Risk Management and Healthcare Policy

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ORIGINAL RESEARCH

Development and Validation of a Postoperative LEDVT Risk Assessment System for Severe Traumatic Brain Injury

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Objective: This study aimed to develop a structured risk assessment system for postoperative lower extremity deep vein thrombosis (LEDVT) in patients with severe traumatic brain injury (sTBI), and to validate its content and reliability through expert consensus.

Methods: The system was designed based on evidence from a comprehensive literature review and refined through a two-round Delphi expert consensus process involving 16 multidisciplinary experts. Indicator weights were assigned using an analytic hierarchy process combined with expert scoring.

Results: The finalized framework incorporated 6 primary domains—demographic characteristics, trauma-related indicators, coagulation parameters, comorbidities, iatrogenic factors, and venous thromboembolism prophylaxis—encompassing 19 secondary indicators. Response rates for two rounds of the expert questionnaire were 100%. The expert authority coefficient was 0.931. The coefficients of variation for the second-round indicators ranged from 0% to 7.01% and Kendall's coefficient of concordance was 0.670 ($p < 0.001$), indicating a high degree of expert agreement.

Conclusion: A comprehensive risk prediction indicator system for LEDVT following sTBI surgery was established. The system is suitable for direct integration into hospital information systems, with weighted indicators reflecting clinical priorities and supporting the development of real-time monitoring modules.By enabling early identification of high-risk patients, this tool can facilitate timely prophylactic interventions, enhance clinical decision-making, and ultimately reduce the incidence of postoperative LEDVT, thereby improving patient safety and overall quality of care.

Keywords: assessment indicators, Delphi method, lower extremity deep venous thrombosis, nursing, risk factors, severe traumatic brain injury

Introduction

Severe traumatic brain injury (sTBI) is defined as substantial damage to brain tissue resulting from direct or indirect external forces to the head, characterized by a Glasgow coma scale (GCS) score of ≤ 8.[1] Epidemiological studies indicate that sTBI accounts for 13% to 21% of all craniocerebral injuries.[2] Its global incidence has risen in parallel with the expansion of transportation networks, construction activities, and participation in high-risk sports.[3] Patients with sTBI frequently present in critical condition with rapid neurological deterioration, often requiring emergent surgical intervention followed by intensive care unit (ICU) admission for advanced life-support measures.

Lower extremity deep vein thrombosis (LEDVT) is a serious postoperative complication in patients with sTBI. Reports indicate that LEDVT develops within 72 hours after surgery in up to 11% of cases, and thrombus detachment can lead to fatal pulmonary embolism (PE), substantially increasing mortality.[4,5] Even with standardized prophylactic anticoagulation, the incidence of LEDVT remains between 5% and 10%.[4,5] Current guidelines for VTE prophylaxis in trauma patients, including those with sTBI, recommend a combination of mechanical and pharmacological measures.[6,7] Mechanical prophylaxis,

https://doi.org/10.2147/RMHP.S585801
Received: 1 December 2025
Accepted: 30 March 2026
Published: 21 April 2026

including graduated compression stockings and intermittent pneumatic compression devices, should be initiated upon admission in the absence of lower extremity injuries.[8] Pharmacological prophylaxis is typically initiated once the risk of intracranial hemorrhage progression has stabilized. Low molecular weight heparin (LMWH) is the preferred agent over unfractionated heparin (UFH), with evidence suggesting superior efficacy in reducing VTE events without increasing mortality or neurosurgical interventions.[9,10] The optimal timing for initiation remains a subject of ongoing investigation, with consensus favoring initiation within 24–72 hours post-injury or surgery, provided there is no evidence of active bleeding or hemorrhagic progression.[11] Despite these standardized protocols, LEDVT continues to occur, highlighting the need for improved risk stratification to guide individualized preventive strategies.Early identification of risk factors is critical for guiding targeted preventive strategies and improving clinical outcomes. However, a validated tool for LEDVT risk assessment following sTBI surgery has not yet been established in China. Existing research on related risk factors is limited by several constraints: (1) a predominant focus on isolated variables without comprehensive integration; (2) inadequate consideration of sTBI-specific pathophysiological mechanisms, such as coagulation abnormalities, and (3) lack of clarity in assigning indicator weights, limiting their applicability in clinical prioritization.

