

# Enhancing Hospital Service Quality and Patient Safety through the MIRACLE Model: A Partial Least Squares Equation Approach

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**Abstract:** *Objective:* Give a background why this model is worthwhile by briefly highlighting the current health system and how this study may help to improve this system. This study aims to assess the impact of the MIRACLE model on quality enhancement and patient safety within healthcare settings.

*Study Design:* Employing a cross-sectional design, this research centers on four key variables and 19 corresponding indicators. Data were collected using a questionnaire distributed via Google Forms, targeting heads of work units at M. Djamil Central General Hospital in Padang, Indonesia.

*Method:* The analysis utilizes the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique to evaluate variable relationships. The variables studied are Communitarian, Apprenticing Affinity, Managing, and Quality and Patient Safety, with indicators integrated into the questionnaire.

*Results:* Communitarian and Apprenticing Affinity emerged as influential factors directly impacting quality of health services and patient safety, moderated by Managing variable. Research findings reveal a significant positive impact of the Apprenticing Affinity variable on Managing (p-value = 0.013), underlining its significance in hospital management. Moreover, Apprenticing Affinity significantly affects quality and patient safety (p-value = 0.00), highlighting its pivotal role in healthcare enhancement. Similarly, the Communitarian variable significantly influences Managing (p-value = 0.11), notably impacting quality and patient safety (p-value = 0.00). However, Managing alone does not significantly impact quality and patient safety (p-value = 0.15). Indirectly, the research unveils that the Managing-moderated Apprenticing Affinity variable lacks significant influence on quality and patient safety (p-value = 0.268). Similarly, Managing-moderated Communitarian influence does not substantially impact quality and patient safety (p-value = 0.411).

*Conclusion:* This study highlights the substantial impact of Communitarian and Apprenticing Affinity, moderated by Managing, on quality and patient safety. Notably, Managing alone lacks direct influence. These findings underscore the significance of cultivating collaborative, learning-oriented environments, alongside effective management practices, to bolster healthcare quality and patient safety.

**Keywords:** MIRACLE, managing, apprenticing affinity, communitarian, quality and patient safety, PLS SEM.

## 1. INTRODUCTION

High-quality healthcare services adhere to professional standards, efficiently utilize available resources, address all customer needs, and aim to achieve optimal health outcomes. The quality of services encompasses various dimensions, including effectiveness, efficiency, accessibility, patient-centeredness, equity, and safety [1].

Quality is a defining attribute of a hospital's patient program that expects best services from the hospital. The level of patient service quality is formed by structure quality, process quality, and result quality. Quality is compliance to standards that have been established and is completely derived from the characteristics of an object or service, fulfilling user needs [2]. Every organization inevitably encounters numerous challenges arising from internal conflicts and contradictions. Drawing on the principles of the Kaizen theory, organizations are urged to embrace a culture of

continuous improvement. This proactive approach aims to mitigate the occurrence of conflicts and contradictions within the organizational framework [3].

When addressing conflicts and contradictions, an organization needs to proactively identify potential threats and opportunities. The effectiveness of a sound governance structure can be influenced by the concept of "apprenticing affinity" within a hospital setting. The CAF (Cause-And-Effect) theory underscores a top-down approach within organizations, emphasizing cause-and-effect relationships. This theory particularly highlights the role of leaders in guiding their subordinates. From this perspective, it becomes evident that effective leadership demands a clear vision, disciplined execution, and adaptability in the face of rapid changes. Leaders must be prepared to navigate rapid changes, such as changes in government regulations, challenges in incident interpretation, complexities, and situations that introduce uncertainty.

In fostering an understanding of the leadership vision among staff, a comprehensive approach is essential. This approach includes providing continuous

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learning opportunities, motivating staff to enhance their self-confidence and professional behavior, and fostering empathy through ongoing coordination. This approach minimizes the potential for miscommunication between leaders and staff. These principles align with the tenets of Total Quality Management theory, which highlights that achieving optimal results hinges on individuals meeting the needs of the healthcare service system effectively.

