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Impact of Career Development Strategies on Sustainable Nursing Performance in Yemen: Testing Patient-Centered JCI Mediation via Structural Equation Modeling

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Abstract

Background

Healthcare systems in fragile environments, such as Yemen, face acute structural challenges and severe resource deficits. This study aims to explore the relationship between career development strategies and nursing performance sustainability while examining the mediating role of compliance with Joint Commission International (JCI) standards. The goal is to determine if international quality frameworks can act as a corrective mechanism for individual performance in crisis-driven contexts.

Methods

A descriptive-analytical comparative approach was employed, targeting nursing staff in leading public and private hospitals in Sana'a. A simple random sample of 526 nurses was analyzed. Data were processed using Structural Equation Modeling (SEM) via AMOS software to verify causal influence and mediation. The study utilized validated scales for career development, JCI compliance, and nursing performance efficiency and effectiveness.

Results

Path analysis indicated a statistically significant positive impact of career development on nursing performance (R^2 = 0.493, P < 0.001). JCI standards demonstrated a partial complementary mediating role, with a robust indirect effect of 0.609. Specifically, Medication Management and Use (β = 0.600) and Patient-Centered Care (β = 0.287) were the only significant mediating paths (P = 0.003). International Patient Safety Goals (IPSG) recorded the lowest compliance level (63.7%).

Conclusions

Investing in nursing human resources achieves excellence in fragile environments only when channeled through standardized quality frameworks. JCI standards serve as institutional substitutes for weak local systems, regulating performance toward safer clinical outcomes. Hospital leadership should prioritize competency-based training in medication safety and patient-centered care to mitigate the effects of high-pressure workloads.

Trial Registration:

Not applicable (this study is a descriptive-analytical survey and does not involve medical interventions on human participants).

Research Highlights

- Career development explains **49.3%** of nursing performance variance in Yemen.
- JCI standards act as a **partial mediator** between HR investment and outcomes.
- **Medication management** and **patient-centered care** are primary mediation paths.
- International standards serve as **institutional substitutes** in fragile zones.
- This study bridges the gap between **rescue culture** and **normative efficiency**

1. Introduction

Healthcare quality and patient safety are the primary ethical and professional cornerstones of contemporary health systems striving for sustainability [29]. Amid rapid digital and technical transformations, human capital has emerged as the most valuable strategic resource for organizations, particularly within the nursing profession, which serves as the first line of defense and fundamental pillar for direct patient care. International statistics indicate that over 18.2 million Yemenis require urgent health assistance within a healthcare environment suffering from a severe humanitarian funding deficit, which has not exceeded 56% of the total requirements [34,12, 36].

In this crisis-driven context, career development emerges not as a luxury but as a strategic mechanism to maximize the clinical value of nursing human resources. This study is grounded in the **Resource-Based View (RBV)**, which posits that excellence in competitive performance and operational outcomes stems from an organization's ability to possess and develop human resources that are rare, valuable, and difficult to imitate—characteristics inherently applicable to highly competent nursing staff [9, 10]. However, translating the impact of such developments into field practice requires a global normative framework. This is provided by the **Joint Commission International (JCI)** standards [15], which, in their modern editions, emphasize **International Patient Safety Goals (IPSG)** and patient-centered care. The global shift toward the **"Accreditation 360"** model, expected to be fully implemented by 2026, necessitates that hospitals re-engineer their strategies to transition from traditional "paper-based compliance" to continuous, data-driven "real-time readiness." Such a transition is vital for improving clinical performance and reducing morbidity and mortality rates amidst collapsing infrastructure [35, 31].

Yemeni hospitals, particularly public ones, face acute structural challenges characterized by funding shortages, with only 56% of the required humanitarian funding secured in recent years [12]. This severe deficit has directly impacted nursing performance through years of salary interruptions in the public sector, increased workloads, and deterioration of physical and technical work environments [34]. Under these circumstances, a profound gap in nursing performance has surfaced; local studies indicate that the level of knowledge and practice in vital areas, such as **Basic Life Support (BLS)** and the prevention of ventilator-associated pneumonia, remains below the required standards [4]. Addressing this imbalance requires a model that transcends superficial descriptions of training, moving toward a comprehensive career development strategy that encompasses administrative leadership, empowerment, and the

cultivation of an organizational culture that supports quality. Here, patient-centered JCI standards serve as a regulatory and guiding tool for this performance, providing clear frameworks for managing clinical risks, ensuring continuity of care, and achieving IPSGs, thereby reducing the likelihood of fatal medical errors in resource-limited settings [14].

2. Research Problem and Knowledge Gap

2.1. Problem Statement

The research problem lies in the acute and deep-seated gap between the "rescue culture" prevalent in Yemeni hospitals—which focuses on effective performance under crisis pressure—and the rigorous normative efficiency required globally to ensure the safety of patients. Field reports and recent local studies have highlighted a decline in nursing knowledge and practice in critical areas, such as BLS and healthcare-associated infection prevention, a gap previously underscored in local governorate evaluations [39]. The results showed that only 53.65% of nurses possessed adequate knowledge, while only 26% had received advanced training [5].

2.2. Research Gap and Scientific Contribution

First, Identification of the Knowledge Gap

Despite the accumulation of literature on human resource management and healthcare quality, a review of previous studies reveals fundamental gaps that this research seeks to bridge.

1. **Lack of Structural Modeling in Conflict Environments**: Most studies examining the impact of career development on nursing performance have been conducted in stable contexts or developed countries. There is a clear scarcity of structural models explaining the mechanics of impact transfer through mediating variables in states with institutional fragility, such as Yemen [17]; early local literature explored these links descriptive-analytically but lacked advanced structural path modeling [40].Furthermore, the current health literature lacks explanatory structural models that clarify how human resource investments translate into final clinical outcomes in protracted conflict environments [25].
2. **Ambiguity regarding the Mediating Role of Modern JCI Standards**: While studies have treated accreditation as an independent variable, its use as a mediator linking human resource maturity to clinical outcomes remains insufficiently explored, especially with the global shift toward "Accreditation 360" standards [35].

3. **Fragmentation in Measuring Nursing Performance**: Performance is often measured solely from a competency perspective. The existing literature lacks a linkage between competency, effectiveness, and final outcomes within a single model that tests a nurse's ability to execute tasks according to quality standards while improving healthcare outcomes, patient safety, and environmental adaptation [35].
4. **Contextual Challenge and Localization**: Most global studies are conducted in economically and politically stable contexts, leaving a knowledge gap in understanding how to localize flexible global standards in hospitals suffering from severe shortages of physical and technical assets [7].

Second: Statement of Originality and Unique Contribution: The scientific originality of this research lies in presenting a "Strategic Integration Model for Nursing Performance in Fragile Environments." The research contributes uniquely by:

- This study develops a theoretical framework that integrates the **Resource-Based View (RBV)** with the **Job Demands-Resources (JD-R)** theory to explain how work pressures in Yemeni hospitals can be transformed into distinguished performance through the gateway of quality standards.
- This study provides the first advanced statistical analysis using **Structural Equation Modeling (SEM)** to test the mediation of JCI standards in the relationship between development and performance in Yemeni hospitals, offering robust empirical evidence beyond simple quantitative description.
- This study formulates practical implications for policymakers, focusing on "smart investment" in human assets as a strategic alternative to the severe shortage of physical assets, while providing insights on localizing global standards in complex local environments.

3. Research Questions and Objectives

3.1 Research Questions

- **Main Question:** To what extent does career development improve nursing performance in Yemeni hospitals through the mediating role of patient-centered JCI standards?
- **Sub-questions:**

    1. What is the current status of career development strategies (training, leadership, culture, and empowerment) in Yemeni hospitals?
    2. What is the level of nursing staff compliance with patient-centered JCI standards?
    3. Does the impact of career development on performance vary according to the level of international quality standard implementation?

3.2 Research Objectives

1. **Diagnosing Reality:** Identifying levels of career development, compliance, and performance in public and private sector Yemeni hospitals.

2. **Model Testing:** Validating the Strategic Integration Model by linking the three variables using SEM.
3. **Quantitative Measurement:** Estimating the direct and indirect effect sizes of career development on performance sustainability and nursing excellence.

