested in patient safety only after an adverse event happens.

TABLE VIII: TEAMWORK ACROSS HOSPITAL UNITS OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Teamwork across Hospital Units	
32	Hospital units do not coordinate well with each other.
34	There is good cooperation among hospital units that need to work together.
36	It is often unpleasant to work with staff from other hospital units.
40	Hospital units work well together to provide the best care for patients.

TABLE IX: HOSPITAL HANDOFFS AND TRANSITIONS OF THE CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Hospital Handoffs and Transitions	
33	Things "fall between the cracks" when transferring patients from one unit to another.
35	Important patient care information is often lost during shift changes.
37	Problems often occur in the exchange of information across hospital units.
41	Shift changes are problematic for patients in this hospital.

In a healthcare organization, staff typically includes physicians, registered nurses, technicians, pharmacists, medical administrators, respiratory therapists, and others. When answering the Chinese version of hospital survey on patient safety culture, not all of the staff needs to fill out all of the questions. For instance, physicians and registered nurses are required to fill out forty one questions. For technicians,

question items 2, 4, 6, 29, and 35 are not required, and the number of questions is thirty six. For pharmacists, question items 2, 4, 6, 29, 33, and 35 are not necessary, and the number of questions is thirty five. For medical administrators, question items 2, 3, 4, 6, 8, 26, 29, 33, 35, 40, and 41 are not required, and the number of questions is thirty. For respiratory therapists, only question item 6 is not required. Finally, for others, question items 2, 3, 4, 6, 8, 26, 29, 33, 35, 40, and 41 are not necessary, and the number of questions is thirty. In order to assess the patient safety culture from all of the staff, this study uses the consensus questions with thirty items among different types of staff. Under the current system, the Chinese version of hospital survey on patient safety culture is conducted in a yearly basis and the original data set should be submitted electronically to Taiwan Joint Commission on Hospital Accreditation through the website.

**B. Importance-Performance Analysis**

Importance-performance analysis originally proposed by Martilla and James [16] is a tool that can provide the management insights to identify the strengths and weaknesses of an organization [18]. IPA, a two-dimensional matrix as shown in Fig. 1, uses importance as an x-axis and performance as a y-axis to form four quadrants that enable the management to classify the most important attributes to the customers with the highest impact on customer satisfaction and the lowest performance attributes required to be improved immediately [19]. These four quadrants are “keep up the good work” (Quadrant I), “possible overkill” (Quadrant II), “low priority” (Quadrant III), and “concentrate here” (Quadrant IV) [20, 21].

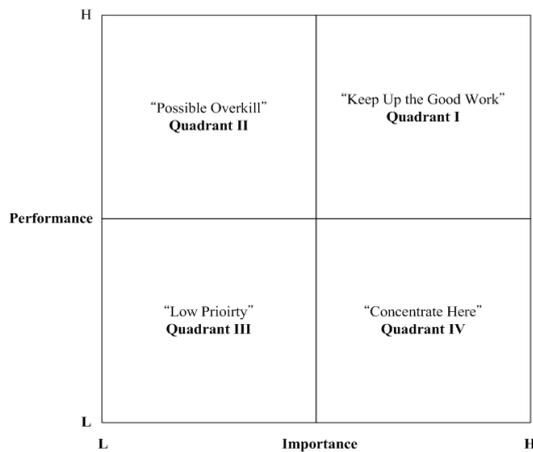


Fig. 1. Importance-performance analysis.

The meanings of these four quadrants are as follows [18]-[21]. Quadrant I has both high importance and performance indicating that items falling in this quadrant can be viewed as competitive advantage for organizations. Quadrant II has low importance but high performance indicating that the resources committed are excessive and should be deployed elsewhere. Quadrant III has both low importance and performance, and items located in this quadrant is considered to be the low priority for improvement and do not require additional efforts. Finally, Quadrant IV has high importance but low performance indicating that items falling in this quadrant are considered as major weaknesses for an organization and are required immediate

attention for improvement. Generally, attributes in Quadrant IV need immediate improvement efforts which should be placed in highest priority when major weaknesses are identified, whereas attributes in Quadrant I regarded as major strengths should be maintained, leveraged, and heavily promoted in order for an organization to be competitive in the market.

**III. A CASE STUDY**

This case hospital in Taichung City, Taiwan belongs to a regional hospital. In order to assess patient safety culture as a whole, only thirty question items excluding 2, 3, 4, 6, 8, 26, 29, 33, 35, 40, and 41 will be used. In addition, 11, 32, 36, 37, and 39 are reversed questions such that each respondent’s answer is adjusted. For instance, the original answer of agree strongly in question item 11 (In this clinical area, it is difficult to discuss errors.) indicates the poor performance of patient safety. Thus, the adjustment is to use numerical value of one if the original answer is agree strongly instead of the numerical value of five. By the same token, the answers from question items 32, 36, 37, and 39 are also adjusted.