Based on this theory, it becomes evident that achieving effective outcomes within the healthcare service system requires providing staff with opportunities for learning, motivation to enhance their capabilities, and fostering empathy from leadership. Through learning, motivation, and empathetic support, individuals are prompted to think more expansively, enabling them to innovate in their approach to identifying solutions for prevailing issues. This aligns with the concept outlined in the AHRQ (Agency for Healthcare Research and Quality) theory, which emphasizes that standardized quality indicators and evidence-based-care quality indicators can be utilized by hospitals to measure and monitor clinical and operational performance through the use of readily available in-patient administrative data [4]. Derived from this concept, the researcher ascertains that fostering innovation in devising solutions necessitates a foundation built upon meticulously gathered data. The problem-solving approach goes beyond being a simple learning mechanism, it is also an intricate thinking process. This parallels problem-solving techniques employed by alternative models, where the process commences with comprehensive data exploration and culminates in the derivation of conclusive insights [5].

During an extensive document review conducted at Dr. M. Djamil Center General Hospital in Padang, a total of 123 risks were identified within the institution. In November, the hospital's risk management initiatives successfully addressed 78 of these risks, while 45 risks remained unresolved. It's important to note that there were no risks that remained unassessed (NA).

The Directorate of Medical, Nursing, and Ancillary Services faced a total of 434 risks, with 352 of them being managed during November. However, 82 risks remained unaddressed, and none were left unassessed (NA). Similarly, the Planning, Finance, and Public Assets Directorate encountered 59 risks, and 44 of them were managed in November, leaving 15 risks unresolved. None of these risks were unassessed (NA).

The Human Resource, Education, and General Directorate dealt with 213 risks. In November, 177 of these risks were managed, but 27 remained unresolved. Additionally, 9 risks were unassessed (NA). Notably, there were 188 patient safety incidents reported in 2022. Out of these, 18 incidents underwent a Root Cause Analysis (RCA). However, it's worth mentioning that Dr. M. Djamil Center General Hospital in Padang did not meet the completion timeline of RCA as per health ministry standards which stipulate a maximum of 45 days for RCA.

Therefore, this research aims to investigate the applicability of the MIRACLE Model as a case study within Dr. M. Djamil Center General Hospital, Padang. The goal is to enhance the quality of hospital services at the work unit level, with a particular focus on improving patient safety. It's a repetition of the text.

## 2. LITERATURE REVIEW

Examined through the diverse lenses of patients, healthcare practitioners, and administrative leadership, quality indicates the degree to which established professional standards or prescribed operating procedures are met in the realm of patient care. It encompasses the realization of anticipated outcomes, both in accordance with professional expectations and from the patients' perspective. This encompasses all aspects of services, including diagnoses, therapies, procedures, and methodologies, employed to address clinical challenges [6]. The concept of quality in healthcare services, whether provided to individual patients or groups, is inherently linked to the ongoing enhancement of healthcare delivery [1]:

As defined by the World Health Organization, quality comprises six dimensions, encompassing [1]:

- a. Effectiveness: Quality is deemed effective when healthcare services are highly evidence-based and succeed in enhancing individual or community health outcomes based on specific needs.
- b. Efficiency: Quality demonstrates efficiency when healthcare services optimize resources and minimize wastage.
- c. Accessibility: Quality is characterized by accessibility when healthcare services are timely, appropriately located in terms of geography, and are provided within the suitable framework of skills and resources to fulfill needs.

- d. **Patient-Centered Acceptance:** This dimension highlights healthcare services that take into consideration the preferences and aspirations of the individual as the service user, as well as the cultural context of the community.
- e. **Equity:** Quality entails equity when healthcare services do not vary in quality due to personal characteristics such as gender, race, ethnicity, geographic location, or socio-economic status.
- f. **Safety:** Quality reflects safety when healthcare services are designed to minimize risks and prevent harm.
- f. **Timeliness:** Healthcare facilities need to reduce waiting times and minimize delays in delivering services.
- g. **Integration:** Healthcare facilities should offer coordinated services across all stages of life, ensuring comprehensive care throughout the lifespan.

