

Research Article

# Situational Awareness and Patient Safety Culture: The Mediating Role of Effort–Reward Imbalance in Hospitals

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**Abstract:** Patient safety culture is an essential component in improving the quality of healthcare services and preventing medical errors in hospitals. However, the implementation of patient safety culture is often influenced by several organizational and individual factors, including situational awareness, availability of hospital infrastructure, and the balance between effort and rewards experienced by healthcare workers. This study aims to analyze the influence of situational awareness and hospital infrastructure on patient safety culture, with effort–reward imbalance acting as a mediating variable. The research was conducted at RSIA Tiara and involved healthcare workers as respondents. A quantitative approach with a cross-sectional design was applied in this study. Data were collected through structured questionnaires distributed to healthcare professionals and analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM). The results show that situational awareness has a significant positive effect on effort–reward imbalance and patient safety culture. Hospital infrastructure also significantly influences effort–reward imbalance and patient safety culture. Furthermore, effort–reward imbalance significantly affects patient safety culture and mediates the relationship between situational awareness, hospital infrastructure, and patient safety culture. These findings indicate that improving healthcare workers’ situational awareness and ensuring adequate hospital infrastructure can help reduce work imbalance and strengthen patient safety culture. In conclusion, hospital management should prioritize training programs to enhance situational awareness, improve supporting facilities, and implement fair reward systems to promote a sustainable and positive patient safety culture in healthcare organizations.

**Keywords:** Effort–Reward Imbalance; Healthcare Workers; Hospital Infrastructure; Patient Safety Culture; Situational Awareness

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## 1. Introduction

Patient safety has become a major concern in healthcare systems worldwide as medical errors and adverse events continue to threaten the quality of healthcare services. The World Health Organization states that unsafe medical practices contribute significantly to patient harm in healthcare institutions, particularly in hospitals where complex clinical processes take place (World Health Organization, 2017). Therefore, hospitals are required to implement effective strategies to minimize risks and ensure safe care for patients. One of the most important elements in achieving this goal is the development of a strong patient safety culture, which reflects shared values, beliefs, and norms among healthcare professionals regarding safety practices within an organization (Sorra & Nieva, 2004). A positive patient safety culture encourages open communication, learning from errors, and continuous improvement in healthcare delivery (AHRQ, 2019).

However, the implementation of patient safety culture in hospitals is often influenced by various organizational and individual factors. One important factor is situational awareness, which refers to the ability of individuals to perceive environmental elements, comprehend their meaning, and project their status in the near future (Endsley, 1995). In high-risk environments such as hospitals, situational awareness plays a crucial role in clinical

decision-making, teamwork, and error prevention. Healthcare workers with strong situational awareness are more capable of identifying potential risks and responding appropriately to dynamic clinical situations, which ultimately contributes to improved patient safety outcomes (Endsley, 1995; Reason, 2000).

In addition to situational awareness, the availability of adequate hospital infrastructure is another important factor affecting patient safety culture. Hospital infrastructure includes the availability of medical equipment, facilities, technology, and supporting resources needed to deliver safe and effective healthcare services. Inadequate infrastructure can create operational barriers, increase workload, and potentially increase the risk of medical errors (Carayon et al., 2006). Therefore, improving hospital infrastructure is essential to support healthcare professionals in performing their duties safely and effectively.

Another factor that may influence patient safety culture is effort–reward imbalance (ERI), a psychosocial work model that explains the imbalance between the effort employees invest in their work and the rewards they receive in return (Siegrist, 1996). When healthcare workers perceive that their efforts are not adequately rewarded, it may lead to job stress, reduced motivation, and decreased organizational commitment. Such conditions may negatively affect teamwork, communication, and adherence to safety procedures, which are important components of patient safety culture in healthcare organizations (Siegrist, 1996; Siegrist & Li, 2016).

Previous studies have highlighted the importance of situational awareness, organizational support, and work-related stress in shaping patient safety outcomes. However, limited research has examined how effort–reward imbalance acts as a mediating variable in the relationship between situational awareness, hospital infrastructure, and patient safety culture. Understanding this relationship is important because it can provide deeper insights into the mechanisms through which organizational and individual factors influence safety culture in healthcare settings.

