

PATIENT SAFETY COMPETENCY

Using Structural Equation Modeling (SEM), a Confirmatory Factor Analysis (CFA) was conducted to examine the factor structure of the Patient Safety Competency (PSC) scale and its seven subconstructs in **Figure A**. The sub-constructs examined were “Ethical and legal aspects of patient safety”, “Nursing practices to prevent or minimize harm from healthcare errors”, “Professional characteristics regarding patient safety”, “Risk management and quality Improvement”, “Academic and research skills regarding patient safety”, “Effective communication in healthcare team”, and “Technology and informatics for patient safety”. The CFA yielded acceptable model fit indices: (RMSEA=.060, CFI=.926, TLI=.917, IFI=.926, CMIN/DF=2.028, SRMR=.046) (Kyndt & Onghena, 2014). Standardized factor loadings exceeded the threshold of .63 recommended by Comrey and Lee (1992), indicating significant relationships between the observed indicators and their factors.

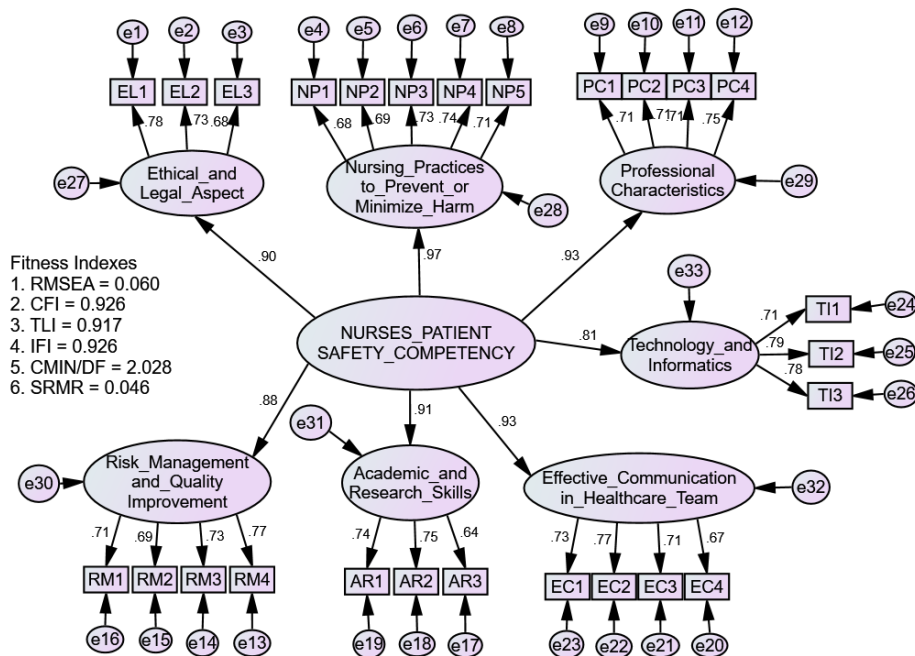


Figure A: The CFA measurement model results for PSC model (All are significant). The figure at the single-headed arrow measures the factor loading of the items.

Table 1 provides detailed descriptions of the abbreviations used for various patient safety competency items in the confirmatory factor analysis shown in **Figure A** above, along with their respective factor loadings. For example, **EL1** represented “**Able to express ideas to prevent risk or harm from nursing care**” under “**Ethical and legal aspects of patient safety**”, **NP1** represented “**Able to administer drugs according to the 7 principles of accuracy: right drug, right way, right time, right size, right person, right record, and ask questions when in doubt about prescription**” under “**Nursing practices to prevent or minimize harm from healthcare errors**”

Table 1: Item Description, and Factor Loadings

Construct	Item description	Factor loading
Patient safety competency	Professional characteristics regarding patient safety	.93
	Effective communication in healthcare team	.93
	Ethical and legal aspects of patient safety	.90
	Technology and informatics for patient safety	.81
	Risk management and quality Improvement	.88
	Academic and research skills regarding patient safety	.91
	Nursing practices to prevent or minimize harm from healthcare errors	.97
Sub-Constructs		
Ethical and legal aspects of patient safety	EL1 (Able to express ideas to prevent risk or harm from nursing care)	.78
	EL2 (Able to assist patients with respect to patient rights)	.73
	EL3 (Able to choose a suitable method to obtain consent for treatment based on the patient/guardian’s situation and limitations)	.68

Construct	Item description	Factor loading
Nursing practices to prevent or minimize harm from healthcare errors	NP1 (Able to administer drugs according to the 7 principles of accuracy: right drug, right way, right time, right size, right person, right record, and ask questions when in doubt about prescription)	.68
	NP2 (Able to assess abnormalities in prescribing and overdosing by doctors)	.69
	NP3 (Able to assess side effects or complications resulting from drug administration to patients)	.73
	NP4 (Able to select fall prevention method that is appropriate for each patient)	.74
	NP5 (Able to provide primary care to patients who have had a fall)	.71
Professional characteristics regarding patient safety	PC1 (Able to be observant and sensitive to potential risks to patients)	.71
	PC2 (Able to speak to others with a positive attitude)	.71
	PC3 (Able to listen and understand others)	.71
	PC4 (Able to express opinions and make suggestions to others with courage)	.75
Risk management and quality Improvement	RM1 (Able to study the changes in the hospital's quality and safety improvement system)	.71
	RM2 (Able to explore the goals and approaches used by the hospital to manage clinical risk)	.69
	RM3 (Able to identify the classification and level of clinical risks)	.73
	RM4 (Able to choose methods for reporting adverse events in each situation)	.77