To address these limitations, this study aimed to develop a multidimensional risk assessment system for LEDVT in patients with sTBI. Through an evidence-based and consensus-driven approach, we sought to identify and prioritize key risk indicators specific to this population. The resulting system is intended to serve a dual purpose: to provide clinical nurses with a standardized tool for bedside risk evaluation, and to establish a foundational framework for the future development of an intelligent risk-warning platform integrated into hospital information systems.

Materials and Methods

Research Team Formation

The research team consisted of eight members: one department director, the deputy director of the nursing department, a head nurse, two critical care nurses, and three graduate nursing students. The deputy director of the nursing department served as the team leader, responsible for overall project direction, scheduling, quality control, and phased evaluations. Team members were tasked with the following: 1) retrieving and reviewing Chinese and international literature to compile a preliminary list of indicators for the expert survey related to risk factors for postoperative LEDVT in patients with sTBI; 2) selecting and consulting domain experts; 3) analyzing and synthesizing expert feedback and scoring results to refine the assessment indicators; and 4) formulating the final postoperative LEDVT risk factor assessment indicator system for patients with sTBI. Ethical approval for the study was obtained from the Ethics Committee of Shanghai Sixth People's Hospital (No. 2025-KY-133(K)).

Preliminary Design of Indicator Framework

A systematic literature search was conducted using the Chinese keywords—craniocerebral trauma, TBI, venous thrombosis, deep vein thrombosis, DVT, risk factors, influencing factors, and relevant factors—and their English equivalents. Eight major Chinese and international databases—Wanfang Data, CNKI, PubMed, Cochrane Library, Embase, Web of Science, CINAHL, and SinoMed—were searched. Studies were included if they: (1) defined sTBI as a Glasgow Coma Scale (GCS) score of $\leq$ 8; (2) involved adult patients undergoing surgery for sTBI; and (3) reported risk factors associated with postoperative LEDVT.Exclusion criteria were: (1) non-original research (eg., reviews, editorials, conference abstracts, case reports); (2) studies not published in Chinese or English; (3) full-text unavailable; and (4) studies that did not clearly define sTBI or did not focus specifically on risk factors for LEDVT in the sTBI surgical population.

Analysis of the retrieved studies, including a recent meta-analysis by our team that synthesized data from 13 studies involving 777,327 patients,[12] identified multiple significant risk factors for LEDVT following surgery in patients with sTBI. These factors, such as advanced age, elevated D-dimer, mechanical ventilation, and blood transfusion, served as the core evidence base for developing the indicator system.

In accordance with the established principles for constructing assessment indicator systems, the extracted results were examined to summarize and screen potential LEDVT risk indicators. A multidisciplinary expert meeting was subsequently convened, comprising clinicians and nurses with extensive experience in neurotrauma and critical care. During this process, core indicators were discussed and designated. Based on these findings, a preliminary framework was established consisting of 5 primary indicators and 17 secondary indicators.

Determining Evaluation Indicators

A Delphi survey was employed to evaluate the rationality, feasibility, and significance of potential indicators in the LEDVT risk factor framework for patients with sTBI. The collected responses were analyzed to determine the final set of assessment indicators.

Expert Survey Questionnaire

Compilation

The questionnaire was structured into three sections: an introduction, a main body, and an expert information form. 1) Introduction: This section provided an overview of the theoretical framework, research methodology, and completion criteria. 2) Main body: This section presented the operational definitions and formulations of potential LEDVT risk factors in sTBI, each rated using a five-point Likert scale to assess perceived importance. A free-text comment field followed each item, enabling experts to provide additional feedback and contextual remarks. 3) Expert information: This section collected demographic and professional background data, the experts' self-assessed familiarity with the topic, and the rationale supporting their evaluations.

The detailed content of the first-round and second-round questionnaires is provided as Supplementary Figure S1 and Supplementary Figure S2.

Selection of Experts

The recommended number of participants in a Delphi survey depends on research scope and resources.[13] Although a minimum of 12 experts from diverse disciplines is generally advised, for this study, 16 experts were purposively recruited, all of whom provided voluntary informed consent.[14]

Inclusion criteria were as follows: 1) healthcare professionals in critical care, vascular surgery, or orthopedics, as well as nursing management specialists with postgraduate supervisory qualifications, capable of providing multidimensional perspectives; 2) more than 10 years of professional experience with extensive clinical and theoretical expertise; 3) possession of a bachelor's degree or higher; 4) attainment of an intermediate or senior professional title; and 5) voluntary participation with informed consent.All 16 invited experts completed both rounds of the Delphi consultation, resulting in a 100% response rate and no expert dropout. In accordance with Delphi methodology, had any expert failed to complete a round, their data would have been excluded from the analysis if the response rate fell below 70%.