4. Significance of the Study

4.1 Theoretical Significance

- Enriching Arabic and international libraries with an original structural model that applies RBV concepts in an unstable healthcare context.
- This study provides contemporary empirical evidence on the mediation dynamics of patient-centered JCI standards, contributing to the advancement of healthcare quality theory.

4.2 Practical Significance

- **For Policymakers:** Providing a roadmap for the Yemeni Ministry of Health on smart investment in personnel as a strategic alternative to physical asset shortage.
- **For Hospitals:** Delivering accurate performance assessment results that help identify training gaps, increase compliance with patient-centered JCI standards, and enhance overall patient safety.

5. Theoretical Framework and Critical Literature Review

5.1 Career Development as a Dynamic Capability in Nursing

In contemporary literature, the concept of career development has evolved from a mere administrative promotion track to a comprehensive ecosystem that fosters both professional and psychological growth for nurses [28, 24]. Kallio et al [16], argue that organizational support for career development is the most significant variable in reducing turnover intention, which is a critical issue in Yemen, where qualified personnel frequently migrate in search of stability [16, 28].

In this study, career development is conceptualized through four vital dimensions.

1. **Continuous Training:** Extending beyond technical skills to include meta-knowledge and complex problem-solving capabilities [18, 21].
2. **Administrative Leadership:** Specifically, humble and supportive leadership has a significant impact on team performance and the success of accreditation projects in resource-limited environments.
3. **Organizational Culture:** Focusing on organizational learning rather than blame, a quality lacking in many health organizations where punitive responses to errors remain prevalent [20,8].
4. **Job Empowerment:** Granting nurses the clinical authority and informatics tools necessary for real-time evidence-based decision-making [35].

5.2 Patient-Centered JCI Standards

The Joint Commission International (JCI) [15] standards represent the most comprehensive global framework for patient safety. As of 2025, the focus has shifted toward "person-centered" rather than merely "patient-centered" care, integrating green management and sustainability into health operations [29]. The six standards selected for this study (**IPSG, ACC, PCC, AOP, COP, and MMU**) encompass the complete cycle of nurse-patient interaction.

Recent studies have confirmed that compliance with these standards serves as an "automatic correction mechanism" for nursing performance. For instance, the **Medication Management and Use (MMU)** standard helps reduce fatigue-related medication errors, whereas the **Assessment of Patients (AOP)** standard ensures that nursing interventions are based on accurate clinical readings [14]. Within the context of the Yemeni crisis, these standards provide professional security for both nurses and patients, replacing individual improvisation with clear, evidence-based policies under high pressure conditions [28].

5.3 Contemporary Nursing Performance

Nursing performance evaluation is no longer confined to the number of tasks completed; it has shifted toward an outcome-based performance [35]. Performance in the current century requires a synergy of **Performance Efficiency** (doing things right) and **Performance Effectiveness** (doing the right things at the right time to achieve outcomes).

Modern global trends highlight the emergence of **Adaptive Performance** as a necessity in unstable environments, where nurses must manage consecutive emergencies, supply shortages, and shifting therapeutic protocols. Furthermore, nursing-sensitive indicators, such as fall rates, healthcare-associated infections (HAIs), and patient satisfaction, have become the "gold standards" for judging performance quality [35]. In Yemen, the results indicate the superiority of effectiveness over efficiency, suggesting a prevalent "rescue culture" that requires formalization through development and accreditation.

6. Research Methodology and Structural Model Construction

6.1 Research Design

This study adopts a **descriptive-analytical comparative approach** to test the causal relationships between variables as they exist in reality, utilizing advanced statistical techniques to ensure the accuracy and generalizability of findings.

6.2 Population and Sample

The study population included nursing staff in the departments of Emergency, Intensive Care Unit (ICU), Inpatient Wards, and Neonatal Intensive Care Unit (NICU) across six leading hospitals in Sana'a, representing both the public and private sectors. This diversity was intentional to test the model's resilience across different funding and management contexts. The sample consisted of **526 nurses**

selected via simple random sampling, with a 62% response rate. The demographic and professional characteristics of the study participants are detailed in Table 1.

Table (1): Demographic and Sectoral Characteristics of the Population and Sample

Hospital	Sector	Population Size	Sample Size	Representation %
Al-Thawra Modern General Hospital	Public	320	170	53%
48 Model Hospital	Public	224	134	60%
Azal Hospital	Private	150	103	69%
Modern European Hospital	Private	70	51	73%
Royal Hospital	Private	50	40	80%
Yemen Health International Hospital	Private	33	28	85%
Total		**847**	**526**	**62%**

The inclusion of public facilities like the 48 Model Hospital builds upon a longitudinal research interest in how quality systems evolutionary affect healthcare performance in Yemen [42]. The sample size was determined based on **Krejcie and Morgan's** table. To ensure proportional representation, a specific sample was drawn from each hospital rather than treating the population as a single aggregate sample. The distribution of the study population by hospital and department is illustrated in Table 2

Table (2): Distribution of the Study Population by Hospital and Department

Hospital	Sector	ER	Inpatient	ICU	NICU	Total
Al-Thawra General Hospital	Public	28	184	89	19	320
48 Model Hospital	Public	22	125	67	10	224
Azal Hospital	Private	19	79	44	8	150
Modern European Hospital	Private	11	40	15	4	70
Royal Hospital	Private	9	18	19	4	50
Yemen Health Int. Hospital	Private	7	13	9	4	33
Total		**96**	**459**	**251**	**41**	**847**

A simple random sample of 526 nurses was selected for the study. Nursing assistants without formal academic qualifications were excluded to ensure accurate responses regarding international quality standards.

6.3 Research Instrument

A questionnaire comprising three main axes was developed. To ensure accurate measurement of latent constructs, a **Second-Order Confirmatory Factor Analysis (CFA)** was conducted. The results indicated that all items had factor loadings exceeding 0.50, with excellent fit indices. The **Average Variance Extracted (AVE)** for all dimensions exceeded 0.50, and the **Composite Reliability (CR)** was recorded at over 0.70.

6.4 Second-Order CFA for the Career Development Scale

As illustrated in **Figure (1)**, the Career Development variable was measured using 25 items across four sub-dimensions: training (seven items), Administrative Leadership (six items), Organizational Culture (six items), and empowerment (six items). The standardized parameter estimates were robust (>0.50); therefore, no items were deleted. The model demonstrated high-quality fit indices without requiring modifications or restricting measurement errors. This confirms that Career Development is effectively measured through these four interconnected dimensions.

6.5 Second-Order CFA for the Patient-Centered JCI Standards Scale

The compatibility of the second-order model with patient-centered JCI standards was verified. As shown in **Figure (2)**, all fit indices met the acceptance criteria, reflecting a high model fit and confirming that the JCI variable was measured through six interconnected standards.

6.6 Second-Order CFA for the Nursing Performance Scale

As shown in **Figure (3)**, the initial model for Nursing Performance was measured using 24 items across three dimensions: Performance Efficiency (five items), Performance Effectiveness (four items), and Performance Indicators (15 items). While factor loadings were acceptable (>0.50), some fit indices were initially outside the acceptable range (e.g., RMSEA = 0.108, CMIN/DF = 7.11).

Consequently, the model was refined based on **Modification Indices (MI)** by correlating specific measurement errors using double-headed arrows within each dimension separately. Following these adjustments, **Figure (4)** shows that the fit indices aligned with the required criteria (Table 3), confirming that the data for Nursing Performance were valid for further statistical analysis.

6.7 Reliability, Convergent Validity, and Discriminant Validity

6.7.1 Reliability and Convergent Validity

Convergent validity describes the degree to which the indicators of a construct are theoretically related. Following Hair et al [13], three criteria were used.

1. **Factor Loadings:** Values > 0.707.
2. **Composite Reliability (CR):** Preferred values > 0.70.

3. **Average Variance Extracted (AVE):** Values > 0.50.

Internal consistency was assessed using **Composite Reliability (CR)**, which is considered more accurate than Cronbach's alpha, as it accounts for item loadings rather than just weights.