Construct	Item description	Factor loading
Academic and research skills regarding patient safety	AR1 (Able to present and exchange knowledge about safe patient care with other personnel)	.74
	AR2 (Able to participate in the design and implementation of nursing quality improvement projects)	.75
	AR3 (Able to use research or empirical evidence for safe nursing care)	.64
Effective communication in healthcare team	EC1 (Able to advise patients and their families to observe the patient's abnormal signs and symptoms)	.73
	EC2 (Able to communicate to patients and family to trust and motivate the family to participate in patient care for safety)	.77
	EC3 (Able to communicate patient's changes verbally to the doctor.)	.71
	EC4 (Able to practice accurate nursing shift handover)	.67
Technology and informatics for patient safety	TI1 (Able to understand the hospital's risk recording and reporting system)	.71
	TI2 (Able to assess patients' risks from information in medical records)	.79
	TI3 (Able to use the network to communicate with the treatment team without conflicting with the law and professional ethics)	.78

VALIDITY AND RELIABILITY: PATIENT SAFETY COMPETENCY

Convergent validity and composite reliability were evaluated for patient safety competency tool. The composite reliability values were above .70, indicating adequate composite reliability.

Average variance extracted (AVE) values exceeded .50, suggesting good convergent validity (Hair et al., 2014) (**Table 2**).

Table 2: Composite reliability and Convergent validity for PSC and its sub-constructs

Construct	Composite reliability (Above .70)	Convergent validity (Above .50)
Patient safety competency	.97	.82
Ethical and legal aspects of patient safety	.77	.53
Nursing practices to prevent or minimize harm from healthcare errors	.84	.51
Professional characteristics regarding patient safety	.81	.51
Risk management and quality Improvement	.82	.53
Academic and research skills regarding patient safety	.75	.51
Effective communication in healthcare team	.81	.52
Technology and informatics for patient safety	.80	.58

KEY PERFORMANCE INDICATORS (KPIs) FOR PATIENT SAFETY OUTCOMES (KPIs PSO) AND LEADERSHIP ROLE REGARDING PATIENT SAFETY

The Pooled CFA analysis was also conducted to examine the factor structure of the Key Performance Indicators (KPIs) for Patient Safety Outcomes (KPIs PSO) as well as the leadership role regarding patient safety. The analysis revealed that all indicators loaded well onto their respective factors, with all factor loadings exceeding the recommended threshold of .63. The model demonstrated good fit indices across various metrics: (RMSEA=.061, CFI=.915, TLI=.907, IFI=.916, CMIN/DF=2.076, SRMR=.050) (Kyndt & Onghena, 2014) (**Figure B**).

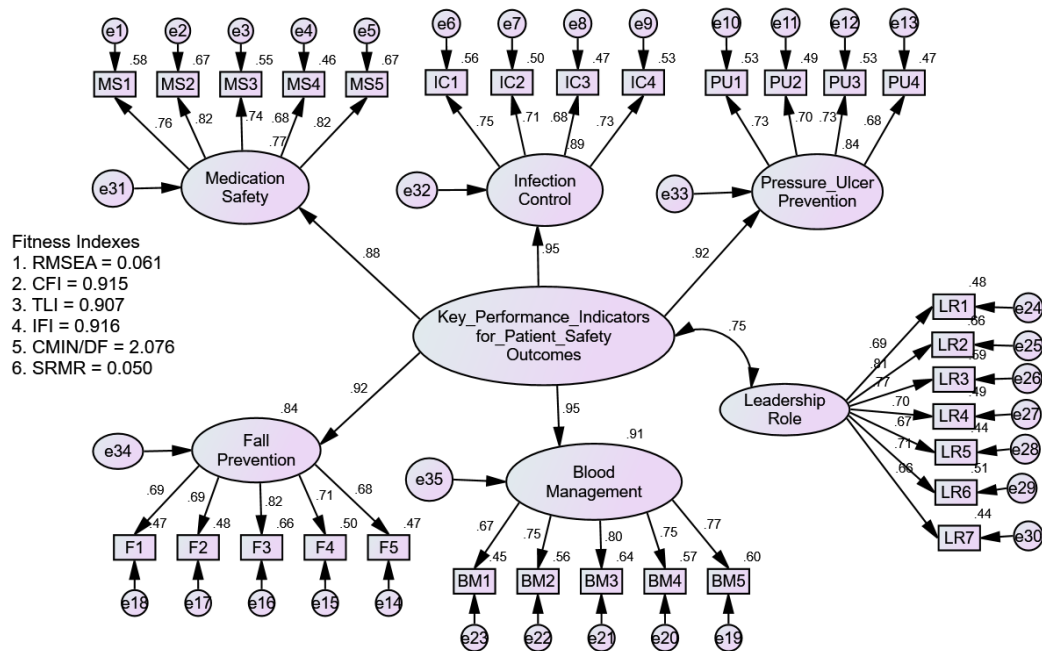


Figure B: The Pooled CFA measurement model results for KPIs PSO model and Leadership Role (All are significant). The figure at the double-headed arrow indicates the correlation between constructs while the figure at the single-headed arrow measures the factor loading of the items.