Therefore, this study aims to analyze the influence of situational awareness and hospital infrastructure on patient safety culture, with effort–reward imbalance acting as a mediating variable. The findings of this study are expected to provide valuable insights for hospital management in developing strategies to strengthen patient safety culture, improve working conditions, and support healthcare professionals in delivering safer and higher-quality healthcare services.

## 2. Literature Review

### Patient Safety Culture

Patient safety culture is a fundamental element in improving healthcare quality and preventing adverse events in hospitals. Patient safety culture refers to the shared values, beliefs, perceptions, and norms related to patient safety that are held by members of an organization. A strong patient safety culture encourages healthcare workers to prioritize safety, communicate openly about errors, and continuously improve healthcare processes to prevent patient harm (Sorra & Nieva, 2004).

According to the Agency for Healthcare Research and Quality (AHRQ), patient safety culture reflects how healthcare organizations manage safety risks and support staff in implementing safe clinical practices. Hospitals with a positive safety culture typically promote teamwork, open communication, and non-punitive responses to errors. Such an environment allows healthcare professionals to report incidents without fear of punishment, thereby enabling organizations to learn from mistakes and implement preventive measures (AHRQ, 2019).

Reason (2000) also emphasized that patient safety culture is closely related to organizational learning and system improvement. Instead of blaming individuals for errors, healthcare organizations should focus on identifying systemic weaknesses that contribute to unsafe conditions. In this perspective, patient safety culture is built through leadership commitment, effective communication, teamwork, and continuous monitoring of safety practices within the organization.

The measurement of patient safety culture in hospitals is commonly conducted using the Hospital Survey on Patient Safety Culture (HSOPSC) developed by AHRQ. This instrument evaluates various aspects of safety culture within healthcare organizations, including communication openness, teamwork, management support for patient safety, and organizational learning. These dimensions help healthcare organizations assess the extent to which safety values are integrated into daily clinical practices (Sorra & Nieva, 2004).

In healthcare settings, the development of a strong patient safety culture is influenced by multiple factors, including organizational support, work environment, infrastructure, and individual competencies of healthcare workers. Therefore, understanding the determinants of

patient safety culture is essential for hospital management to design effective strategies that promote safer healthcare delivery.

### **Situational Awareness**

Situational awareness refers to an individual's ability to perceive elements in the environment, understand their meaning, and anticipate future events in dynamic situations. The concept was introduced by Endsley (1995), who defined situational awareness as a cognitive process consisting of three levels: perception of environmental elements, comprehension of their meaning, and projection of their future status. These three levels allow individuals to understand what is happening in their environment and make appropriate decisions in complex situations.

In healthcare settings, situational awareness is considered a critical competency for healthcare professionals, particularly in environments characterized by high workload, time pressure, and complex patient conditions. Healthcare workers must continuously monitor patient conditions, interpret clinical data, and anticipate potential complications that may arise during patient care. When situational awareness is well developed, healthcare professionals are more capable of identifying early warning signs and responding quickly to changes in patient conditions, which ultimately contributes to improved patient safety.

Situational awareness also plays an important role in supporting effective communication and teamwork among healthcare workers. In clinical environments, patient care is rarely performed by individuals alone but rather involves collaboration among multidisciplinary teams. A shared understanding of patient conditions and clinical situations enables healthcare workers to coordinate their actions more effectively and minimize the risk of errors. Therefore, situational awareness is considered an important factor in improving the quality and safety of healthcare services.

### **Hospital Infrastructure**

Hospital infrastructure refers to the physical facilities, medical equipment, and supporting resources available within healthcare organizations to support the delivery of healthcare services. Adequate infrastructure is essential for ensuring that healthcare workers can perform their duties effectively and safely. According to Carayon et al. (2006), the healthcare work system consists of several interrelated components, including technology, physical environment, organizational structure, and human resources. These components collectively influence the performance of healthcare professionals and the quality of patient care.

Inadequate hospital infrastructure may create barriers in the healthcare delivery process, such as limited medical equipment, insufficient workspace, or inadequate supporting facilities. These limitations can increase the workload of healthcare workers and potentially lead to operational inefficiencies or medical errors. Therefore, the availability of adequate infrastructure is an important prerequisite for supporting safe and effective healthcare services.