Administration

The survey was distributed through a combination of on-site paper questionnaires and email. Responses were collected one week after dissemination. Following the first round, responses were analyzed and indicators with a mean importance score > 4 and a coefficient of variation (CV) < 0.25 were retained. Indicators with a mean importance score ≤ 4 or CV ≥ 0.25 were considered for revision or exclusion based on expert feedback.Indicators were revised according to expert feedback to produce the second-round questionnaire. Following the second round, responses were synthesized and further refinements were applied to relevant indicators. Expert consensus was achieved after two rounds.To assess the reliability of expert judgments, we calculated the expert authority coefficient (Cr) for each round. Cr is derived from the judgment coefficient (Ca), which reflects the basis of the expert's opinion (eg., theoretical knowledge, practical experience), and the familiarity coefficient (Cs), which indicates the expert's familiarity with the topic. In accordance with established Delphi methodology, Cr $\geq$ 0.7 was considered acceptable, and Cr $\geq$ 0.8 indicated a high level of authority.[15,16]

Calculation of Indicator Weights

The AHP was applied to evaluate the primary indicators of the postoperative LEDVT risk factor framework in patients with sTBI. A judgment matrix for primary indicators was constructed using the 1–9 Saaty ratio scale. Weight coefficients for each indicator were then derived, and consistency tests were conducted for both individual and overall rankings. Based on

 https://doi.org/10.2147/RMHP.S585801

the weights of the primary indicators, a combined weighting method was applied to determine the weights of the secondary indicators. Specifically, score ratios for secondary indicators were calculated from expert-assigned importance ratings and multiplied by the corresponding primary indicator weights to obtain the final combined weight coefficients.

Statistical Methods

Data entry was performed independently by two researchers using Microsoft Excel, and statistical analyses were conducted with SPSS 25.0 (IBM Corp., Armonk, NY, USA). The AHP calculations were executed using SPSSAU 2022 software to determine indicator weights. Descriptive statistics for expert characteristics are expressed as frequencies and percentages. The questionnaire recovery rate was used as a measure of expert engagement.[17] The expert authority coefficient (Cr) was calculated to assess the level of authority, while coordination among experts was evaluated using the non-parametric multi-sample Kendall coefficient of concordance (Kendall' W) and CV. Importance ratings of indicators are reported as mean ± standard deviation.

Results

Expert Characteristics

Sixteen experts participated in the Delphi process. The mean age was 46.69 ± 6.75 years, and the average duration of professional experience was 25.81 ± 7.39 years. Among the participants, 18.8% (n = 3) held doctoral degrees, 43.8% (n = 7) held master's degrees, and 75.0% (n = 12) had senior professional titles. Table 1 presents the baseline data of the participating experts in the experiment.

Expert Engagement

Both consultation rounds achieved full participation, with all 16 questionnaires distributed and returned in each round, yielding a 100% valid response rate. In the first round, 11 experts proposed 36 revisions, while no additional suggestions were made in the second round.

Table 1 Basic Data of Participating Experts (n = 16)

Item	Classification	N	Constituent Ratio (%)
Professional Title	Intermediate	4	25.00
	Associate Senior	6	37.50
	Senior	6	37.50
Educational Level	Bachelor's degree	6	37.50
	Master's degree	7	43.75
	Doctoral degree	3	18.75
Age	30-39	2	12.50
	40-49	8	50.00
	50-59	5	31.25
	>60	1	6.25
Working Experience	10-15 years	1	6.25
	16-20 years	3	18.75
	> 20 years	12	75.00
Department	Orthopedic Traumatology	2	12.50
	Vascular Surgery	3	18.75
	Critical Care Medicine	5	31.25
	Neurosurgery	3	18.75
	Nursing	3	18.75
Professional Field	Clinical Medicine and Nursing	10	62.50
	Nursing Management	4	25.00
	Nursing Education	2	12.50

(*Continued*)

Table 1 (Continued).