Table 3 also offers detailed descriptions of the abbreviations for various key performance indicators and leadership roles related to patient safety items, as depicted in the confirmatory factor analysis in **Figure B**, along with their corresponding factor loadings. For example, **MS1** represented “**Medication orders are clear and easily understood**” under “**Medication Safety**”, **LR1** represented “**Leadership ensures that there are adequate financial resources allocated to support patient safety initiatives**” under “**Leadership role regarding patient safety**”

Table 3: Item Description, Factor Loadings, Composite Reliability (CR) and Average Variance Extracted (AVE) for KPIs PSO model and Leadership Role

Construct	Item description	Factor loading
Medication Safety	MS1 (Medication orders are clear and easily understood)	.76

Construct	Item description	Factor loading
	MS2 (Medication administration is accurately documented in medical records)	.82
	MS3 (The healthcare team takes necessary precautions to prevent medication errors)	.74
	MS4 (Nurses double-check patient identities before administering medications)	.68
	MS5 (Adequate measures are in place to prevent allergic reactions to medications)	.82
Infection Control	IC1 (The healthcare facility maintains a clean and hygienic environment)	.75
	IC2 (Staff consistently follows proper hand hygiene protocols)	.71
	IC3 (There is clear communication about infection prevention measures)	.68
	IC4 (The healthcare facility actively monitors and addresses healthcare-associated infections)	.73
Pressure Ulcer Prevention	PU1 (The healthcare team assesses and documents risks for pressure ulcers regularly)	.73
	PU2 (Adequate measures are in place to prevent pressure ulcers, such as repositioning and the use of pressure-relieving devices)	.70
	PU3 (Staff receive education on how to prevent pressure ulcers during their stay)	.73
	PU4 (Patients and families are educated on pressure ulcer prevention measures)	.68
Fall Prevention	F1 (Fall risk assessments are routinely conducted for all patients)	.69

Construct	Item description	Factor loading
	F2 (Individualized fall prevention plans are developed for high-risk patients)	.69
	F3 (Staff receive education on how to prevent falls in the healthcare facility)	.82
	F4 (Adequate lighting is maintained in patient care areas)	.71
	F5 (Fall prevention protocols are regularly reviewed and updated)	.68
Blood Management	BM1 (Staff are regularly updated on advancements in blood management practices)	.67
	BM2 (Blood transfusions are administered according to established protocols)	.75
	BM3 (Measures are in place to prevent transfusion reactions)	.80
	BM4 (Clear communication is maintained regarding blood management procedures)	.75
	BM5 (Blood product storage and transportation adhere to safety guidelines)	.77
Leadership role regarding patient safety	LR1 (Leadership ensures that there are adequate financial resources allocated to support patient safety initiatives)	.69
	LR2 (Leadership effectively manages and allocates physical resources (equipment, technology, etc.) to enhance patient safety)	.81
	LR3 (Leadership ensures that the facility is designed and maintained to promote a safe environment for patients and staff)	.77
	LR4 (Leadership actively engages with and supports staff involvement in patient safety initiatives)	.70

Construct	Item description	Factor loading
	LR5 (Leadership promotes a culture of open communication and encourages staff to report safety concerns without fear of reprisal)	.67
	LR6 (Leadership clearly communicates and integrate patient safety goals into the overall facility goals)	.71
	LR7 (Leadership actively seeks and incorporates feedback from staff and patients to improve patient safety strategies)	.66

VALIDITY AND RELIABILITY: KEY PERFORMANCE INDICATORS (KPIs) FOR PATIENT SAFETY OUTCOMES (KPIs PSO) AND LEADERSHIP ROLE REGARDING PATIENT SAFETY

Convergent validity and composite reliability were evaluated for the key performance indicators (KPIs) for patient safety outcomes and leadership role regarding patient safety tools. KPIs subconstructs, including Medication Safety, Infection Control, Pressure Ulcer Prevention, Fall Prevention, and Blood Management as well as Leadership Role regarding Patient Safety, exhibited composite reliability scores above .70 and Average Variance Extracted (AVE) above .50, indicating adequate composite reliability and good convergent validity (Hair et al., 2014) (Table 4).

Table 4: Composite reliability and Convergent validity for KPIs for Patient Safety Outcome and Leadership Role constructs

Construct	Composite reliability (Above .70)	Convergent validity (Above .50)
Medication Safety	.88	.59
Infection Control	.81	.51
Pressure Ulcer Prevention	.80	.51

Construct	Composite reliability (Above .70)	Convergent validity (Above .50)
Fall Prevention	.84	.52
Blood Management	.87	.57
Leadership role regarding patient safety	.88	.52