Furthermore, hospital infrastructure also influences the working conditions experienced by healthcare workers. A well-designed physical environment, supported by appropriate medical equipment and information systems, can facilitate clinical processes, improve communication, and reduce the likelihood of errors in patient care. Consequently, improving hospital infrastructure is considered an important strategy for enhancing healthcare quality and strengthening patient safety culture in healthcare organizations.

### **Effort–Reward Imbalance**

Effort–reward imbalance (ERI) is a psychosocial work model developed by Siegrist (1996) to explain the relationship between the effort employees invest in their work and the rewards they receive in return. According to this model, work-related stress occurs when there is an imbalance between high levels of effort and insufficient rewards. Rewards in the workplace may include financial compensation, recognition, career opportunities, and job security.

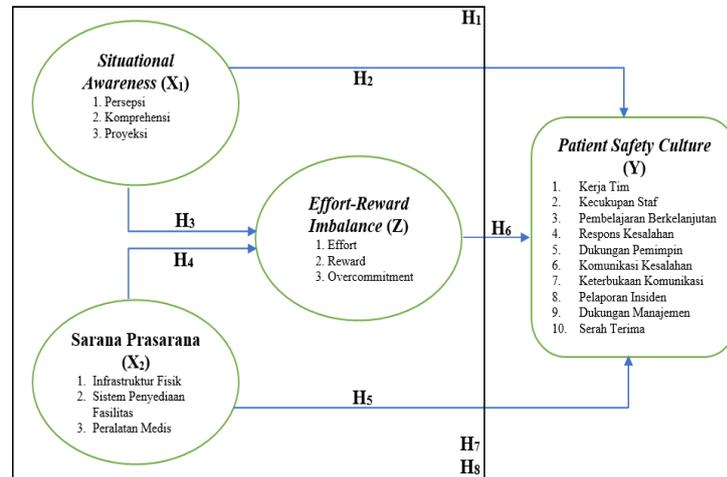
In healthcare settings, healthcare professionals often face demanding work environments characterized by heavy workloads, emotional pressure, and high responsibility for patient outcomes. When healthcare workers perceive that the efforts they invest are not adequately rewarded, they may experience psychological stress, reduced motivation, and decreased job satisfaction. Such conditions can negatively affect their performance and overall well-being (Siegrist, 1996; Siegrist & Li, 2016).

Effort–reward imbalance has also been associated with several organizational outcomes, including reduced work engagement, lower organizational commitment, and increased burnout among healthcare workers. These conditions may ultimately affect teamwork, communication, and adherence to safety procedures within healthcare organizations. Therefore, maintaining a balanced relationship between effort and rewards is essential for

creating a supportive work environment and improving the overall quality of healthcare services.

### Research Framework

Patient safety culture in hospitals is influenced by various organizational and individual factors that shape the behavior and performance of healthcare workers. In complex healthcare environments, the ability of healthcare professionals to understand clinical situations, supported by adequate infrastructure and balanced work conditions, plays an important role in ensuring patient safety. Therefore, this study examines the relationship between situational awareness, hospital infrastructure, effort–reward imbalance, and patient safety culture.



**Figure 1.** Research Framework

Situational awareness enables healthcare workers to perceive and interpret clinical situations accurately, anticipate potential risks, and respond appropriately to dynamic patient conditions. When healthcare professionals possess high situational awareness, they are more likely to communicate effectively, coordinate with team members, and comply with patient safety procedures. These behaviors contribute to the development of a positive patient safety culture within healthcare organizations.

In addition to situational awareness, the availability of adequate hospital infrastructure also plays a crucial role in supporting healthcare service delivery. Adequate facilities, medical equipment, and supporting systems enable healthcare professionals to perform their duties more efficiently and safely. Conversely, inadequate infrastructure may create operational barriers that increase workload and potentially compromise patient safety.

Another factor that may influence patient safety culture is effort–reward imbalance (ERI). The ERI model explains how the balance between the efforts made by employees and the rewards they receive affects their psychological well-being and work motivation. When healthcare workers perceive a fair balance between effort and reward, they are more likely to experience higher job satisfaction, stronger organizational commitment, and better work performance. These conditions can support the development of a stronger patient safety culture within healthcare organizations.