Table (3): Reliability and Convergent Validity Indicators

Main Variables	Dimension / Standard	Cronbach's Alpha	Composite Reliability CR	AVE
IV: Career Development	Training	.926	.965	0.653
	Administrative Leadership	.876	0.879	0.551
	Organizational Culture	.906	0.906	0.616
	Empowerment	.932	0.932	0.694
MV: Patient-Centered JCI	IPSG	.925	.980	0.553
	ACC	.923	0.920	0.622
	PCC	.929	0.930	0.657
	AOP	.911	0.919	0.694
	COP	.932	0.932	0.631
	MMU	.930	0.927	0.681
DV: Nursing Performance	Efficiency	.897	.956	0.606
	Effectiveness	.922	0.922	0.749
	Performance Indicators	.944	0.940	0.513

Table (3) demonstrates that all variables possess high reliability, with coefficients ranging from 0.876 to 0.944, and CR values between 0.879 and 0.940. These figures reflect a strong internal consistency [30]. AVE values ranged from 0.513 to 0.749, all exceeding the 0.50 threshold, thereby confirming convergent validity and indicating that each dimension explained more than 50% of its indicators' variance with minimal residuals.

6.7.2 Model Fit Indices

The fit indices indicate that the proposed theoretical model possesses sufficient statistical robustness for the hypothesis testing. The specific structural model fit indices are summarized in Table 4.

Table (4): Structural Model Fit Indices

Index	Threshold	Achieved Value	Decision
CMIN/DF	< 5	2.763	Perfect Fit
RMSEA	< 0.08	0.058	Very Good Fit
GFI	≥ 0.90	0.640	Contextually Acceptable
CFI	≥ 0.90	0.840	Contextually Acceptable
TLI	≥ 0.90	0.836	Contextually Acceptable

Note: Although GFI, CFI, and TLI are slightly below 0.90, they are considered acceptable in highly complex environments and large-scale structural models [32].

6.8 Statistical Methods

Data analysis was performed using **Structural Equation Modeling (SEM)** via **AMOS** software. A **Bootstrapping** technique was applied to test the significance of the mediating role.

7. Results

Statistical analysis was performed using **SPSS (v. 26)** and **AMOS (v. 24)** to conduct descriptive and inferential statistics.

7.1 Data Quality and Normality Testing

Prior to the primary analysis, the data suitability for parametric testing was verified using skewness and kurtosis tests, as detailed in Table 5.

Table (5): Normality Distribution of Variables

Variable / Dimension	Skewness	Kurtosis	Decision
Career Development	-0.283	-0.647	Normal Distribution
JCI Standards	-0.553	-0.278	Normal Distribution
Nursing Performance	-0.552	0.265	Normal Distribution

The skewness and kurtosis values fell within the acceptable range of ± 1.96, indicating that the data were normally distributed. This distribution permits the application of **Structural Equation Modeling (SEM)** and regression analysis. The results of the Variance Inflation Factor (VIF) and tolerance tests are shown in Table 6.

Table (6): Variance Inflation Factor (VIF) and Tolerance Test

Independent Variables	Dimensions	VIF	Tolerance
Independent (Career Development)	Training	2.210	.452
	Administrative Leadership	3.147	.318
	Organizational Culture	3.726	.268
	Empowerment	3.118	.321
Mediator (Patient-Centered JCI Standards)	Int. Patient Safety Goals (IPSG)	3.070	.326
	Access & Continuity of Care (ACC)	3.471	.288
	Patient-Centered Care (PCC)	4.482	.223
	Assessment of Patients (AOP)	4.568	.219
	Care of Patients (COP)	5.688	.176
	Medication Management & Use (MMU)	3.410	.293

Multicollinearity was assessed, and the **Variance Inflation Factor (VIF)** for all independent and mediating variables remained below the threshold of 10 (ranging between 2.210 and 5.688). These results confirm the independence of the dimensions and the absence of multicollinearity issues that may impede estimation accuracy.

7.2 Descriptive Analysis of Study Variables

The descriptive analysis reflects the implementation levels of the studied practices from the nursing staff's perspective, which is vital for diagnosing practical gaps within Yemeni hospitals.

7.2.1 Availability Level of Career Development Dimensions

The results indicated that the level of career development was generally moderate, with an overall mean of **3.99** (57%) based on the 7-point Likert scale employed.

Table (7): Availability Level of Career Development Dimensions for Nursing Staff

Dimension	Mean	Percentage	Qualitative Rating	Rank
Training	4.01	57%	Moderate	1
Administrative Leadership	4.01	57%	Moderate	1
Organizational Culture	3.93	56%	Moderate	3
Empowerment	3.99	57%	Moderate	2
Overall Average	**3.99**	**57%**	**Moderate**	**--**

The data in Table 7 demonstrate that all dimensions received a "moderate" rating, indicating clear deficiencies in human capital investment strategies within Yemeni hospitals. The overall average (3.99 out of 7) represents a moderate level at the lower bound. From a **Resource-Based View (RBV)** perspective, stagnation at this level prevents hospitals from building rare knowledge assets capable of withstanding crises. Notably:

- The **Organizational Culture** dimension recorded the lowest mean (3.93), reflecting a deficit in psychological safety and supportive work environments. This aligns with global warnings regarding the impact of toxic leadership in conflict zones [33]. Furthermore, this decline suggests a work environment potentially lacking in mutual support and continuous improvement, likely due to conflict-related pressures that drive management to prioritize daily operations over cultural development.
- While **Training** and **Leadership** were relatively higher (4.01), they remained insufficient to keep pace with modern developments. Studies have shown that training in Yemen often lacks field-based follow-up (4).

7.2.2 Implementation Level of Patient-Centered JCI Standards

The implementation of these standards was rated as "moderately high," with nurses demonstrating relatively high awareness and compliance, yielding an overall mean score of **4.77** (68%). The implementation levels of the individual patient-centered JCI standards are presented in Table 8

Table (8): Implementation Level of Patient-Centered JCI Standards

Dimension	Mean	Percentage	Qualitative Rating	Rank
Access & Continuity of Care (ACC)	4.95	71%	Moderately High	1
Care of Patients (COP)	4.88	70%	Moderately High	2
Patient-Centered Care (PCC)	4.85	69%	Moderately High	3
Medication Management & Use (MMU)	4.76	68%	Moderately High	4
Assessment of Patients (AOP)	4.69	67%	Moderately High	5
Int. Patient Safety Goals (IPSG)	4.46	64%	Moderately High	6
Overall Average	**4.77**	**68%**	**Moderately High**	**--**

The **ACC** standard ranked first (71%), reflecting the hospitals' commitment to organizing admission/discharge processes and ensuring continuity of care despite resource constraints. Conversely, **International Patient Safety Goals (IPSG)** received the lowest rank (64%) and constitute a critical indicator, as these goals are directly linked to preventing major medical errors, such as patient misidentification or wrong-site surgery. This decline may stem from workload pressures and burnout among Yemeni nurses, leading to the neglect of rigorous safety protocols. Consequently, Yemeni

hospitals excel in service accessibility (ACC) but falter in safety benchmarks (IPSG), an administrative behavior that can be explained by the overwhelming demand for services. A low IPSG score serves as a significant alarm.

7.2.3 Level of Nursing Performance

The overall mean performance was **4.64** (66%), which is considered "moderately high" overall. The specific performance dimensions of the nursing staff are detailed in Table 9.

Table (9): Level of Nursing Performance in Yemeni Hospitals

Dimension	Mean	Percentage	Qualitative Rating	Rank
Performance Effectiveness	4.86	69%	Moderately High	1
Performance Efficiency	4.65	66%	Moderately High	2
Performance Indicators	4.41	63%	Moderate	3
Overall Average	**4.64**	**66%**	**Moderately High**	**--**

The high score for **Performance Effectiveness** (69%) indicates the nursing staff's ability to deliver services timely through teamwork and effective communication—"soft skills" that Yemeni nurses rely on to compensate for resource shortages. However, the lower rating for **Performance Indicators** (63%) reflects the difficulty in achieving tangible final quality outcomes (e.g., reducing healthcare-associated infections) amidst deteriorating infrastructure and shortages of essential medical supplies. The gap between effectiveness and objective indicators represents the core crisis in fragile health systems.

7.3 Hypothesis Testing and Path Analysis

Structural Equation Modeling (SEM) was employed to examine the direct and indirect influence relationships. The findings provide comprehensive support for the primary research hypotheses.

7.3.1 Hypothesis 1: Direct Impact of Career Development on Nursing Performance

The testing results for the first hypothesis (H1) are depicted in Figure 5, while the specific path coefficients are provided in Table 10.