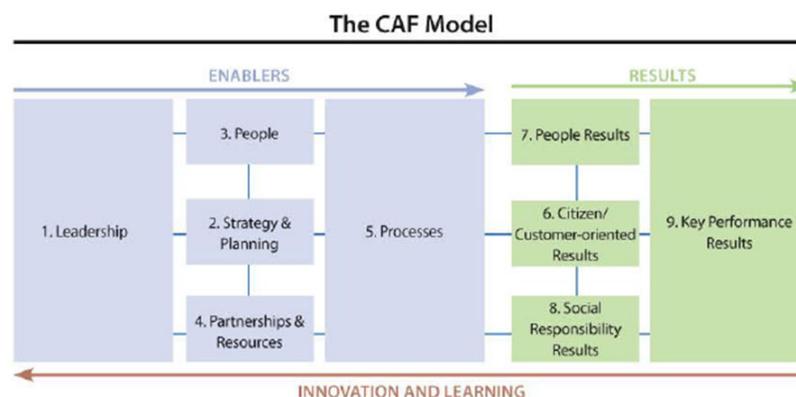
Whereas according to the Indonesian Ministry of Health [7], quality is composed of seven dimensions, which are:

- a. **Patient-Centric:** Quality dimensions should revolve around the patient, tailoring services to their preferences, needs, and individual values.
- b. **Equity:** Healthcare services should uphold fairness by offering uniform care, regardless of gender, tribe, ethnicity, residency, religion, or socioeconomic status.
- c. **Safety:** Quality dimensions must prioritize safety, minimizing preventable harm, injuries, and medical errors for service recipients.
- d. **Efficiency:** Efficiency involves optimizing available resources while minimizing material wastage.
- e. **Effectiveness:** Healthcare facilities should deliver evidence-based services that meet the community's healthcare needs.

The Common Assessment Framework (CAF) is a comprehensive quality management tool designed for independent evaluation within the public sector. Developed by the public sector CAF serves as a cost-free resource readily available for enhancing the performance of public sector organizations. The assessment framework features a nine-box structure aimed at identifying the key aspects that necessitate consideration in organizational analysis [8].

The following contributors(enablers) from organization help in improving its performance [8]:

- a. Leadership that determined the strategic direction of the organization and creates organization foundation.
- b. Leadership that determines the strategy and planning, as well as human resource management, then collaborates with partners and manages resources, such as: budget, knowledge, and IT
- c. the organization defines and collects internal process documents permanently developing it
- d. Assessment framework that is beneficial for the organization and provides results for the customers, stakeholders, employees, country residents, and the community as well.



**Figure 1:** The CAF Model [8].

Throughout the assessment framework process, the organization also develops cause-and-effect relationships. The cause-and-effect relationship between the enabler (cause) and the result (effect) must be measured. Organizations must continuously evaluate the consistency of the results provided and the evidence collected against the relevant criteria from the perspective of the enabler [8].

Drawing from the Common Assessment Framework, it becomes evident that CAF inherently follows a top-down structure. This is evident in the illustration that the pivotal figure within an organization is its highest leader. However, this research diverges from the traditional CAF theory and adopts a distinctive approach. This study will employ a bottom-up methodology, wherein the process of determining indicators will be orchestrated by the relevant units. This shift is supported by the unit's deeper understanding of the specific service requirements for patient care.

The healthcare services industry is prone to various risks, particularly within hospital settings. Several risks that can occur are risks during patient admission, risks to the healthcare worker, risks to non-healthcare workers, risks from the infrastructure and facilities, financial risks, and others [9].

Patient safety is an important component of the quality of care [10]. This is a critical step in enhancing the quality of healthcare services. The issue of patient safety stands as a primary concern within healthcare services, as it surpasses mere efficiency in importance. Various risks stemming from medical procedures can emerge as a part of patient care. Thus, it can be inferred that patient safety involves prevention and mitigation, of adverse events stemming from the healthcare service process [11]. Consequently, a patient safety program represents an endeavor to decrease the occurrence of adverse events that commonly occur during in-patient care, which could prove detrimental to both the patient and the hospital.