In this study, effort–reward imbalance is also considered as a mediating variable that explains the relationship between situational awareness, hospital infrastructure, and patient safety culture. Situational awareness and adequate infrastructure may influence how healthcare workers perceive their work conditions, including the balance between effort and rewards. When this balance is maintained, healthcare professionals are more motivated to perform their duties and adhere to safety procedures, which ultimately strengthens patient safety culture.

Based on these theoretical considerations, the research framework of this study examines the direct and indirect relationships between situational awareness, hospital infrastructure, effort–reward imbalance, and patient safety culture.

### Research Hypotheses

The research hypotheses are outlined as follows:

- H1: There is a positive and simultaneous influence between Situational Awareness, Infrastructure and Effort-reward Imbalance on Patient Safety Culture
- H2: There is a positive and significant influence between Situational Awareness and Patient Safety Culture.
- H3: There is a positive and significant influence between Situational Awareness and Effort-reward Imbalance.

- H4: There is a positive and significant influence between Infrastructure and Effort-reward Imbalance.
- H5: There is a positive and significant influence between Infrastructure and Patient Safety Culture.
- H6: There is a positive and significant influence between Effort-reward Imbalance and Patient Safety Culture
- H7: There is a positive and simultaneous influence between Situational Awareness and Effort-reward Imbalance on Patient Safety Culture
- H8: There is a positive and simultaneous influence between Infrastructure and Effort-reward Imbalance on Patient Safety Culture

### 3. Research Method

#### Research Design

This study employed a quantitative research approach with a cross-sectional design to examine the relationships between situational awareness, hospital infrastructure, effort–reward imbalance, and patient safety culture. The quantitative approach was chosen to analyze the causal relationships among variables using statistical methods. The study aimed to test both the direct and indirect effects between variables within the proposed research framework.

#### Population and Sample

The population of this study consisted of healthcare workers at RSIA Tiara, including doctors, nurses, and other healthcare professionals involved in patient care. These healthcare workers play an important role in implementing patient safety practices within the hospital environment.

The sampling technique used in this study was non-probability sampling, specifically purposive sampling. This technique was selected because the respondents were chosen based on specific criteria relevant to the objectives of the study. Purposive sampling allows researchers to select participants who have sufficient knowledge and experience related to the research variables.

In this study, the respondents consisted of healthcare workers who were directly involved in patient care and patient safety practices at RSIA Tiara. This approach was considered appropriate to obtain relevant information regarding situational awareness, hospital infrastructure, effort–reward imbalance, and patient safety culture within the hospital setting.

#### Data Collection

Data were collected using a structured questionnaire distributed to healthcare workers. The questionnaire consisted of several statements designed to measure the research variables. Each item was assessed using a four-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). The questionnaire was designed based on established measurement instruments that have been widely used in previous studies.

Before data analysis, the collected responses were reviewed to ensure completeness and consistency. The data were then coded and prepared for statistical analysis.

#### Measurement of Variables

The measurement of research variables was adapted from established theoretical frameworks and previous studies. Situational awareness was measured based on the conceptual framework proposed by Endsley (1995), which includes perception, comprehension, and projection of environmental information. Hospital infrastructure refers to the availability of physical facilities, medical equipment, and supporting resources necessary for healthcare service delivery.

The effort–reward imbalance variable was measured using the conceptual model developed by Siegrist (1996), which assesses the balance between employees' work efforts and the rewards they receive from the organization. Meanwhile, patient safety culture was measured using dimensions adapted from the Hospital Survey on Patient Safety Culture developed by the Agency for Healthcare Research and Quality (AHRQ).

#### Data Analysis

The data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with the assistance of statistical software. PLS-SEM was selected because it is suitable for analyzing complex models involving multiple variables and mediating relationships. The analysis was conducted in two stages.