The results revealed a statistically significant positive impact of career development on improving nursing performance in Yemeni hospitals. The path coefficient was recorded at ($\beta = 0.702$, $p < .001$), indicating that career development explains **49.3%** of the variance in nursing performance ($R^2 = .493$). This outcome corroborates the fact that investment in nursing personnel is a fundamental driver of clinical excellence.

Table (10): Path Coefficients for the Impact of Career Development on Nursing Performance

Path	Beta	C.R.	P-value	R^2
Career Development → Nursing Performance	0.702	11.932	0.000	0.493

The high impact coefficient (0.702) underscores career development as a strategic catalyst of performance. The R^2 value of .493 suggests that the collective dimensions of career development (training, leadership, culture, and empowerment) account for nearly half of the variance in nurses' performance. These results align with recent studies emphasizing that human resource investment is the sole guarantee of enhanced service quality in low-resource settings [16], which directly supports previous baseline findings in the Yemeni context [37].

7.3.2 Hypothesis 2: Analysis of the Mediating Role of JCI Standards

The structural model for the second hypothesis (H2) is illustrated in Figure 6, and the detailed mediation results are summarized in Table 11.

Mediation testing was the analytical core of this study. A **Bootstrapping** technique was used to verify the significance of the indirect effects. The mediating role of international quality standards in the relationship between career development and nursing performance was tested, yielding the following results.

Table (11): Path Coefficients for the Mediating Role of Patient-Centered JCI Standards

Analysis Phase	Research Path	Beta	C.R.	P-value	Mediation Type
Total Effect	Career Development → Nursing Performance	0.702	11.932	0.000	--
Direct Effect (Path a)	Career Development → JCI Standards	0.709	12.140	0.000	--
Direct Effect (Path b)	JCI Standards → Nursing Performance	0.788	13.482	0.000	--
Indirect Effect (a*b)	Career Dev → JCI → Nursing Perf	0.609	9.984	0.003	--
Direct Effect (Path c')	Career Development → Nursing Performance	0.142	3.445	0.000	**Partial Complementary Mediation**

The findings established **Partial Complementary Mediation**. The direct effect of career development on performance remained statistically significant after the inclusion of the mediator, but decreased from 0.702 to 0.142. Conversely, the indirect effect through JCI standards was robust (0.609) and statistically significant.

This result is pivotal, suggesting that career development does not merely improve performance automatically. Rather, its greatest impact is realized by equipping personnel and enhancing their capacity to comply with global quality benchmarks (i.e., **JCI standards**). In essence, career development provides human infrastructure, while JCI standards provide a procedural framework that regulates performance and steers it toward safe patient outcomes. The synergy between human resources and organizational standards is where true strategic power lies.

7.3.3 Testing Sub-hypotheses of the Second Primary Hypothesis

The detailed sub-hypothesis testing results are presented in Figure 7, with the specific regression paths illustrated in Table 12

This section examines the specific impact of career development on nursing performance through individual, patient-centered JCI dimensions.

Table (12): Specific Regression Paths for Mediation via JCI Dimensions

Regression Path	Beta	S.E.	C.R.	P-value
Career Dev. → IPSG → Nursing Performance	.059	.124	.476	.622
Career Dev. → ACC → Nursing Performance	-.015	.101	-1.485	.887
Career Dev. → PCC → Nursing Performance	.287	.094	3.053	**.003***
Career Dev. → MMU → Nursing Performance	.600	.115	5.217	**.003***
Career Dev. → COP → Nursing Performance	.214	.159	1.346	.157
Career Dev. → AOP → Nursing Performance	.162	.154	1.051	.243

The path analysis results provide an advanced understanding of how the impact of career development is transmitted. While it was hypothesized that all six JCI standards would act as mediators, the results indicated that this impact was restricted to only two specific paths.

First: Analysis of Significant Paths

1. **Medication Management and Use (MMU):** This path recorded the highest impact coefficient (β = 0.600). This aligns with Keers et al [19], who posited that technical and clinical competence are the first lines of defense for safety. Development programs focusing on pharmacological knowledge immediately translate into performance due to the high-stakes nature of medication tasks. This also supports Aiken et al [1], who found a direct correlation between nursing education/training levels and reduced medical error rates.
2. **Patient-Centered Care (PCC):** This path had a significant effect (beta = 0.287, p = .003). This is consistent with Rathert et al [27], who demonstrated that adopting PCC values leads to tangible improvements in clinical outcomes and patient satisfaction. In the Yemeni context, this suggests

that nurses successfully transform the communication and empathy skills gained from development programs into field practices that enhance performance quality.

Second: Interpretation of Non-Significant Paths (Field Gaps)

The lack of significant impact on **IPSG, ACC, COP, and AOP** can be interpreted from the following perspectives:

- **Infrastructure Weakness (Structure):** Based on Donabedian's [11] Structure-Process-Outcome model, improving nursing skills (Process) may not enhance performance (Outcome) if the administrative policies and facilities (Structure) are not supportive. For instance, **Access to Care (ACC)** depends more on hospital logistics than on individual nursing skills.
- **The Yemeni Context:** The protracted conflict and unstable environment pose immense challenges. As noted by Qirbi and Ismail [26], the resilience of the Yemeni health system faces severe resource constraints, making the implementation of complex standards such as **Patient Assessment (AOP)** difficult due to excessive workloads and lack of equipment, thereby neutralizing the statistical impact of career development in these areas.
- **"Paper-based" Quality Culture:** The non-significance of **International Patient Safety Goals (IPSG)** suggests that these standards might be treated as administrative documentation requirements for accreditation rather than being genuinely integrated into the nurse's professional developmental track.

Third: Theoretical Contribution

This study contributes to **Human Capital Theory** by demonstrating that investment in employee development does not automatically improve performance; it must be channeled through quality compliance. In the Yemeni case, mediation through the **MMU** and **PCC** proved to be the most effective. This suggests that career development programs in Yemeni hospitals should be selective and targeted toward high-impact areas (e.g., medication safety and patient education). Bridging the gap in non-significant paths requires interventions that transcend individual training to reform the organizational environment.

8. Discussion of Results

The findings of this study demonstrate that person-centered Joint Commission International (JCI) standards—specifically **Medication Management and Use (MMU)** and **Patient-Centered Care (PCC)**—serve as the most potent mediating pathways through which career development enhances nursing performance. This result aligns with the findings of Al-Jaradi [3], who identified critical gaps in medication management skills among Yemeni nurses, rendering the adoption of MMU standards a necessary structural mechanism for performance enhancement. Notably, while career development directly impacts performance, its greatest clinical value is realized when channeled through these formal quality frameworks.

8.1. Integration with Resource-Based View (RBV) and Global Context

From an **RBV** perspective, the results confirm that hospitals that successfully integrate developed human resources with international quality standards possess a competitive advantage that is difficult to imitate; here, standards function as an organizational capability that multiplies the value of human capital. In the Yemeni context, the challenge lies in the sustainability of these resources amid funding shortages and economic pressures. This study validates RBV hypotheses in crisis-hit healthcare environments, positing that normative clinical knowledge is a strategic resource that protects hospitals from operational failure [22, 23]. Compared to Ni et al [24], the Yemeni model goes further by linking this growth to international compliance, expanding on preliminary evidence regarding JCI patient-centered impacts on local nursing cohorts [38]. Furthermore, our results regarding the strong impact of patient-centered JCI standards surpass the outcomes recorded in some European hospitals, reinforcing the hypothesis that JCI accreditation serves as an "institutional substitute" in developing nations [23].

8.2. Documentation Gap vs. Care Gap

A critical finding is the discrepancy between performance efficiency and effectiveness. Studies in similar regional contexts point to a **"rhetorical-reality gap,"** where documentation aligns with standards, while field practice remains superficial [6]. With the shift toward **Accreditation 360**, this gap will become more pronounced, as evaluations will rely on real-time data. Consequently, future career development must focus on enhancing **nurses' data literacy** [35].

8.3. Leadership and Organizational Culture

The fact that organizational culture received the lowest evaluation is consistent with a 2025 systematic review of the impact of toxic leadership on nursing [33]. This study underscores that humble and supportive leadership is the linchpin of accreditation project success.