Based on the literature discussed, the hypotheses of this research are as follows:

**Hypothesis 1 (H1):** The effect of apprenticing affinity on managing.

**Hypothesis 2 (H2):** The effect of apprenticing affinity on quality and patient safety.

**Hypothesis 3 (H3):** The effect of Communitarian on apprenticing affinity.

**Hypothesis 4 (H4):** The effect of Communitarian on managing.

**Hypothesis 5 (H5):** The effect of Communitarian on quality and patient safety.

**Hypothesis 6 (H6):** The effect of managing on quality and patient safety.

**Hypothesis 7 (H7):** The effect of Communitarian on quality and patient safety, moderated by managing.

**Hypothesis 8 (H8):** The effect of apprenticing affinity on quality and patient safety, moderated by managing.

### 3. MATERIALS AND METHODS

#### 3.1. Data and Sample

This research utilized data collected from the perspectives of the heads of 52 work units at Dr. M. Djamil Center General Hospital in Padang, involving 43 samples. The data was collected via a survey using a Google Form with 43 respondents, all of whom were the unit heads. The MIRACLE Model (Managing, Innovating, Research for Decision, Apprenticing Affinity, Communitarian, Leadership, Educating) was designed to be implemented by these unit heads or hospital management to improve the quality and patient safety at Dr. M. Djamil Center General Hospital.

Table 1 presents descriptive data regarding the perception of unit heads on the implementation of the MIRACLE Model.

Previous studies [12, 13] have shown that the structural equity model (SEM) can serve as a necessary tool for managers, policy makers, and regulators in the healthcare field. Our data is derived from the aforementioned index and is included in the database.

In this article, we utilize the partial least square composite scheme (PLS-SEM) to represent the variability of the total variables for various reasons. Specifically, PLS-SEM is a model that sufficiently incorporates documented information or secondary data [13].

Based on the results presented in Table 1, it is evident that the perception of unit leaders regarding management is generally positive, with a percentage greater than 50%. However, regarding the "Apprenticing Affinity" dimension, there are certain indicators where the results are below 50%, particularly

**Table 1: Descriptive Data**

Component	Indicator	Description	F (%)
Managing	M1	We always resolve issues by innovating based on data	93%
	M2	We always identify risks in implementing innovations	95%
	M3	We always analyze risks in implementing innovations	91%
	M4	We always manage risks in implementing innovations	60%
	M5	Resolve issues creatively and with developments so that members can be more creative and innovative	93%
	M6	We always report risk control to the associated director	100%
Apprenticing Affinity	A1	There are interactive study activities in helping staff become more independent in their work	93%
	A2	We always attempt to motivate staff to respond, and act fast in resolving the issues being faced.	95%
	A3	We always perform study processes from thoughts, feelings, strategies, and behaviours from the staff aimed at achieving goals.	88%
	A4	We always regard the workload of others as our own.	12%
	A5	We always coordinate in resolving issues that occur in our unit through effective communication, such that a bond is formed.	95%
Communitarian	C1	We always search for solutions from conflicts that occur in our unit.	93%
	C2	Disagreements between staff that occur in our unit regarding work are resolved in a good manner.	93%
	C3	In our unit there are staff that are willing to work when assigned the work but does not finish the work.	37%
	C4	Leaders are able to resolve staff that are non-compliant in performing the assignment given	79%
	C5	Issues that become a threat in our unit are worked on by the leader, and are resolved in a good manner	93%
	C6	We always see opportunities in our unit to develop existing potentials	91%
	C7	Unit leaders have the same vision and mission as the hospital to accommodate quick changes towards an issue	95%
	C8	Leadership are able to resolve uncertainties with the truth regarding an issue	91%
	C9	Leaders are able to resolve issues that are complex in gaining clarity	95%
	C10	Leaders must be capable of identifying uncertainties in the identification of quick solutions for issues	98%
Quality and Patient Safety	M1	We have evaluated quality using indicators	98%
	M2	We have analyzed indicators that are not fulfilled	98%
	M3	We measure indicators regarding to patient safety	88%
	M4	We perform monitoring and follow-up of indicators that are not fulfilled	95%
	M5	We perform simple investigation analysis and or RCA	91%

in relation to the statement "We always regard the workload of others as our own." This finding highlights a lack of empathy within the work units of Dr. M. Djamil Center General Hospital.