The first stage involved the evaluation of the measurement model (outer model) to assess the validity and reliability of the indicators used to measure each construct. The second stage involved the evaluation of the structural model (inner model) to examine the relationships between variables and test the research hypotheses

### 4. Results and Discussion Respondent Characteristics

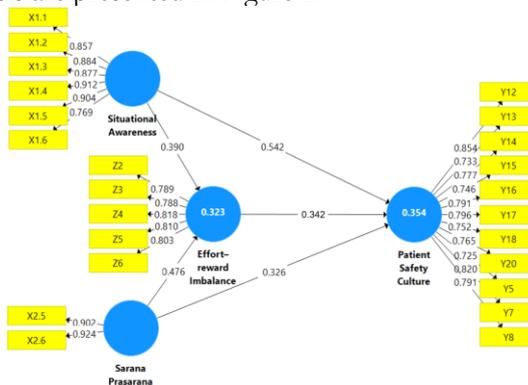
The respondents in this study consisted of healthcare workers at RSIA Tiara who were directly involved in patient care. Based on the demographic data, the majority of respondents were in the age group of **25–30 years**, indicating that the workforce was dominated by relatively young healthcare professionals. This condition reflects a productive workforce that is actively involved in healthcare service delivery and patient safety practices within the hospital.

**Table 1.** Respondent Characteristics

| Characteristics   | Cat.         | Freq.(f) | Percentage (%) |
|-------------------|--------------|----------|----------------|
| Age               | < 25 y.o     | 12       | 17.4           |
|                   | 25–30 y.o    | 29       | 42.0           |
|                   | 31–35 y.o    | 16       | 23.2           |
|                   | 36–40 y.o    | 4        | 5.8            |
|                   | > 40 y.o     | 8        | 11.6           |
|                   | Total        | 69       | 100            |
| Gender            | Male         | 14       | 20.3           |
|                   | Female       | 55       | 79.7           |
|                   | Total        | 69       | 100            |
| Education         | DIII Nursing | 27       | 39.1           |
|                   | S1           | 42       | 60.9           |
|                   | Total        | 69       | 100            |
| Marital Status    | Not married  | 28       | 40.6           |
|                   | Married      | 41       | 59.4           |
|                   | Total        | 69       | 100            |
| Length of Service | < 1 year     | 22       | 31.9           |
|                   | 1–2 years    | 14       | 20.3           |
|                   | 2–5 years    | 16       | 23.2           |
|                   | 5–10 years   | 12       | 17.4           |
|                   | > 10 years   | 5        | 7.2            |
|                   | Total        | 69       | 100            |

### Structural Model Analysis

The structural model analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the relationships between situational awareness, hospital infrastructure, effort–reward imbalance, and patient safety culture. The results of the path coefficient analysis are presented in Figure 2.



**Figure 2.** Outer Model SEM-PLS

### Direct Effects

**Table 2.** Direct Effect Testing

|  | Coefficient | t-statistic | p value |
|--|-------------|-------------|---------|
| Situational Awareness → Patient Safety Culture   | 0,542       | 5,975       | 0,000   |
| Situational Awareness → Effort-reward Imbalance  | 0,390       | 3,306       | 0,001   |
| Infrastruktur → Effort-reward Imbalance          | 0,476       | 4,229       | 0,000   |
| Infrastruktur → Patient Safety Culture           | 0,326       | 2,478       | 0,014   |
| Effort-reward Imbalance → Patient Safety Culture | 0,342       | 2,537       | 0,011   |

The results show that situational awareness has a significant positive effect on patient safety culture ( $\beta = 0.542$ ;  $t = 5.975$ ;  $p < 0.001$ ). This indicates that healthcare workers with higher situational awareness are more capable of understanding clinical situations, anticipating risks, and implementing safer healthcare practices. Consequently, improved situational awareness contributes to strengthening patient safety culture in hospitals.

Situational awareness also shows a significant positive effect on effort–reward imbalance ( $\beta = 0.390$ ;  $t = 3.306$ ;  $p = 0.001$ ). This result suggests that healthcare workers who are more aware of clinical situations tend to perceive their work conditions differently, which may

influence how they evaluate the balance between their work efforts and the rewards they receive.

Furthermore, hospital infrastructure has a significant positive effect on effort–reward imbalance ( $\beta = 0.476$ ;  $t = 4.229$ ;  $p < 0.001$ ). Adequate infrastructure, including medical equipment and supporting facilities, can improve the work environment and reduce the workload burden experienced by healthcare workers. This condition may influence employees’ perceptions regarding the balance between effort and reward in their workplace.