8.4. Digitization and Artificial Intelligence

Recent literature indicates that integrating **Artificial Intelligence (AI)** in nursing exponentially improves productivity but requires "competency readiness" [2]. In its new model, the JCI recommends reducing the administrative burden by 30% through digitization (**The Joint Commission 2025**) [31]. For Yemen, this represents both a challenge and an opportunity to build technological pathways that allow nurses to focus on providing compassionate care. Furthermore, the findings explain how career development acts as a "job resource" that mitigates the negative effects of demanding workloads (**JD-R theory**). Low compliance with the IPSG can be interpreted through this theory as a consequence of the imbalance between high demands and available resources, leading to nursing burnout.

8.5. Public vs. Private Sector Disparities

Additional findings revealed that private hospitals significantly outperformed public hospitals in JCI implementation ($p < .001$). This disparity is attributed to the private sector's ability to provide better

incentives, technical equipment, and streamlined administrative service efficiencies through ongoing digital transformation frameworks [41].

9. Conclusions

Based on advanced statistical analysis and structural modeling, this study draws the following conclusions:

1. **Career development** (training, empowerment, and leadership) in fragile environments is not an end in itself; rather, it is the fuel that requires the "JCI standards engine" to translate into distinguished clinical performance. The strong mediation (0.609) proves that global standards act as institutional substitutes for weak local systems.
2. Yemeni nursing tended toward high compliance in **Patient Flow and Care (ACC, COP)** while faltering in **Safety Goals (IPSG)**. This reflects a "rescue culture" that prioritizes quantity to save lives but may overlook the quality associated with precise and safe protocols.
3. **The MMU** and **IPSG** represent the cornerstones of improving nursing care outcomes in fragile settings; adherence significantly reduces mortality and complications resulting from human error.
4. Career development successfully improved performance through only two JCI mediators: **Medication Management** and **Patient-Centered Care**. The **Critical Ratios (C.R.)** for these paths (5.217 and 3.053, respectively) exceeded the threshold of 1.96, reinforcing the statistical confidence in these specific pathways.
5. **The MMU** and **PCC** are the most effective channels for transmitting the impact of career development on clinical performance.
6. The non-significance of **IPSG, ACC, COP, and AOP** as mediators indicates a substantial gap between theoretical development and field practice.
7. The low level of **organizational culture** in Yemeni hospitals is a primary barrier to sustainable quality efforts, necessitating leadership interventions to rebuild the values of transparency and error-based learning.
8. Reliance on individual skills without a supportive organizational environment (Culture scored 3.93) renders the competitive advantage of Yemeni hospitals temporary and vulnerable to collapse upon talent migration.
9. Yemeni nurses exhibit high **adaptive capacity**; acceptable performance levels were achieved despite significant deficits in formal career development, indicating strong internal professional motivation that warrants institutional support.

10. Recommendations

10.1 Macro-Policy Recommendations (Ministry of Health & Organizations)

- **Activate the National Hospital Accreditation Program (AHSAN)** and link it to annual performance evaluations, integrating patient-centered JCI standards as mandatory licensing requirements.
- **Redesign career development** to be **competency-based**, linking professional growth to improvements in clinical indicators associated with JCI standards, particularly medication safety, and humanistic patient-centered care.
- **Collaborate with JCI** to develop a "flexible" version of standards—**Context-Based Accreditation**—that accounts for resource scarcity in fragile environments without compromising core safety.
- Link public hospital funding and international grants to the level of **IPSG implementation** as a top priority for funding.

10.2 Administrative and Operational Recommendations (Hospital Management)

- **Data-Driven Decision Making:** Train nurses to utilize clinical data, supporting PCC and MMU standards, while reducing administrative burdens by 30% through digitization.
- **Leadership Training:** Focus on training department heads and supervisors in **humble and supportive leadership** to ensure impact sustainability across management changes.
- **Incentive Systems:** Design reward systems that link professional development to nursing outcomes, clinical results, and quality compliance to create positive feedback loops.
- **Soft Skills Integration:** Incorporate communication and emotional intelligence into annual performance reviews and incentivize initiatives that involve patients and their families in the care plan.
- **Electronic Health Records (EHR):** Gradually transition toward electronic records to facilitate continuous evaluation and allow nurses to apply developmental training with higher flexibility.
- **Operational Intervention:** Because some standards (such as ACC) were unaffected by nursing training alone, senior management must intervene to improve logistics and patient flow.

10.3 Career Development and Training Recommendations

- Yemeni hospital administrations should pivot away from traditional, sporadic training sessions toward **Micro-learning** and **On-the-Job Training (OJT)** directly linked to JCI performance indicators.

Abbreviations

1. **JCI:** Joint Commission International
2. **SEM:** Structural Equation Modeling
3. **IPSG:** International Patient Safety Goals
4. **MMU:** Medication Management and Use
5. **PCC:** Patient-Centered Care
6. **ACC:** Access to Care and Continuity of Care

7. **AOP:** Assessment of Patients
8. **COP:** Care of Patients
9. **RBV:** Resource-Based View
10. **JD-R:** Job Demands-Resources

Declarations

Ethical Approval and Consent to Participate

All methods were carried out in accordance with relevant guidelines and regulations (in accordance with the Declaration of Helsinki). This study was approved by the Ethical Committee of the Center of Business Administration at Sana'a University on July 15, 2024 (Approval No. 835). All participants provided written informed consent prior to participation, and confidentiality was ensured through anonymous data collection, guaranteeing the protection of participants' rights, safety, and well-being."

Consent for Publication

This was not possible because no individual participant data (e.g., images and identifiable information) were included in this study.

Availability of Data and Materials

The datasets generated and analyzed during this study are not publicly available because of ethical restrictions protecting participant confidentiality, but are available from the corresponding author (M.M.A, mwesabi@21umas.edu.ye) upon reasonable request, subject to approval by the Ethics Committee of Sana’a University.

Competing Interests

The authors declare that they have no competing interests regarding the publication of this research. No financial or personal relationships influenced the objectivity of the study’s findings.

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Authors’ Contributions

K.A.Q. (Kamal Ahmed Qabban) was responsible for the study’s conceptualization, literature review, data collection from the six hospitals, and performing the statistical analysis using Structural Equation Modeling (SEM) via AMOS software.

M.M.A. (Muneer Musleh Al-Wesabi) served as the lead supervisor, validated the research methodology and structural model construction, performed critical revisions of the manuscript, and is the corresponding author. Both authors have read and approved the final manuscript.

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- 48 Model Hospital.
- Azal Hospital.
- Modern European Hospital.
- Royal Hospital.
- Yemen Health International Hospital.