Item	Classification	N	Constituent Ratio (%)
Working Province/ Municipality	Shanghai	10	62.50
	Fujian Province	1	6.25
	Zhejiang Province	2	12.50
	Hubei Province	1	6.25
	Jiangsu Province	1	6.25
	Shandong Province	1	6.25

Expert Authority

The expert Cr, calculated as the arithmetic mean of the judgment coefficient and the familiarity coefficient, was 0.931, indicating a high level of authority among the participating experts. All coefficients from the two rounds of expert authority questionnaire testing are presented in Table 2.

Expert Opinion Coordination

The degree of coordination among experts was assessed to evaluate the consistency of assessments and reliability of conclusions. A CV < 25.00% and a Kendall's W value approaching 1 were considered indicators of strong coordination. The results of the coordination analysis across both rounds are presented in Table 3.

Expert Survey Results

Based on the first round feedback, indicators were revised at multiple levels:

1. Exclusion of indicators: Six secondary indicators were removed according to the thresholds of a CV < 0.25 and a mean significance score > 3.5.
2. Revision of indicators: Five secondary indicators were refined following expert suggestions. Modifications included clarifying the inclusion criteria and subtypes of hypertension and diabetes, as well as incorporating the duration of mechanical ventilation, deep vein catheterization, and use of dehydration agents.
3. Addition of indicators: Six new secondary indicators were introduced. The location and severity of multiple injuries were incorporated, and two comorbidity-specific indicators—chronic lung disease and pneumonia/lung infection—were added. Three further indicators—basic prevention, physical prevention, and pharmacological prevention—were incorporated under the LEDVT prevention domain, each accompanied by specific action categories.

Table 2 Expert Authority Questionnaire

Round	Expert Judgment Coefficient	Expert Familiarity Coefficient	Expert Authority Coefficient
First	0.956	0.875	0.916
Second	0.975	0.888	0.931

Table 3 Degree of Coordination of Expert Opinions

Round	Kendall' s W value	X^2 value	*p* value
First	0.373	143.387	<0.001
Second	0.670	246.572	<0.001

 https://doi.org/10.2147/RMHP.S585801

Table 4 Assessment Indicator System and Weights of Postoperative LEDVT Risk Factors in Patients with sTBI

Indicator	Importance Assignment (x ± s)	Coefficient of Variation	Weight
A Demographic characteristics	5.00±0.00	0.00	0.167
A1 Advanced age	4.94±0.25	0.05	0.084
A2 Body mass index	4.94±0.25	0.05	0.084
B Trauma-related factors	5.00±0.00	0.00	0.167
B1 Glasgow Coma Scale (GCS) score	5.00±0.00	0.00	0.057
B2 ICU length of stay	4.88±0.34	0.07	0.055
B3 Polytrauma	4.87±0.33	0.07	0.055
C Coagulation function	5.00±0.00	0.00	0.168
C1 D-dimer	5.00±0.00	0.00	0.084
C2 Prothrombin time (PT)	4.94±0.25	0.05	0.084
D Comorbidities	5.00±0.00	0.00	0.167
D1 Hypertension	5.00±0.00	0.00	0.044
D2 Diabetes	5.00±0.00	0.00	0.044
D3 Chronic lung disease	4.06±0.25	0.06	0.036
D4 Pneumonia/lung infection	4.94±0.25	0.05	0.044
E Iatrogenic exposures	4.94±0.25	0.05	0.165
E1 Mechanical ventilation	4.94±0.25	0.05	0.034
E2 Deep venous catheterization	5.00±0.00	0.00	0.035
E3 Operative duration	4.94±0.25	0.05	0.034
E4 Blood transfusion	4.06±0.25	0.06	0.028
E5 Dehydrating agents	4.94±0.25	0.05	0.034
F LEDVT prevention	5.00±0.00	0.00	0.167
F1 Basic prevention	4.88±0.34	0.07	0.055
F2 Physical prevention	4.94±0.25	0.05	0.056
F3 Pharmacological prevention	5.00±0.00	0.00	0.056

The CV for indicators in the revised framework ranged from 0.00 to 0.07, reflecting strong expert consensus. No further modifications were suggested and the consultation process was therefore finalized. The resulting postoperative LEDVT risk assessment indicator system for patients with sTBI comprised 6 primary indicators and 19 secondary indicators. A judgment matrix was subsequently generated from expert ratings using the Saaty scale and indicator weights were calculated accordingly (Table 4).