Hospital infrastructure also demonstrates a significant positive influence on patient safety culture ( $\beta = 0.326$ ;  $t = 2.478$ ;  $p = 0.014$ ). This finding indicates that the availability of adequate facilities and equipment supports healthcare workers in performing their duties more effectively and safely, thereby strengthening the implementation of patient safety culture within the hospital.

In addition, effort–reward imbalance significantly affects patient safety culture ( $\beta = 0.342$ ;  $t = 2.537$ ;  $p = 0.011$ ). This result suggests that the perception of fairness between work efforts and organizational rewards plays an important role in shaping employees’ attitudes and behaviors toward patient safety practices.

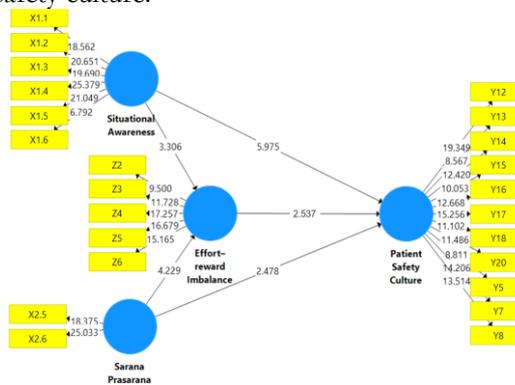
**Indirect Effects (Mediation Analysis)**

**Table 3.** Indirect Effect Testing

|  | Coefficient | t statistic | p value |
|--|-------------|-------------|---------|
| Situational Awareness → Effort-Reward Imbalance → Patient Safety Culture | 0,190       | 1,977       | 0,047   |
| Infrastruktur → Effort-Reward Imbalance → Patient Safety Culture         | 0,130       | 1,972       | 0,049   |

The mediation analysis results indicate that effort–reward imbalance mediates the relationship between situational awareness and patient safety culture ( $\beta = 0.190$ ;  $t = 1.977$ ;  $p = 0.047$ ). This finding suggests that situational awareness not only influences patient safety culture directly but also indirectly through employees’ perceptions of effort–reward balance.

Similarly, effort–reward imbalance also mediates the relationship between hospital infrastructure and patient safety culture ( $\beta = 0.130$ ;  $t = 1.972$ ;  $p = 0.049$ ). This result indicates that the availability of adequate infrastructure can improve working conditions and influence employees’ perceptions of fairness in the workplace, which ultimately contributes to strengthening patient safety culture.



**Figure 2.** Inner Model SEM-PLS

**Hypothesis Testing Results**

**Table 4.** Hypothesis Results

| No | Hypothesis   | Results  | Desc.    |
|----|--|--|----------|
| 1  | Simultaneously, Situational Awareness and Infrastructure on Patient Safety with the intervening variable Effort–Reward Imbalance | $F_{count} = 11,87 > F_{table} = 2,661$ ( $\alpha = 5\%$ ) | Accepted |
| 2  | Situational Awareness has a significant effect on Patient Safety   | Coeff. = 0,542; $t = 5,975$ ; $p\text{-value} = 0,000$     | Accepted |
| 3  | Situational Awareness has a significant effect on Effort–Reward Imbalance  | Coeff. = 0,390; $t = 3,306$ ; $p\text{-value} = 0,001$     | Accepted |
| 4  | Infrastructure has a significant effect on Effort–Reward Imbalance   | Coeff. = 0,476; $t = 4,229$ ; $p\text{-value} = 0,000$     | Accepted |
| 5  | Infrastructure has a significant effect on Patient Safety  | Coeff. = 0,326; $t = 2,478$ ; $p\text{-value} = 0,014$     | Accepted |
| 6  | Effort–reward imbalance has a significant effect on patient safety.  | Coeff. = 0,342; $t = 2,537$ ; $p\text{-value} = 0,011$     | Accepted |

| No | Hypothesis   | Results                                    | Desc.    |
|----|--|--|----------|
| 7  | Situational awareness affects patient safety through effort–reward imbalance.        | Coeff. = 0,190; t = 1,977; p-value = 0,047 | Accepted |
| 8  | Facilities and infrastructure affect patient safety through effort–reward imbalance. | Coeff. = 0,130; t = 1,972; p-value = 0,049 | Accepted |

**IPMA Analysis on Effort–Reward Imbalance**

The Importance–Performance Map Analysis (IPMA) was conducted to identify which indicators of effort–reward imbalance require priority improvement in order to enhance patient safety culture. The IPMA results show that several indicators related to the balance between employees’ efforts and the rewards they receive have relatively high importance but moderate performance levels.