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Figures

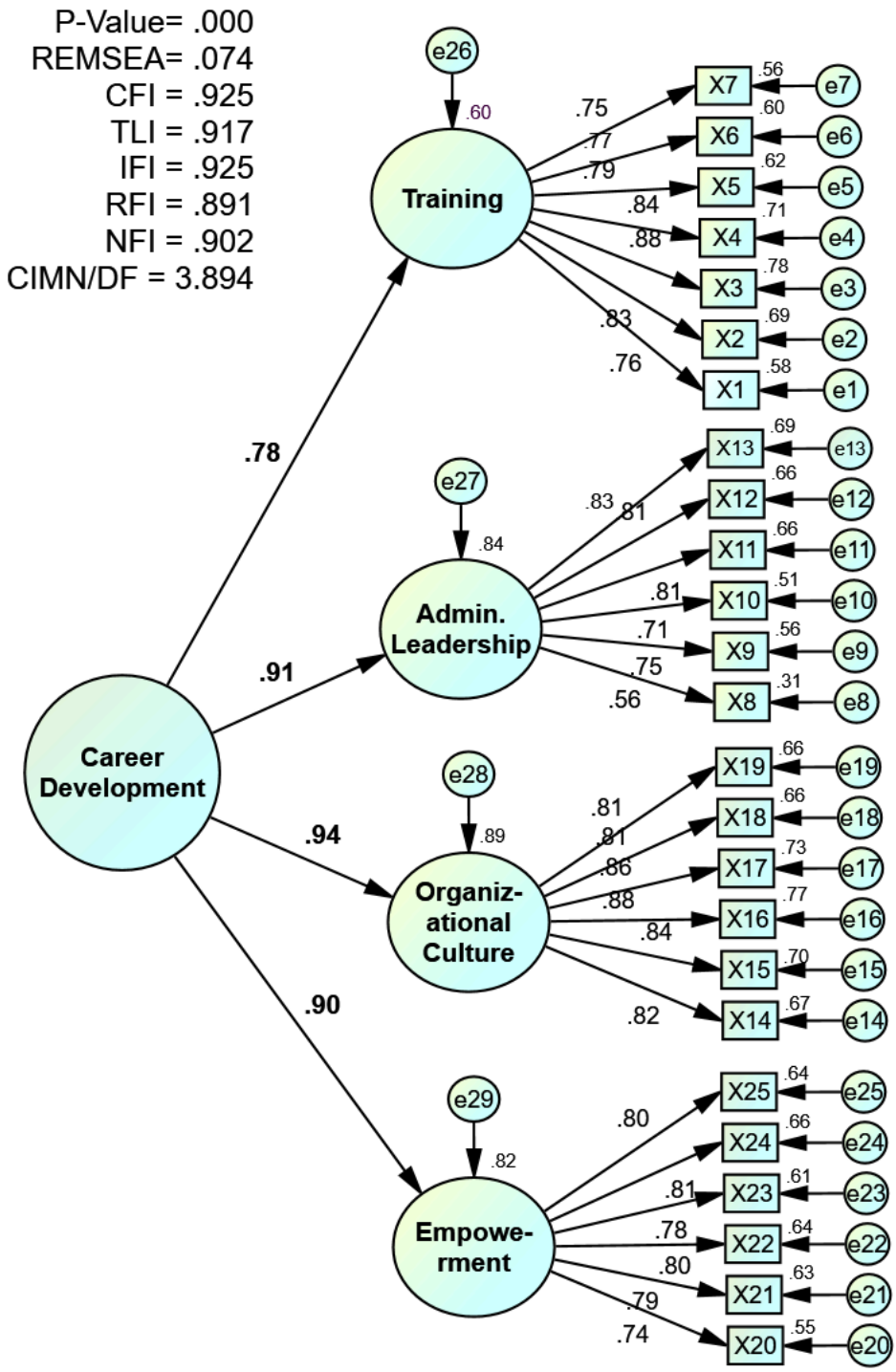


Figure 1

Second-Order CFA for the Career Development Scale

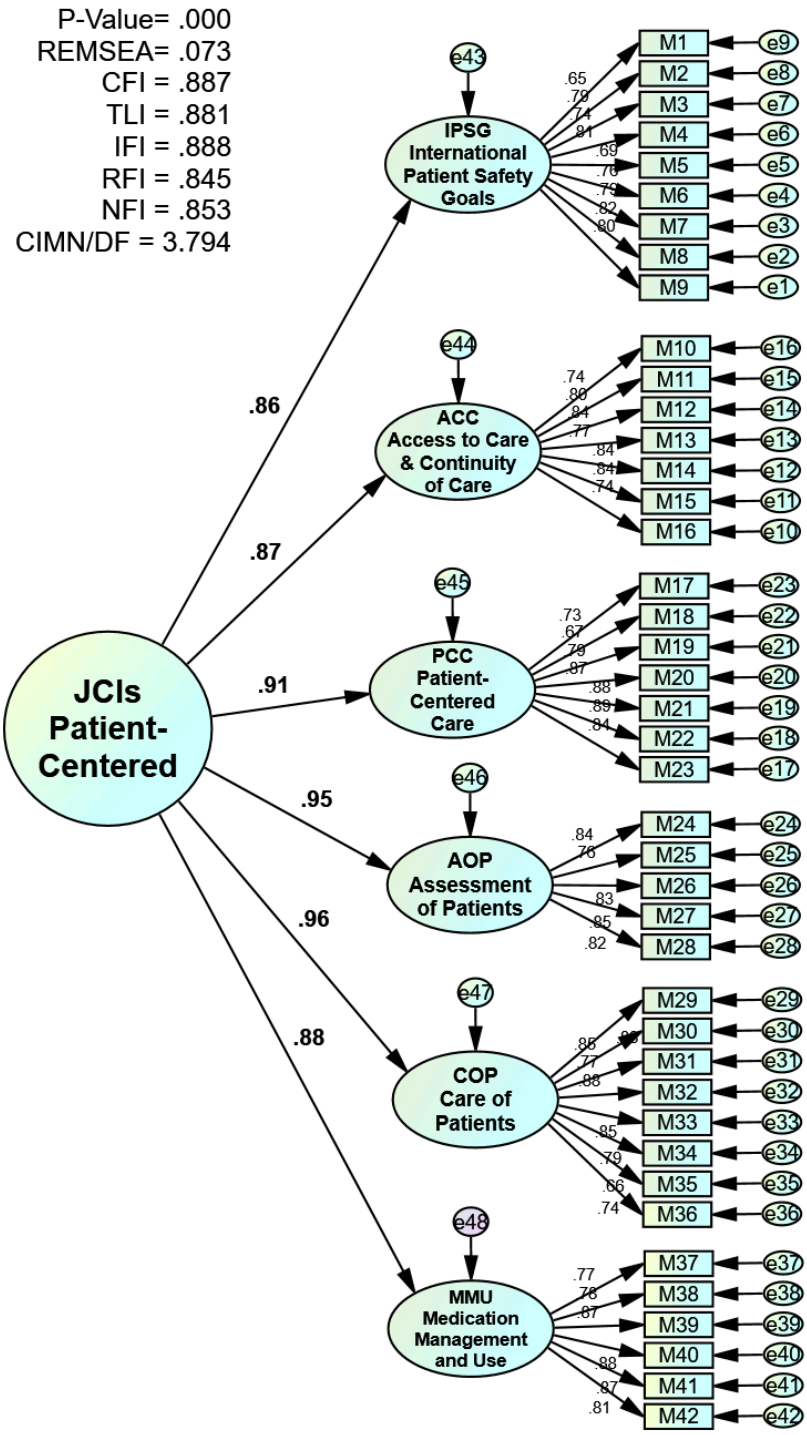


Figure 2

Second-Order CFA for the Patient-Centered JCI Standards Scale

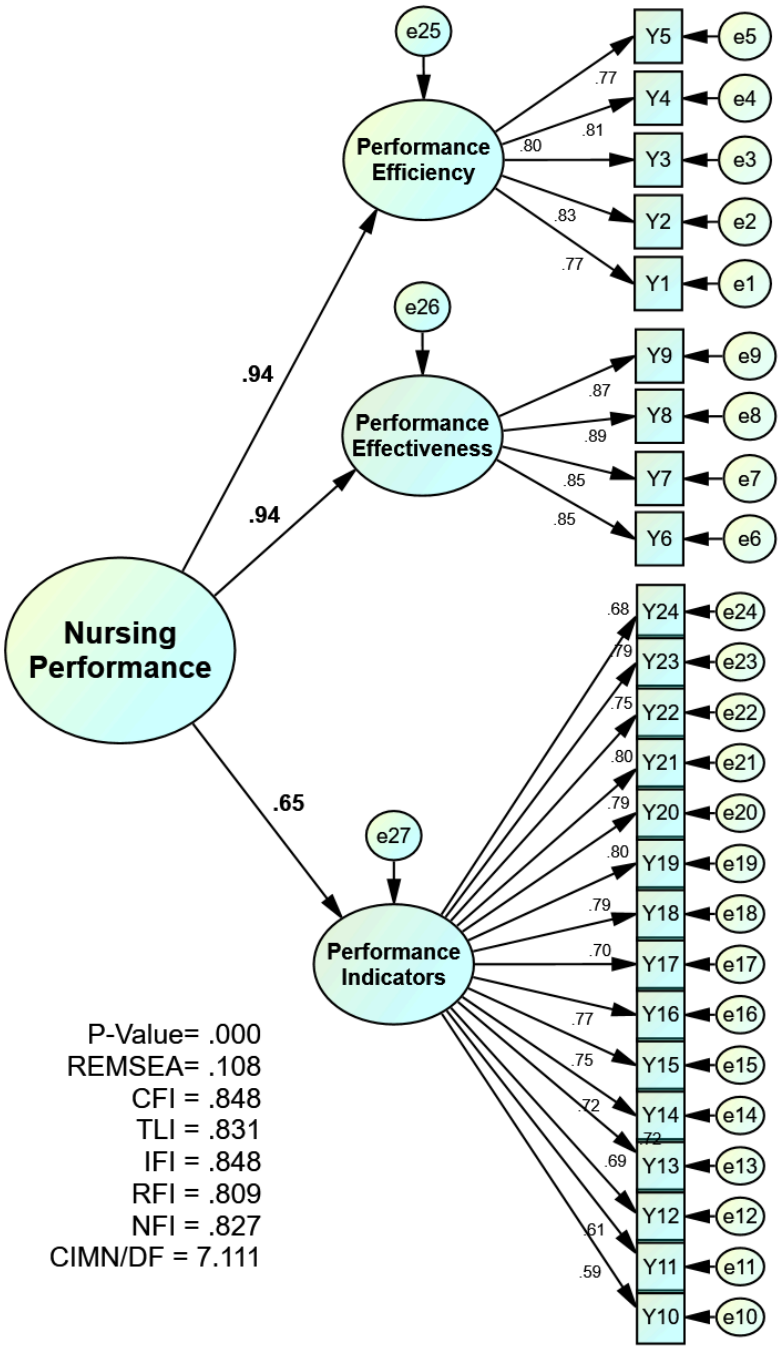


Figure 3

Second-Order CFA for the Nursing Performance Scale (A)