In the "Communitarian" dimension, the statement "In our unit, there are staff members who are willing to start assigned tasks but do not complete them" yielded a result of 37%. This suggests that the sense of

responsibility among staff members in the unit, concerning the completion of assigned tasks, remains relatively low or inadequate.

Regarding the perspective of quality and patient safety, the results exceeded 50%, indicating that the implementation of quality and patient safety practices within the units is satisfactory.

### 3.2. Statistics Procedure

The structural equity model is analyzed in two steps [13]. We first explained the results for the measurement model determining the relationship between construction and the indicators, then the association with the structural model is presented that includes the relationship between constructed and the hypothesis model, i.e.:

1. Measurement model analysis
2. Structural model analysis

This sequence ensures that the measurement scale is valid and reliable before attempting to reach a conclusion regarding the hypothesis which is included in the structural model [12]. This research used the Smart-PLS software [14] for statistical analyses.

## 4. RESULTS

### 4.1. Measurement Model/Outer Model

The outer model/measurement model evaluates each variable in terms of the reliability of individual items, construction reliability, convergent reliability, and discriminant validity. Initially, the reliability of individual items is assessed through their weights, as depicted in Figure 2. Items with weights exceeding the cutoff value of 0.708 indicate good reliability. Next, construction

reliability is evaluated using the alpha Cronbach, rho Dijkstra–Henseler coefficient, and composite reliability. Table 4 demonstrates that all constructs exceed the recommended cutoff value of 0.7 for these three measurements, ensuring satisfactory construction reliability.

Furthermore, convergent validity is established as the average variance extracted for each construct exceeds 0.5. The criteria outlined above are met by the measurement model, as indicated in Table 2.

Tables 2 and 3 present outer loading results greater than 0.7, Cronbach's alpha exceeding 0.7, and Average Variance Extracted (AVE) surpassing 0.7. Consequently, all item variables can be deemed valid and reliable.

Table 4 displays the results of discriminant validity assessment using the Heterotrait-Monotrait (HTMT) inference correlation ratio. All constructs achieve discriminant validity, as indicated by the absence of confidence intervals that contain zero. This outcome signifies that each variable is distinct from the others [15].

The data analyzed in the measurement model above indicates that all variables exhibit construct validity.

