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Contextual Barriers and Implementation Dynamics of Non- pharmacological Postoperative Delirium Prevention Among Older Adults Hospitalized with Hip Fracture: A Situational Analysis

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Abstract

Objective To explore the practical status, dilemmas, and optimized nursing pathways for non-pharmacological prevention of postoperative delirium (POD) in elderly patients with hip fracture.

Design A situational analysis combining interviews and observations.

Methods The study was conducted in the trauma surgery ward of a tertiary hospital in Shanghai, China. Twenty participants (10 ward nurses and 10 family caregivers) were recruited by purposive maximum variation sampling and interviewed. Eight days of participant observation (7 hours daily, 56 hours in total) covered admission assessment, preoperative preparation and postoperative care during morning, afternoon and early evening periods. Interview and observation data were coded within a single framework, with situational analysis as the analytic strategy and reflexive thematic analysis as the coding technique. Reporting followed the Standards for Reporting Qualitative Research (SRQR).

Results A total of 20 participants were enrolled, including 10 ward nurses and 10 family members. Cross-validation was conducted with 8 days of participant observation data, and four themes were finally extracted: (1) patients' silencing elements; (2) clinical practice of non-pharmacological preventive measures; (3) facilitators and barriers of family caregiving dynamics; (4) systemic supports and tensions.

Conclusion Non-pharmacological POD prevention for elderly hip-fracture patients is not merely a set of clinical tasks but a dynamic situational-adaptation strategy. Nurses deliver interventions amid overlapping constraints: conflicting ward environments, limited staffing and resources, and misaligned professional values. Competing priorities require ongoing negotiation within daily clinical work.

Patient or Public Contribution

Family caregivers participated in pilot interview guide revision and post-analysis member checking to validate thematic interpretations of postoperative delirium care barriers. Older orthogeriatric patients did not take part in study design or data verification owing to fluctuating postoperative cognition.

1 Introduction

Hip fracture in older adults is an increasingly prominent public health concern amid global population aging, with its incidence rising continuously alongside demographic ageing [1, 2]. Both hip fracture injury and surgical treatment impose substantial physiological stress on older adults. Diminished functional reserve across organ systems and impaired cognitive function render elderly patients a high-risk population for postoperative delirium (POD)[3, 4]. Nevertheless, as one of its most prevalent and severe complications, POD remains a hidden epidemic that is frequently overlooked and inadequately managed in routine clinical care[5]Furthermore, its heterogeneous clinical manifestations, coupled with limited clinician and nurse sensitivity to identify its symptoms[6], often lead practitioners to attribute such intrinsic psychiatric disturbances to normal ageing or routine postoperative recovery. Consequently, a large proportion of POD cases fail to receive timely diagnosis and effective clinical management [7]

Of greater concern, the subjective experiences of delirious patients exacerbate this clinical dilemma. Elderly individuals experiencing delirium often withdraw voluntarily when they perceive a lack of understanding and trust from healthcare providers and family caregivers. They suppress internal confusion, reduce active communication,

and even deliberately conceal their symptoms to avoid being questioned or doubted[8]. This repressed subjective stance further impedes early identification of an already concealed clinical syndrome, creating a vicious cycle characterized by masked symptomatology, insufficient detection, and delayed intervention. In the short term, unrecognized POD prolongs hospital length of stay, elevates the incidence of secondary postoperative complications, and delays functional recovery. In the long run, it markedly increases patients' risks of persistent cognitive decline, permanent functional dependence, and all-cause mortality[9], imposing substantial burdens on individual patients, their families, and the healthcare system.

Given the profound adverse impacts of delirium, prevention is prioritized over treatment. While certain antipsychotic agents are administered for delirium prophylaxis in high-risk cohorts, limited clinical benefits coupled with significant adverse effects mean current evidence does not support routine pharmacological prevention in standard clinical practice[10]. Against this backdrop, non-pharmacological preventive strategies have garnered growing attention owing to their superior safety profile, cost-effectiveness, and alignment with patient-centered care philosophies[11]. Research has found that a comprehensive approach—including early mobilisation, improved sleep, targeted stimulation, maintenance of fluid and electrolyte balance, and optimisation of the environment—can significantly reduce the risk of POD in elderly patients[12].