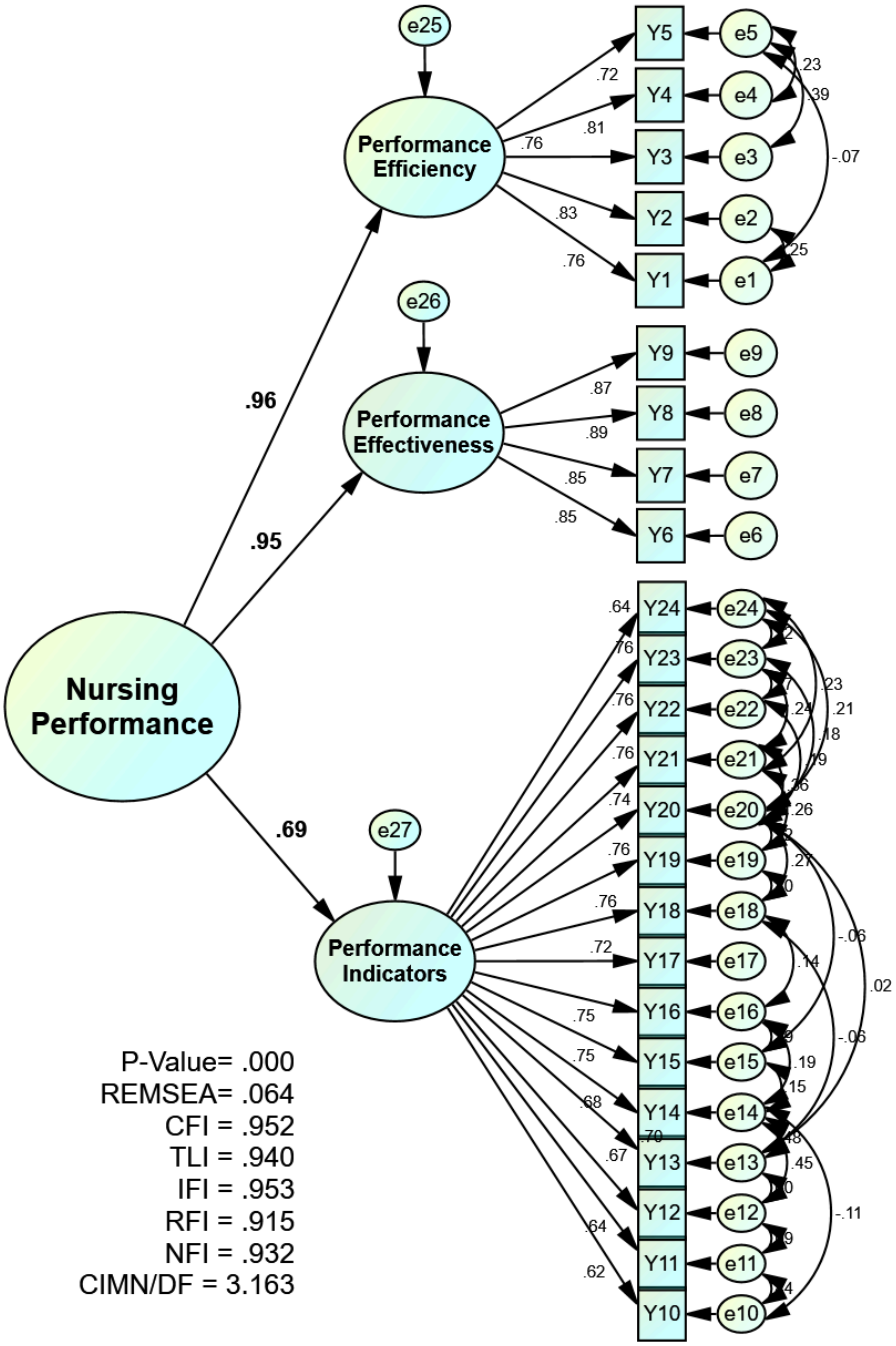


Figure 4

Second-Order CFA for the Nursing Performance Scale (B)