By removing incomplete questionnaires, the number of effective questionnaires in 2010 is 500, where 41, 338, 80, 22, 5, and 14 questionnaires are from physicians, registered nurses, technicians, pharmacists, respiratory therapists, and others. The average values in agreement of thirty questions of the Chinese version of hospital survey on patient safety culture are summarized in Table X, where question items 19 (When my workload becomes excessive, my performance is impaired.) and 5 (It is easy for personnel here to ask questions when there is something that they do not understand.) have the two highest agreement values, whereas 36 (It is often unpleasant to work with staff from other hospital units.), 39 (Hospital management seems interested in patient safety only after an adverse event happens.), and 34 (There is good cooperation among hospital units that need to work together.) are the lowest among thirty questions.

TABLE X: AVERAGE VALUES IN AGREEMENT OF THIRTY QUESTIONS IN CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Number	Average Value	Number	Average Value
1	3.302	21	3.462
5	3.812	22	3.592
7	3.424	23	3.316
9	3.726	24	3.724
10	3.382	25	3.416
11	3.396	27	3.278
12	3.604	28	3.258
13	3.464	30	3.448
14	3.520	31	3.152
15	3.596	32	2.960
16	3.442	34	2.908
17	3.550	36	2.748
18	3.298	37	3.078
19	3.746	38	3.520
20	3.654	39	2.902
		Grand Average	3.389

The current Chinese version of hospital survey on patient safety culture only consists of the agreement of forty one questions along with some demographic information but does not include the importance of the questions. In order to apply importance-performance analysis, the importance for each question item is needed. A survey was conducted from October 2, 2013 to October 23, 2013 to ask the upper management of this case regional hospital to evaluate the importance of thirty questions in Chinese version of hospital survey on patient safety culture. Sixty two questionnaires have been issued but only thirty nine questionnaires were valid, representing a 62.90% effective return rate. The demographic information regarding the upper management is depicted in Table XI. The average values in importance of thirty questions based on thirty nine questionnaires are in Table XII, where question items 7 (I would feel safe being treated here as a patient.) and 5 (It is easy for personnel here to ask questions when there is something that they do not understand.) are considered to be the two most important items, where 36 (It is often unpleasant to work with staff from other hospital units.), 11 (In this clinical area, it is difficult to discuss errors.), and 37 (Problems often occur in the exchange of information across hospital units.) are the least important items among thirty questions.

TABLE XI: DEMOGRAPHIC INFORMATION OF UPPER MANAGEMENT

	Frequency	Percentage
Gender		
Male	25	64.1
Female	14	35.9
Age		
20 years old and below	1	2.6
21-30 years old	1	2.6
31-40 years old	8	20.4
41-50 years old	14	35.9
51-60 years old	14	35.9
61 years old and above	1	2.6
Job Position		
Physician	20	51.3
Registered Nurse	4	10.3
Technician	2	5.1
Pharmacist	1	2.6
Medical Administrator	10	25.5
Respiratory Therapist	1	2.6
Other	1	2.6
Experience in Organization		
6 to 11 months	2	5.1
1 to 2 years	4	10.3
3 to 4 years	2	5.1
5 to 10 years	5	12.8
11 to 20 years	21	53.9
21 years or more	5	12.8
Education		
Junior/Senior High School	4	10.3
College/University	18	46.2
Graduate School	16	41.0
Doctoral Degree	1	2.6

By combining the information from Tables X and XII and replacing performance by agreement, importance-agreement analysis can be plotted in Fig. 2. The classifications of thirty items are summarized in Table XIII. Question items located in Quadrant I include 5, 7, 9, 13, 14, 15, 19, 20, 21, 22, 24, 25, and 38, which can be viewed as the major strengths in patient safety culture. That is, these items should be maintained in order for this healthcare organization to be competitive. Specifically, Item 5 (I would feel safe being treated here as a patient.) is a major strength in this regional hospital, indicating that the patient safety culture is very positive. In addition, Items 5, 9, 13, 14, 15, 24, 25, and 38 are highly related to a good working environment and positive atmosphere toward patient safety culture. However, Items 19, 20, 21, and 22 located in Quadrant I, belonging to stress recognition, show different scenario. That is, with fatigue, work overload, tension, and angry, the efficiency goes down particularly to cope with emergencies, and the number of errors increases. Therefore, the hospital management needs to pay much attention to staff's stress management.