In China, there are shortcomings in the implementation of delirium assessment protocols in orthopaedic wards. Research has found that 50.17% of the nurses surveyed had not received systematic training in delirium management, and 73.21% of nurses did not carry out routine bedside delirium screening as part of their daily work[13]. These challenges extend beyond the technical feasibility of the interventions themselves and are deeply rooted in the complexity of implementation contexts, including structural shortages of nursing workforce, practical constraints on departmental resource allocation, communication barriers hindering interdisciplinary collaboration, and the insufficient autonomous engagement of family caregivers throughout preventive care[5, 14].Conventionally, delirium prevention research predominantly adopts quantitative designs focused on comparative efficacy of interventions[12, 15], with limited inquiry into how and under what circumstances preventive measures are implemented within specific clinical contexts. This missing contextual lens limits the generalizability and sustainability of non-pharmacological protocols that demonstrate positive outcomes in controlled trial environments.

Situational analysis, an emerging qualitative methodological framework, provides theoretical and analytical tools to unpack complex clinical contexts. Developed by Adele E. Clarke [16, 17] on the foundation of grounded theory, this approach integrates human and non-human elements, material, discourse, history, culture, and politics to unpack dynamic negotiation processes shaping target phenomena. Unlike traditional grounded theory, situational analysis places greater emphasis on how physical environments, discursive practices, and non-human actors collectively construct social contexts and shape the behaviors and meaning-making of human agents[18]. This theoretical lens aligns closely with the multidimensional complexity of delirium prevention: non-pharmacological prophylaxis is not an isolated individual nursing action, but a collaborative practice enacted within specific ward environments, organizational cultures, and cross-professional relational networks. Its efficacy is simultaneously bounded by structural conditions and sustained or modified through iterative negotiation in daily clinical work.

Within ward settings, family caregivers of older adults with hip fractures act not merely as a source of emotional support but as vital agents maintaining non-pharmacological preventive strategies both in hospital and post-discharge [19, 20]. Current clinical workflows, however, tend to frame family caregivers as passive care recipients who merely comply with medical instructions, rather than active collaborative partners. Accordingly, several critical

research questions remain underexplored: What implementation barriers hinder nurses from delivering non-pharmacological POD prevention for elderly hip fracture patients within real clinical contexts? What facilitating and inhibiting factors shape family caregivers' participation in delirium prevention initiatives? What unmet supportive needs do family caregivers experience throughout the care trajectory? Addressing these inquiries is essential to elucidate the real-world implementation of non-pharmacological preventive protocols.

As an innovative qualitative analytical method for untangling complex clinical contexts, situational analysis provides a rigorous framework for this investigation. The present study therefore employs situational analysis to comprehensively explore the real-world implementation status and inherent tensions of non-pharmacological POD prevention among older adults with hip fractures, generating contextual theoretical insights and actionable clinical recommendations.

2 Methods

2.1 Study Aims and Objectives

This exploratory study aims to characterize current orthopedic ward practice regarding nurses' understanding and execution of non-pharmacological POD prevention for elderly hip fracture patients, alongside family caregivers' awareness and participation in delirium prophylaxis. Specific research objectives are as follows:(1)Identify mechanisms through which nurses implement non-pharmacological delirium prevention strategies;(2)Explore the roles and support needs of family caregivers in non-pharmacological delirium prevention;(3)Construct situational maps to delineate complex interactions between human, material, and institutional factors that facilitate or hinder intervention delivery, thereby optimizing sustainable nursing pathways for non-pharmacological prophylaxis.

2.2 Design

Situational analysis[16]was adopted to dissect implementation mechanisms of non-pharmacological POD prevention among elderly hip fracture patients in authentic clinical environments, with data collected at a tertiary comprehensive hospital in Shanghai, China. Situational analysis leverages spatial visual mapping to construct clinical implementation contexts, generating dynamic situational maps that articulate discourses of diverse stakeholders and illuminate unspoken narratives shaping nursing intervention delivery. Data were sourced via two primary modalities: (1) participant observation and (2) semi-structured interviews[17].

2.3 Researcher Reflexivity

All authors possess clinical or research backgrounds in healthcare, bringing divergent disciplinary perspectives to this investigation. Participant observation of nurses' non-pharmacological interventions and family caregivers' ward engagement enabled in-depth analysis of interactive strategies and implementation barriers for early mobilization, circadian rhythm regulation, sensory stimulation, and related protocols. Interviews with nurses and family caregivers complemented observational data by capturing interpretations and perceptions of non-pharmacological prevention unobserved in routine ward practice.