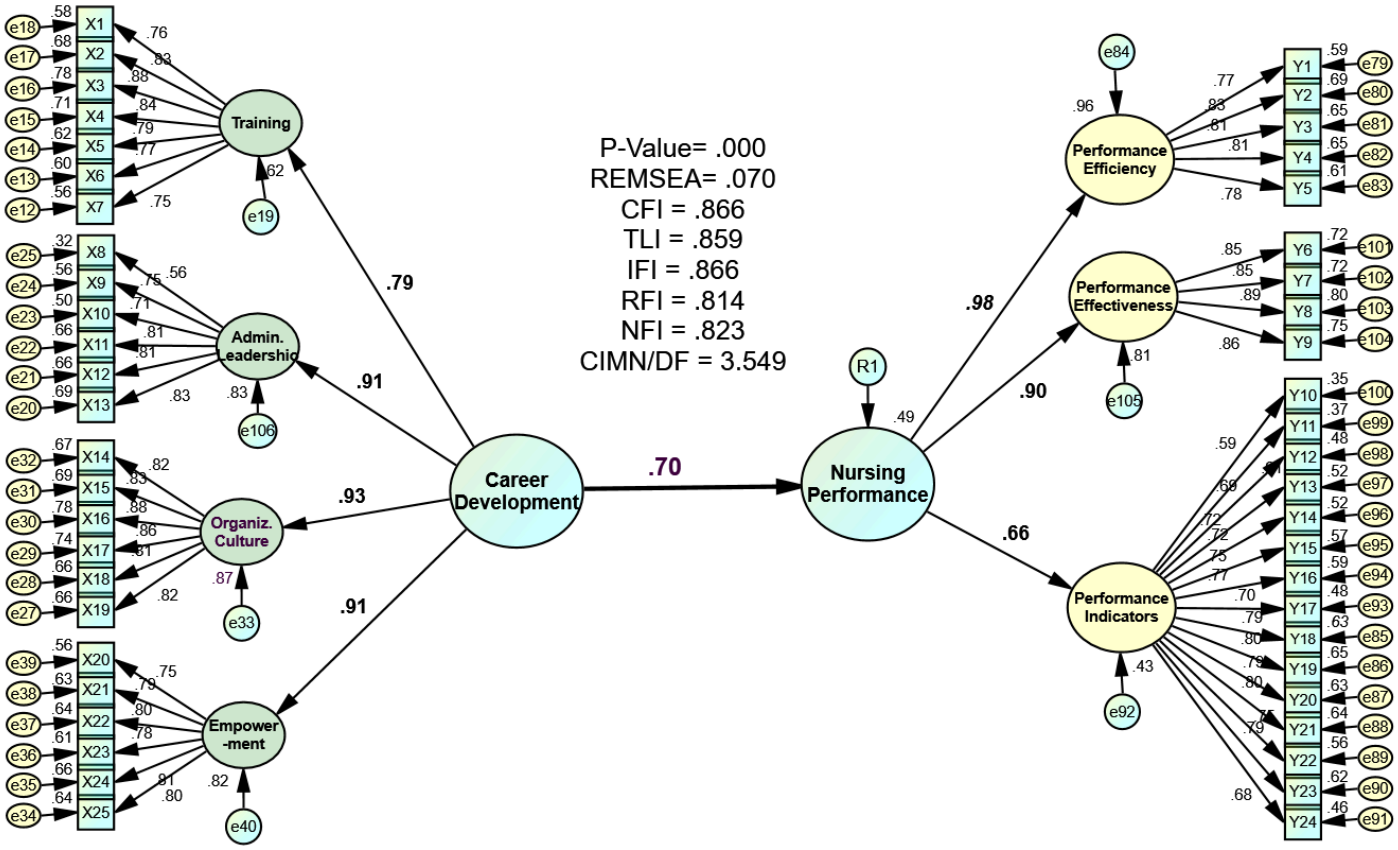


Figure 5

First Hypothesis (H1) Testing Results

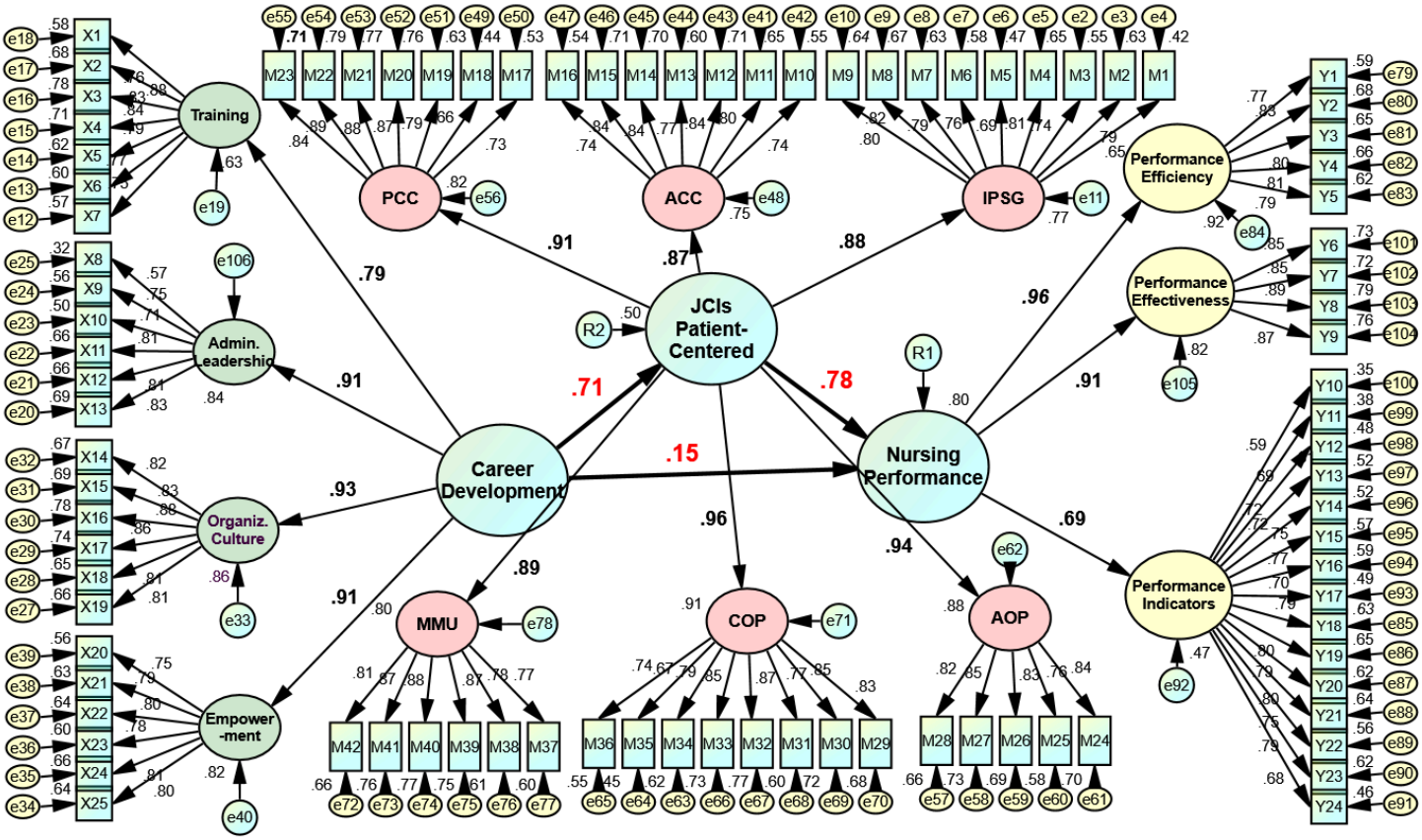


Figure 6

Second Hypothesis (H2) Testing Results (Structural Model)

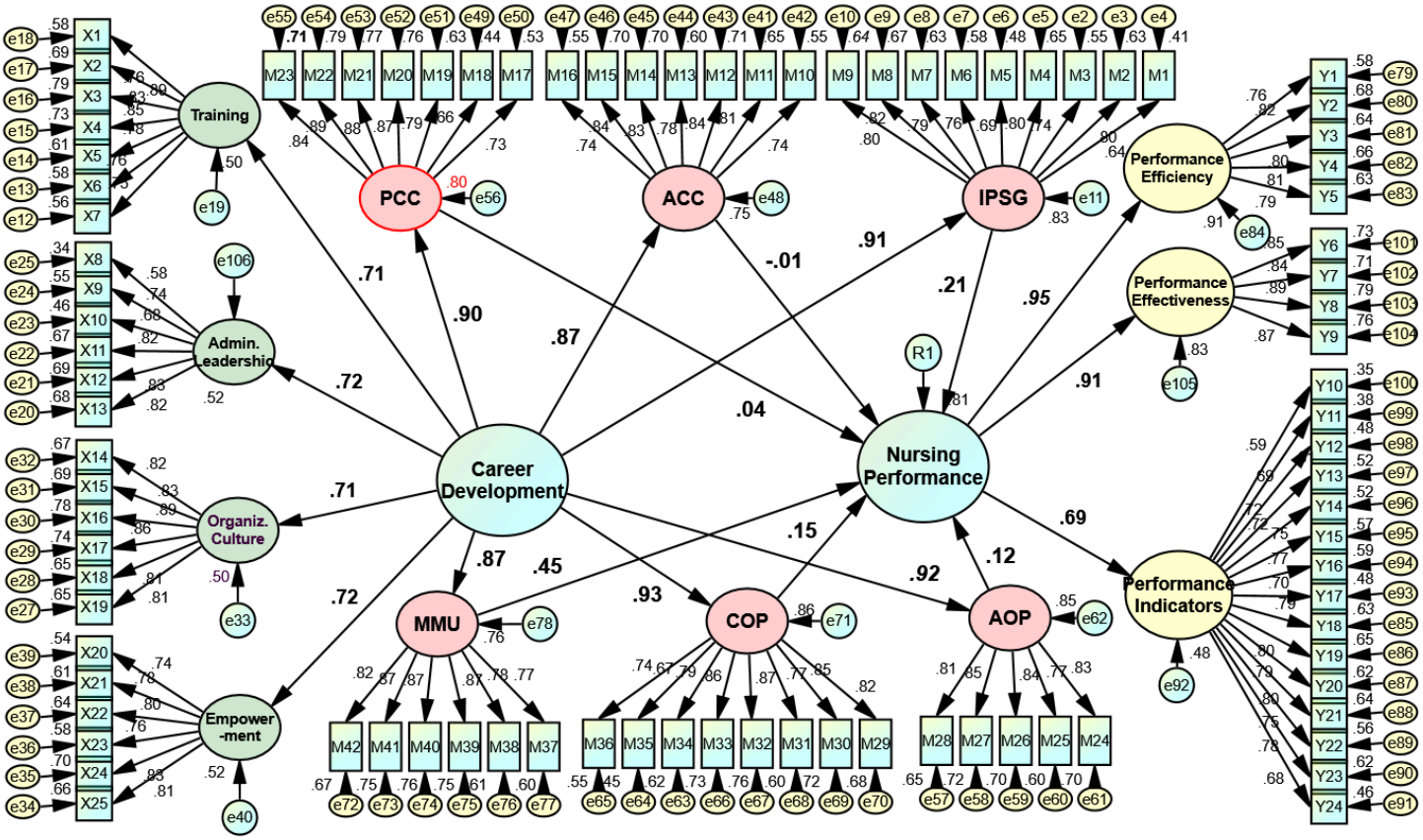


Figure 7

Second Hypothesis (H2) Sub-Hypotheses Testing Results