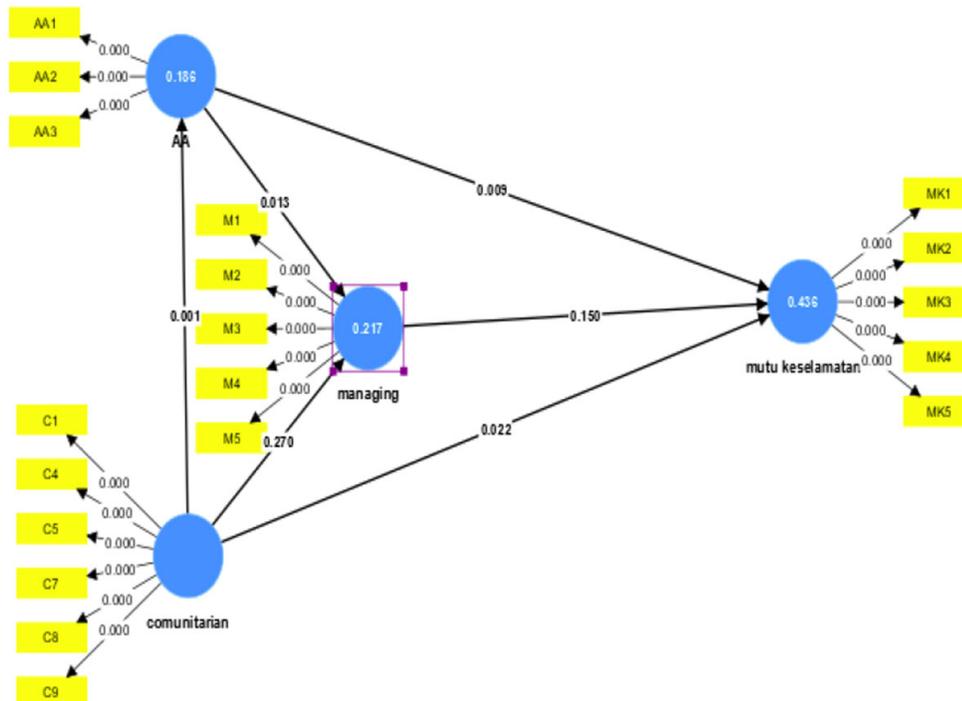


Figure 2: Significance and coefficient paths.

**Table 2: Outer Loading Results**

Indicator variables	Validity
AA1 <- AA	0.89
AA2 <- AA	0.885
AA3 <- AA	0.878
C1 <- communitarian	0.73
C4 <- communitarian	0.826
C5 <- communitarian	0.888
C7 <- communitarian	0.906
C8 <- communitarian	0.792
C9 <- communitarian	0.936
M1 <- managing	0.808
M2 <- managing	0.863
M3 <- managing	0.896
M4 <- managing	0.871
M5 <- managing	0.781
MK1 <- quality safety	0.7
MK2 <- quality safety	0.722
MK3 <- quality safety	0.768
MK4 <- quality safety	0.853
MK5 <- quality safety	0.865

**Table 3: Convergent Validity and Reliability**

Variable	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
AA	0.862	0.873	0.915	0.782
communitarian	0.922	0.934	0.939	0.721
managing	0.901	0.911	0.926	0.714
Quality safety	0.849	0.888	0.888	0.715

**Table 4: HTMT Inference**

HTMT Inference	Original sample (O)	Sample mean (M)	2.50%	97.50%
AA -> managing	0.365	0.388	0.088	0.684
AA -> quality safety	0.348	0.342	0.093	0.622
communitarian -> AA	0.432	0.478	0.254	0.732
communitarian -> managing	0.172	0.166	-0.191	0.435
communitarian -> quality safety	0.252	0.256	0.037	0.489
managing -> quality safety	0.245	0.251	-0.102	0.565

Significance, 95% confidence interval with corrected bias through the bootstrap procedure with 5,000 replications.

#### 4.2. Structural Model/Inner Model

Once the measurement model has been constructed and the analyzed results are validated and deemed reliable, the subsequent step involves testing the structural model, or inner model. This was achieved in our study through evaluating the coefficient paths

and their significance levels utilizing 5,000 bootstrap resampling, as detailed in Table 5 and illustrated in Figure 2.

Based on the data analysis results presented in Table 5, it is evident that the Apprenticing Affinity variable demonstrates a positive direct effect on

**Table 5: All Sample Results**

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
<b>Direct effect</b>					
AA -> managing	0.365	0.388	0.147	2.483	0.013
AA -> quality safety	0.437	0.44	0.112	3.897	0
communitarian -> AA	0.432	0.478	0.124	3.482	0.001
communitarian -> managing	0.329	0.352	0.129	2.552	0.011
communitarian -> quality safety	0.483	0.502	0.115	4.196	0
managing -> quality safety	0.245	0.251	0.17	1.438	0.15
<b>Indirect effect</b>					
AA -> managing -> quality safety	0.089	0.098	0.081	1.108	0.268
communitarian -> managing -> quality safety	0.042	0.036	0.051	0.822	0.411

managing, along with a positive effect on quality and patient safety with p-values of 0.00. The communitarian variable, in relation to the Apprenticing Affinity, also exhibits a positive effect with a p-value of 0.001. Additionally, the communitarian variable displays a positive effect on quality and patient safety with a p-value of 0.00.