2.4 Participant Recruitment

Purposive maximum variation sampling was applied to recruit nurses and family caregivers. For nurses, maximum heterogeneity was achieved by stratifying participants according to professional title, working years, receipt of delirium systematic training, and routine implementation of bedside delirium screening. For family caregivers,

sampling variations covered kinship with patients, age, intensity of caregiving burden, prior experience of patients' postoperative delirium, and whether a hired caregiver was involved in daily care.

The observed subjects were older adults aged 65 years and above who were diagnosed with a hip fracture and received surgical treatment for the fracture during hospitalization in orthopaedic trauma wards of the participating hospital. Hip fracture diagnosis was confirmed via radiographic examinations including X-ray or Computed Tomography scan.

Purposive maximum variation sampling was adopted to recruit nurses and family caregivers for semi-structured interviews. For participating nurses, inclusion criteria were as follows: (1) holding a valid nursing practice license; (2) having no less than 5 years of clinical nursing experience; (3) being formally employed on the wards of the research hospitals; (4) possessing direct clinical experience in caring for elderly patients with postoperative delirium; (5) being willing to sign written informed consent. Nurses were excluded if they had communication obstacles that affected normal interview interaction, or voluntarily withdrew informed consent in the process of data collection.

For patient family caregivers, inclusion criteria were listed below: (1) aged 18 years and older; (2) serving as the primary caregiver of the enrolled hip fracture patients, namely the family member undertaking main care work, communicating with clinicians and participating in clinical decision-making; (3) having normal verbal communication ability and being able to provide written informed consent. Family caregivers would be excluded if they could not sign consent forms or finish interviews owing to physical diseases, cognitive dysfunction or communication disorders, as well as those who withdrew consent at any stage of the interview.

Researchers met eligible nurses prior to observation to explain study procedures, address inquiries, and obtain written informed consent. Post-observation, nurses were invited to semi-structured interviews, with consent forms amended accordingly for participants agreeing to interview involvement. Study objectives and procedures were communicated to patients, with verbal consent obtained for observational data collection. Following observation, family caregivers were recruited for interviews based on scheduling availability and communication capacity, with written informed consent secured prior to all interviews. Per Braun and Clarke's methodological guidance[21, 22], data collection ceased after interviews with 10 nurses and 10 family caregivers, as information power was deemed sufficient to address study objectives. This manuscript adheres to the Standards for Reporting Qualitative Research (SRQR)[23] .

2.5 Data Collection

Following a detailed explanation of the study's purpose and procedures to the nurses, written informed consent was obtained and signed. Data were then collected using a combination of participant observation and in-depth interviews. Participant observation was conducted for 7 hours per day in three fixed time periods: 08:00–11:00 in the morning, 14:00–17:00 in the afternoon, and 19:00–20:00 in the early evening. Morning and afternoon sessions covered routine ward rounds, nursing operations and peak periods of postoperative delirium fluctuation, while the early evening period was set to capture evening worsening of delirium manifestations in elderly hip fracture patients. Observations were carried out within the trauma ward, tracking nurses' non-pharmacological prevention practices throughout the entire care continuum—from admission assessment and preoperative preparation to postoperative care—while interacting with the on-duty nursing staff.

Purposive maximum variation sampling was used to select 12 to 18 eligible patients for in-depth participant observation. Stratification variables included the presence or absence of postoperative delirium, age, baseline

cognitive function, comorbidities and family caregiving patterns.

Key events were documented in field notes immediately, including the date and time, physical environment, critical incidents, details of non-pharmacological interventions, sources of interruption, verbatim quotes from nurses and patients, non-verbal behaviors, and spatial arrangements. A contextual analysis memo was completed within 24 hours post-observation. This memo integrated the researcher's subjective reflections on the observation setting, awareness of potential biases, and preliminary interpretations of the underlying meaning of clinical actions. These reflexive notes serve as essential contextual support for interpreting the objectively recorded data.

Post-observation, semi-structured in-depth interviews were administered to consented nurses and family caregivers. An initial interview guide was developed through a literature review and consultation with clinical experts. The guide was piloted with four participants (two ward nurses and two primary family caregivers). After each pilot interview, the research team held a 30-minute debriefing session to revise ambiguous probing questions, remove repetitive items, and add targeted questions on collaboration with paid nursing assistants. The revised version constituted the formal interview framework used for all subsequent data collection. Data from the four pilot interviews were excluded from the final dataset. The finalized guide is provided in Supplementary File 1.