TABLE XII: AVERAGE VALUES IN IMPORTANCE OF THIRTY QUESTIONS IN CHINESE VERSION OF HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

Number	Average Value	Number	Average Value
1	4.436	21	4.436
5	4.462	22	4.359
7	4.615	23	4.231
9	4.436	24	4.333
10	4.154	25	4.308
11	3.949	27	4.282
12	4.103	28	4.154
13	4.333	30	4.231
14	4.282	31	4.410
15	4.282	32	4.103
16	4.256	34	4.333
17	4.205	36	3.744
18	4.282	37	3.949
19	4.385	38	4.359
20	4.359	39	4.000
Grand Average			4.259

Question items 11, 12, 16, 17, and 30 belong to possible overkill. The staff has high agreement on these questions but these questions are less important. The hospital management does not need to deploy more resources on these question items in high priority. In contrast, question items 1, 18, 27, 31, and 34 are situated in Quadrant IV and viewed as major weaknesses in patient safety culture. These five items need to be improved immediately in order to enhance patient safety. It is worth to note that these five items are spread out in five different dimensions. The summaries of these opinions are that cooperation among hospital units is relatively poor and staff's opinions cannot be well received such that the low morale exists which might not be able to provide a good working environment toward a positive patient safety culture.

Finally, question items 10, 23, 28, 32, 36, 37, and 39 belong to minor weaknesses. When the question items in Quadrant IV have been improved, these items could be the next to be enhanced.

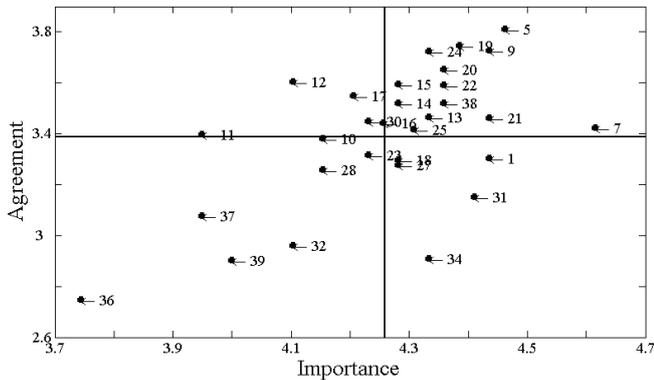


Fig. 2. Importance-agreement analysis of patient safety culture.

TABLE XIII: CLASSIFICATIONS OF THIRTY QUESTION ITEMS IN PATIENT SAFETY CULTURE

Quadrant II	Quadrant I
11, 12, 16, 17, 30	5, 7, 9, 13, 14, 15, 19, 20, 21, 22, 24, 25, 38
Quadrant III	Quadrant IV
10, 23, 28, 32, 36, 37, 39	1, 18, 27, 31, 34

IV. CONCLUSIONS

Patient safety culture is critically important for healthcare organizations and should be measured regularly through employees' safety attitudes. In this study, the Chinese version of hospital survey on patient safety culture from Taiwan Joint Commission on Hospital Accreditation is used to assess employees' safety attitudes. In order to measure patient safety culture on the same basis for all of the staff in this case regional hospital, thirty out of forty one questions with consensus by physicians, registered nurses, technicians, pharmacists, medical administrators, respiratory therapists, and others are used. Because the current Chinese version of hospital survey on patient safety culture only has the agreement for each question but does not include the importance, this study further conducted the survey to measure the importance values of thirty questions from the upper management of this case regional hospital. An importance-agreement analysis plot was constructed to classify thirty questions into four major groups in terms of importance and agreement.

The results show that thirteen questions with both high importance and agreement belonging to major strengths of this case hospital should be maintained to gain its competitiveness in this regional hospital. Staff's stress management is of particularly important in order to set up a positive patient safety culture. Five questions are viewed as minor strengths, and the hospital management does not need to deploy more resources on these question items. On the other hand, five questions with high importance but low agreement are classified as major weaknesses and should be improved immediately in order to enhance patient safety culture in this hospital. Cooperation among hospital units should be improved, and staff's opinions should be well received in order to establish a positive patient safety culture. Moreover, seven questions are minor weaknesses. When the major weaknesses have been addressed, the minor weaknesses could be the next to be improved. Finally, importance-agreement analysis enables the hospital management to identify the strengths and weaknesses in

patient safety culture and to deploy resources effectively and efficiently in order to provide a better patient safety culture for both staff and patients.

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In recent years, Dr. Wu has received several awarded. For instance, he received Outstanding Young Industrial Engineer Award from Chinese Institute of Industrial Engineers (Taiwan) in December 2008, Quality Award for Individuals from Chinese Society for Quality (Taiwan) in November 2011, and Mr. Lu Feng Zhang Memorial Medal from Chinese Management Association (Taiwan) in December 2012. Besides, Dr. Wu has been awarded by National Science Council in Taiwan with Special Outstanding Talent Award since October 2010. Most importantly, he was elected as one of the eleven 2013 IEDRC fellow members.