**Figure 3.** IPMA on ERI Variable

Indicators associated with recognition and appreciation for employees’ work tend to have higher importance values, indicating that healthcare workers perceive these aspects as essential for maintaining motivation and work commitment. However, the performance level of these indicators is not yet optimal. This condition suggests that although healthcare workers invest significant effort in performing their duties, the rewards they perceive—such as recognition, appreciation, or career development opportunities—may not fully meet their expectations.

According to the effort–reward imbalance model proposed by Siegrist (1996), an imbalance between high effort and low reward can create work-related stress and reduce employees’ motivation and well-being. In healthcare settings, such conditions may negatively affect communication, teamwork, and compliance with safety procedures. Therefore, improving the reward system, including both financial and non-financial recognition, is essential to maintain healthcare workers’ motivation and strengthen their commitment to patient safety practices.

From a managerial perspective, hospital management should consider implementing strategies that enhance the perceived fairness between employees’ efforts and organizational rewards. These strategies may include recognition programs, transparent career development opportunities, and supportive leadership practices that acknowledge healthcare workers’ contributions. Improving these aspects may help reduce the perception of effort–reward imbalance and ultimately support a stronger patient safety culture.

**IPMA Analysis on Patient Safety Culture**

The IPMA analysis was also conducted on the patient safety culture variable to identify priority areas for improvement in strengthening safety practices within the hospital. The results indicate that several dimensions of patient safety culture demonstrate relatively high importance values but still have moderate performance levels.



**Figure 4.** IPMA on PSC Variable

In particular, indicators related to communication openness and non-punitive response to errors show high importance in supporting patient safety culture. Healthcare workers perceive open communication and a supportive environment as crucial elements in reporting

and learning from errors. However, the performance of these indicators is not yet optimal, suggesting that healthcare professionals may still experience barriers in openly discussing errors or reporting safety incidents.

These findings are consistent with the concept of safety culture proposed by Reason (2000), which emphasizes that organizations should move away from a blame culture and instead promote a learning-oriented environment. When healthcare workers feel safe to report incidents without fear of punishment, organizations can better identify systemic weaknesses and implement preventive measures to improve patient safety.

In addition, teamwork and coordination among healthcare workers also play an important role in strengthening patient safety culture. Effective collaboration among healthcare professionals enables better information sharing, improves situational awareness, and reduces the likelihood of medical errors during patient care.

Based on the IPMA results, hospital management should prioritize the development of an organizational environment that encourages open communication, supports incident reporting, and promotes learning from errors. Training programs related to patient safety, team communication, and error management may also help improve the performance of these critical indicators.

### **Discussion**

The findings of this study highlight the important role of situational awareness in strengthening patient safety culture within healthcare organizations. Healthcare professionals who possess strong situational awareness are more capable of identifying potential risks, communicating effectively with team members, and responding promptly to changes in patient conditions. These capabilities are essential in preventing medical errors and ensuring safer healthcare services.

The results also emphasize the importance of hospital infrastructure in supporting patient safety practices. Adequate facilities and medical equipment enable healthcare workers to perform their duties efficiently and safely, thereby reducing operational barriers that may increase the risk of clinical errors.

In addition, the study confirms that effort–reward imbalance plays a significant role in shaping employees' attitudes and behaviors toward patient safety. When healthcare workers perceive that their efforts are fairly rewarded, they tend to demonstrate higher motivation, stronger organizational commitment, and greater compliance with safety procedures.

Overall, the results indicate that improving situational awareness, providing adequate hospital infrastructure, and maintaining a balanced relationship between effort and reward are essential strategies for strengthening patient safety culture in healthcare organizations.

### **5. Comparison**

The findings of this study provide empirical evidence regarding the relationships between situational awareness, hospital infrastructure, effort–reward imbalance, and patient safety culture among healthcare workers. The results are generally consistent with previous studies that emphasize the importance of cognitive awareness, organizational support, and work environment in improving patient safety outcomes.