From April to June 2026, the researcher contacted participants via WeChat to schedule interview sessions at mutually convenient times. All interviews were conducted in a quiet and comfortable conference room within the hospital, ensuring privacy with only the researcher and the individual participant present. The duration of the interviews ranged from 32 to 58 minutes.

With the informed consent of the participants, all interviews were audio-recorded. The recordings were transcribed verbatim within 24 hours after each session. To ensure confidentiality, transcripts were subsequently de-identified: all personal identifiers were removed and replaced with unique codes. Specifically, nurses were assigned codes ranging from N1 to N10, while family members were assigned codes ranging from F1 to F10. These codes were used consistently throughout the data analysis process to track the source of the data while protecting participant anonymity.

2.6 Data Analysis

All interviews were transcribed verbatim within 24 hours, and transcripts, observational field notes and contextual memos were imported into NVivo 14 for data management. Two analytic traditions were combined in a deliberately asymmetric way: Clarke's situational analysis[16, 17] provided the overarching analytic strategy, and Braun and Clarke's reflexive thematic analysis[24, 25] provided the coding technique applied within it. Thematic analysis was used to build the coded architecture of the dataset; situational analysis was then used to ask how that architecture was produced, sustained or eroded within one concrete ward situation—that is, to map the human and non-human, material, institutional and discursive elements that shaped whether non-pharmacological prevention was actually delivered at the bedside.

Two researchers (JX, YX) read all transcripts and field notes repeatedly to achieve familiarisation, then performed line-by-line open coding of the entire dataset. Coding was inductive and semantic at the outset, with latent coding applied in later passes where participants' accounts implied meanings they did not state directly. This generated 198 initial codes. Through constant comparison, codes sharing conceptual congruence were collated into 19 candidate subthemes; each candidate subtheme was then checked for internal coherence and for distinctiveness from its neighbours, and the 19 subthemes were aggregated into four themes: (1) patients' silencing elements; (2) clinical practice of non-pharmacological preventive interventions; (3) facilitators and barriers of family caregiving

dynamics; (4) systemic supports and tensions. Themes were reviewed against the full dataset and against the original coded extracts before being defined and named. Observational and interview data were coded within a single coding framework rather than analysed separately, so that each theme could be evidenced simultaneously by what participants said and by what was observed to happen. The full coding tree, including all 19 subthemes, is presented in Supplementary File 1.

To strengthen analytic rigour, two researchers independently coded a randomly selected 30% of the interview transcripts and the full set of observational field notes. Discrepancies were collated and discussed in weekly consensus meetings; they most often concerned an inconsistent definition of patients' silencing behaviours, ambiguous classification of family caregiver barriers, and blurred boundaries between institutional structural constraints and ward environmental constraints. Each disagreement was examined by re-reading the original verbatim quotation together with the corresponding field record, and interpretations were refined through discussion until both coders agreed the reading was defensible against the data.

Once the four themes were settled, situational mapping was undertaken following Clarke's (2005) procedure, in two iterative steps. First, messy situational maps were drawn for each theme, listing every element present in the data without initially privileging any: human actors (ward nurses, patients, family caregivers, paid nursing assistants, physicians); non-human actants (cardiac monitors, urinary catheters, indwelling intravenous cannulae, physical restraints, analgesia charts, wall clocks); material and spatial conditions (five-bed rooms, ambient noise, lighting, the day-to-evening shift pattern); institutional and organisational elements (nurse-to-patient ratios, the absence of a standardised delirium prevention pathway, annual nursing competency assessment, the hospital's pilot programme for inpatient care without family attendants); and discursive elements (the framing of family caregivers as passive recipients of instruction, the idiom of "not troubling others", and the normalisation of postoperative confusion as a lingering anaesthetic effect). Second, these messy maps were converted into ordered relational maps by querying each element: which elements were present in the ward but silent in participants' accounts, which were actively contested between stakeholders, and which were absent from the ward yet consequential for practice (for example, a delirium screening tool that was available but never used). Relations were drawn between elements rather than between persons. This step produced the integrated situational map presented as Fig. 1.