Conversely, the managing variable does not exert a significant influence on quality and patient safety, as indicated by a p-value of 0.15. Examining the indirect effect of the Apprenticing Affinity variable on quality and patient safety, mediated by the managing variable, no significant effect is observed with a p-value of 0.268. Similarly, for the communitarian variable's indirect effect on quality and patient safety, mediated by the managing variable, no significant effect is observed with a p-value of 0.41.

**5. DISCUSSION**

We conducted a comprehensive analysis utilizing a dataset comprising five variables and 19 indicators. The variables encompassed in this study are managing, Apprenticing Affinity, communitarian, and quality and patient safety. Notably, the relationship between the managing variable and quality and patient safety was found to be non-positive, as evidenced by the examination of problem-solving, innovation, and risk management indicators. This discovery highlights a deficiency in the implementation of problem-solving, innovation, and risk management practices within the mentioned work units.

Consequently, it is imperative for leadership and management to initially identify existing issues, assess the complexity and severity of these challenges, and

subsequently motivate each leader to foster innovation and support enhanced work practices within these working units.

The Apprenticing Affinity variable, encompassing Interactive Learning, Self-Efficacy and Self-Regulation, and Transcendence (Empathy and Attachment), exhibited indicators that positively influence quality and patient safety. This signifies that the learning process takes place interactively among staff and their leaders, resulting in a positive impact that encourages staff to function effectively within hospital units. Interactive learning helps address individual differences among staff members as employees can proactively contribute based on their individual abilities without waiting for others. The presence of empathy prompts individuals to perceive the work performed by others as their own responsibility [16].

The communitarian variable exhibited a favorable influence on quality and patient safety, as indicated by the Threats, Conflicts, Opportunities, and Contradictions indicators. These findings suggest that conflicts between staff and their leaders within organizational units need to be resolved within the unit itself or through coordination with higher management or the relevant leaders. Failure to address such issues can impact hospital services and patient satisfaction, ultimately affecting patient safety. Addressing conflicts and contradictions necessitates coordinated efforts among different units. Root causes need to be identified, followed by the implementation of solutions to address these issues.

Threats are challenges faced by organizations that can impede their progress. Current threats encountered by Dr. M. Djamil Center General Hospital

include suboptimal reporting culture, financial constraints, environmental factors, system inefficiencies, knowledge gaps, staff behaviors, compliance concerns, patient and family grievances, media-related threats, infrastructure and facilities availability, and delayed physician response times. These threats can significantly impact hospital services, particularly patient safety. Consequently, management intervention is essential to address these concerns, and the reinforcement of risk management practices within each unit is crucial [17].

## 6. CONCLUSION

Comprehending the complex interactions among managing, Apprenticing Affinity, communitarian, and quality and patient safety is pivotal for informed decision-making to enhance community health through effective leadership implementation within the work units of Dr. M. Djamil Center General Hospital, Padang. Utilizing the equity structural model approach our formulated MIRACLE Model outlines the implementation of robust leadership systems within these work units. This model facilitates the comparison of the impacts stemming from antecedent variables, providing valuable insights for public institutions and policy makers at Dr. M. Djamil Center General Hospital, Padang, with regard to data-informed decision-making.

Relevant factors that exert influence on the MIRACLE Model to enhance hospital quality and patient safety encompass work motivation, workload, and a conducive work environment. These factors foster workplace innovation and resolution of challenges within the units.

Our findings indicate that Apprenticing Affinity positively influences the model's emphasis on quality and patient safety, while managing exhibits a negative impact on the same. In light of these outcomes, we advocate for heightened attention from unit leaders towards their staff, aiming to enhance staff performance through specialized training initiatives and the establishment of a comfortable work environment. Furthermore, the communitarian aspect, which contributes positively to quality and patient safety, underscores the importance of coordination among leaders and staff in addressing unit-related issues. This collaboration is instrumental in advancing the overall quality and patient safety within the hospital.

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## COMPETING INTERESTS

None declared.

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