First, the results show that situational awareness has a significant positive effect on patient safety culture. This finding is consistent with the theory proposed by Endsley (1995), which highlights that situational awareness enables individuals to understand complex situations and make appropriate decisions. Previous studies have also indicated that situational awareness plays a critical role in reducing clinical errors and improving safety performance in healthcare settings. Healthcare professionals who possess strong situational awareness are more capable of recognizing potential risks and responding appropriately to dynamic clinical situations.

Second, the study confirms that hospital infrastructure significantly influences patient safety culture. This finding supports previous research emphasizing that the availability of adequate facilities, medical equipment, and supporting systems is essential for ensuring safe healthcare services. According to Carayon et al. (2006), a well-designed work system, including physical environment and technology, can improve healthcare workers' performance and reduce the likelihood of errors in patient care.

Third, the results also demonstrate that effort–reward imbalance significantly affects patient safety culture. This finding is consistent with the effort–reward imbalance model proposed by Siegrist (1996), which explains that employees' perceptions of fairness between effort and rewards influence their motivation, well-being, and work performance. When healthcare workers perceive a balanced relationship between their work efforts and organizational rewards, they tend to show higher commitment and greater adherence to safety procedures.

Furthermore, the mediation analysis reveals that effort–reward imbalance partially mediates the relationship between situational awareness and hospital infrastructure with patient safety culture. This finding suggests that organizational factors and individual competencies influence patient safety culture not only directly but also indirectly through employees' perceptions of their work conditions. Compared with previous studies, this research provides additional insight by integrating cognitive, organizational, and psychosocial perspectives in explaining patient safety culture in hospital settings.

Overall, the results of this study strengthen previous findings while providing new empirical evidence on the mediating role of effort–reward imbalance in the relationship between situational awareness, hospital infrastructure, and patient safety culture.

## 6. Conclusion

This study examined the relationships between situational awareness, hospital infrastructure, effort–reward imbalance, and patient safety culture among healthcare workers at RSIA Tiara. The results indicate that situational awareness and hospital infrastructure have significant positive effects on patient safety culture. These findings suggest that healthcare workers who possess a strong understanding of clinical situations and are supported by adequate facilities and equipment are more likely to implement safe healthcare practices. In addition, the study found that effort–reward imbalance significantly influences patient safety culture and partially mediates the relationship between situational awareness, hospital infrastructure, and patient safety culture.

The findings support the research objective of identifying factors that contribute to strengthening patient safety culture in healthcare organizations. Situational awareness enables healthcare professionals to recognize potential risks and make appropriate decisions in dynamic clinical environments, while adequate hospital infrastructure facilitates the effective implementation of healthcare services. Furthermore, a balanced relationship between effort and reward plays an important role in maintaining healthcare workers' motivation and commitment to patient safety practices.

From a practical perspective, the results of this study provide important implications for hospital management. Healthcare organizations should prioritize the development of situational awareness among healthcare workers through continuous training and professional development programs. In addition, improving hospital infrastructure and ensuring the availability of adequate facilities and medical equipment are essential to support safe and effective healthcare delivery. Hospitals should also maintain a fair reward system that recognizes the efforts of healthcare workers in order to reduce work-related stress and enhance employee motivation.

Despite these contributions, this study has several limitations. The research was conducted in a single hospital setting, which may limit the generalizability of the findings to other healthcare organizations. In addition, the cross-sectional design used in this study does not allow the observation of causal relationships over time. Therefore, future research is recommended to involve a larger sample from multiple healthcare institutions and to use longitudinal approaches in order to obtain a more comprehensive understanding of the factors influencing patient safety culture.

**Author Contributions:** Conceptualization: S.R.; Methodology: S.R.; Software: S.R.; Validation: S.R., T.R., and S.D.; Formal analysis: S.R.; Investigation: S.R.; Resources: S.R.; Data curation: S.R.; Writing—original draft preparation: S.R.; Writing—review and editing: S.R., T.R., and S.D.; Visualization: S.R.; Supervision: T.R., and S.D.; Project administration: S.R.; Funding acquisition: S.R.

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**Data Availability Statement:** The data supporting the findings of this study are not publicly available due to privacy and ethical restrictions related to hospital policies and the confidentiality of respondents. However, the data may be available from the corresponding author upon reasonable request and with permission from the hospital management where the study was conducted.

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