Discussion

Scientific Rigor and Reliability of Questionnaire

The questionnaire was developed using a combination of expert consultation and the Delphi method, integrating both clinical evidence and multidisciplinary consensus. Sixteen senior specialists in neurocritical care, vascular surgery, orthopedics, and nursing management were recruited, each with at least ten years of professional experience and an intermediate or higher academic title. Building on findings from prior meta-analyses, structured expert discussions aligned evidence from the literature with clinical expertise, facilitating the precise definition and clinical operationalization of the indicators and optimization of the framework for clinical application. The Delphi validation confirmed the robustness of the instrument.

The expert panel, comprising professionals from acute and critical care nursing, nursing management, orthopedics, neurosurgery, and vascular surgery, had a mean age of 46.69 ± 6.75 years and an average of 25.81 ± 7.39 years of experience. Among them, 75.0% (n = 12) held senior professional titles and 62.6% (n = 10) had obtained a master's or doctoral degrees, supporting the authority and representativeness of their assessments. Both Delphi rounds achieved a 100% valid response rate, reflecting a high level of engagement.[18] The expert authority coefficient (Cr) of 0.931, substantially exceeding the recommended threshold of 0.8, confirmed the high reliability of expert judgments and indicated that the evaluations were consistent and dependable. The mean coefficient of variation (CV) of 2.99%, well below the 15% criterion, reflected low variability among expert responses and supported the stability of their assessments. Kendall's coefficient of concordance (W) was 0.670 ($p < 0.001$), demonstrating a strong and statistically significant level of consensus among experts, indicative of well-coordinated opinions within the panel. These parameters are widely used to validate expert reliability and consensus in group decision-making processes, ensuring that the resulting judgments are both credible and robust.[19–21] Collectively, these results indicate that the questionnaire is both scientifically rigorous and clinically reliable, providing a solid foundation for risk factor data collection.

Clinical Implications and Actionable Indicators for Nursing Practice

The weight distribution among the six primary domains—demographic characteristics, trauma-related indicators, coagulation parameters, comorbidities, iatrogenic exposures, and LEDVT prevention—provides valuable guidance for prioritizing nursing assessments and interventions in clinical practice. By identifying the most influential risk factors, this system enables nurses to focus their attention and resources on variables that have the greatest potential to modify patient outcomes.

Among trauma-related indicators, GCS score ≤ 8 (weight 4.94 ± 0.25) emerged as the highest-priority variable. This finding aligns with the pathophysiological link between severe brain injury and coagulation dysfunction,[22,23] but more importantly, it offers a practical bedside trigger for nursing action. Upon identifying a patient with GCS ≤ 8, nurses can immediately initiate enhanced surveillance protocols, including more frequent limb circumference measurements and early mobilization assistance, even before coagulation abnormalities become laboratory-evident. Similarly, within coagulation parameters, D-dimer ≥ 5.0 μg/mL (4.88 ± 0.34) serves as a highly sensitive biomarker that nurses can routinely monitor and act upon. When elevated D-dimer is detected, nurses can promptly communicate with physicians to consider advanced imaging or adjust prophylaxis, potentially averting thrombus progression before clinical symptoms manifest.

The iatrogenic exposures domain contains several highly actionable variables. Mechanical ventilation > 72 hours (4.81 ± 0.40) and central venous catheterization (4.50 ± 0.52) represent modifiable or monitorable risk factors where nursing vigilance is paramount. For ventilated patients, nurses can implement frequent position changes, subclavian versus femoral site selection advocacy, and daily assessment of extubation readiness to minimize duration. Central line care bundles, including strict aseptic technique and daily review of line necessity, are nursing-driven interventions that can directly reduce thrombosis risk associated with indwelling catheters.[24]

Notably, the LEDVT prevention domain introduces indicators that are uniquely actionable by nursing staff. The timing of pharmacological prophylaxis (4.88 ± 0.34) highlights a critical window for nursing-physician collaboration. Nurses are often the first to identify when a patient becomes hemodynamically stable and eligible for anticoagulation,[25] positioning them to advocate for timely initiation. Furthermore, the documentation of discontinuation of mechanical prophylaxis (CV = 9.0%) addresses a previously underemphasized but clinically significant gap in care continuity. When intermittent pneumatic compression devices are removed for patient mobilization or procedures, nurses can ensure timely reapplication through systematic documentation and handoff communication, preventing unwarranted gaps in mechanical prophylaxis.

The practical value of prioritizing these indicators extends beyond individual patient encounters. By focusing nursing assessments on high-weight, modifiable factors, healthcare teams can achieve earlier identification of high-risk patients,

 https://doi.org/10.2147/RMHP.S585801

enabling preventive interventions before thrombus formation, while more efficiently allocating nursing resources toward variables with the greatest clinical impact.

Standardized documentation practices help ensure the continuity of nursing information across different shifts and departments, thereby significantly reducing the incidence of lower extremity deep vein thrombosis (LEDVT). A retrospective study in acute stroke patients showed that implementing an evidence-based standardized nursing protocol—including risk stratification, pharmacological and mechanical prophylaxis, early mobilization, and patient education—reduced the DVT incidence from 14.13% to 2.38%, while also improving overall patient recovery and reducing complications.[26] Although non-mandatory thromboprophylaxis protocols in electronic medical records failed to significantly reduce the incidence of VTE in hospitalized patients, combining them with strictly enforced nursing standards and continuous documentation holds promise for enhancing preventive effects.[27] By accurately documenting patient risk factors and nursing interventions, healthcare teams can promptly adjust intervention strategies, reducing the incidence of pulmonary embolism, shortening ICU length of stay, and lowering overall healthcare costs.[28]

In contrast, lower-weight indicators such as operative duration (3.88 ± 0.81) warrant less intensive nursing focus, as they are either non-modifiable or have weaker associations with LEDVT risk in this population. This differential prioritization is essential for preventing alert fatigue and ensuring that nursing efforts are concentrated where they can achieve the greatest patient benefit.

Collectively, these findings demonstrate that the weighted indicator system not only identifies key risk factors but also translates them into a clinically actionable framework. By explicitly linking each high-priority variable to specific nursing interventions, the system empowers bedside nurses to function as proactive agents in LEDVT prevention, ultimately enhancing patient safety and quality of care.

Study Limitations

Despite its methodological strengths, this study has several limitations. The Delphi method, while systematic, inherently involves a degree of subjectivity. Although the expert panel was composed of highly experienced professionals from tertiary Class A hospitals and multiple specialties, their geographic distribution was relatively limited. Furthermore, the specific thresholds chosen for quantitative indicators may restrict generalizability. Broader multicenter validation is therefore necessary to confirm the applicability and external validity of the developed risk assessment system for postoperative patients with sTBI.Such validation studies would prospectively evaluate the system's predictive accuracy, discriminate between high- and low-risk patients, and assess its impact on clinical decision-making and patient outcomes in real-world settings.

Conclusion

This study established a comprehensive, weighted assessment indicator system for postoperative LEDVT risk factors in patients with sTBI by integrating evidence from a systematic literature review with a two-round Delphi expert consensus process. The system demonstrates scientific rigor, as evidenced by high expert authority (Cr = 0.931) and strong consensus (Kendall's W = 0.670, $p < 0.001$), with indicator weights systematically assigned through analytic hierarchy process.

Clinically, this tool translates complex risk factors into actionable guidance for frontline nursing practice. It enables nurses to identify high-risk patients at an early postoperative stage; prioritize modifiable factors such as pharmacological prophylaxis timing and mechanical prophylaxis continuity; and implement targeted preventive interventions aligned with individual patient risk profiles. By supporting real-time risk monitoring through integration with hospital information systems, this tool facilitates timely prophylactic actions that can reduce LEDVT incidence, prevent fatal pulmonary embolism, and ultimately improve patient safety and quality of care.

Despite these strengths, multicenter validation is needed to confirm the system's generalizability across diverse clinical settings and to refine indicator thresholds based on real-world data. Furthermore, as this system was developed through expert consensus, its predictive accuracy—including sensitivity, specificity, and area under the curve (AUC)—requires prospective validation in real-world patient cohorts before it can be fully integrated into clinical decision-making.

Data Sharing Statement

Data are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

This study was conducted with approval from the Ethics Committee of Shanghai Sixth People's Hospital (No.2025-KY -133(K)). This study was conducted in accordance with the declaration of Helsinki. Written informed consent was obtained from all participants.

Acknowledgments

We would like to acknowledge the hard and dedicated work of all the staff that implemented the intervention and evaluation components of the study.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This work was supported by Nursing Discipline Construction Project of Shanghai Jiaotong University School of Medicine (No.SJTUHLXK2023).

Disclosure

The authors declare that they have no competing interests.

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