Findings were triangulated across three data sources—interview accounts, observational records and contextual memos—so that participants' interpretations could be compared with observed behaviour, and so that instances where stated practice and observed practice diverged could be treated as data rather than as error. Member checking was conducted after the four themes and the draft situational map had been produced, as a procedure situated within the situational analysis tradition rather than as a criterion of analytic validity. A purposive subset of six participants (three nurses and three family caregivers) took part. We shared the four themes, representative quotations and the draft situational map with these participants in one-to-one offline sessions, and invited them to confirm whether the interpretations matched their ward experience, to correct any misinterpretation of their narratives, and to supplement contextual details we had not recorded. Minor revisions to thematic wording and to the labelling of two elements in Fig. 1 were made in response; no theme was added or removed.

2.7 Ethical Considerations

This study received ethical approval from the Medical Ethics Committee of a tertiary hospital in Shanghai, China (Ethics Approval No. 2025YS-292). Written informed consent was obtained from all interview participants prior to data collection. For the participant observation component, verbal informed consent was secured from the nurses

involved. All interview transcripts and observational records underwent full anonymization, and all study data were securely stored and treated with strict confidentiality.

3 Results

3.1 Interview Coding Outcomes

The researcher conducted 20 interviews between April and June 2026, including 10 nurses and 10 family caregivers; all interviews were conducted by two researchers. Meanwhile, participant observation was performed on 13 elderly hip fracture inpatients to document the actual implementation status of nurses' non-pharmacological preventive measures for postoperative delirium, as shown in Table 1–3. After conducting concurrent thematic analysis of the interview data, a total of 19 subthemes and 4 themes were identified, as shown in Table 4.

Table 1
Demographic characteristics of 10 interviewed orthopaedic trauma nurses

Participant ID	Gender	Age	Work experience(year)	Professional title	Position	Received systematic delirium training	Conduct routine bedside delirium screening
N1	Female	29	10	Senior Nurse	Staff Nurse	Yes	Yes
N2	Female	28	9	Senior Nurse	Staff Nurse	No	No
N3	Female	28	9	Senior Nurse	Staff Nurse	No	No
N4	Female	32	11	Associate Chief Nurse	Staff Nurse	No	No
N5	Female	44	24	Associate Chief Nurse	Charge Nurse	Yes	Yes
N6	Female	35	12	Associate Chief Nurse	Staff Nurse	No	No
N7	Female	31	11	Senior Nurse	Staff Nurse	No	No
N8	Female	38	17	Associate Chief Nurse	Head Nurse	Yes	Yes
N9	Female	46	22	Associate Chief Nurse	Charge Nurse	No	No
N10	Female	55	32	Associate Chief Nurse	Head Nurse	Yes	No

Table 2
Demographic characteristics of 10 interviewed family caregivers

Participant ID	Age (years)	Relationship with patient	Education	Daily caregiving duration	Patient developed POD	Awareness of postoperative delirium	Employed paid caregiver for assistance
F1	64	Daughter	high school	Full-day	Yes	Unaware	Yes
F2	44	Son	College graduate	Half-day	Yes	Aware	Yes
F3	76	Spouse	high school	Intermittent	No	Unaware	Yes
F4	62	Son	high school	Intermittent	No	Unaware	Yes
F5	58	Son	high school	Half-day	Yes	Unaware	Yes
F6	51	Daughter	high school	Half-day	Yes	Aware	Yes
F7	62	Daughter	high school	Full-day	Yes	Unaware	No
F8	48	Daughter	College graduate	Full-day	No	Unaware	No
F9	47	Daughter	College graduate	Intermittent	No	Unaware	Yes
F10	56	Son	College graduate	Intermittent	No	Unaware	Yes

Table 3
Baseline characteristics of 13 observed elderly patients with hip fracture

Characteristic	***n* (%)**
Age group (years)	
65–74	2(15%)
75–84	6(46%)
≥ 85	5(38%)
Sex	
Male	6(46%)
Female	7(54%)
Surgical procedure	
Hip fracture internal fixation	6(46%)
Joint arthroplasty	7(54%)
POD occurrence	
Yes	5(38%)
No	8(62%)
Baseline cognition	
Normal	12(92%)
Mild cognitive impairment	1(8%)
Primary caregiver	
Spouse	2(15%)
Offspring	3(23%)
Paid caregiver	3(23%)
Offspring and paid caregiver	5(38%)
Comorbidities	
Hypertension	11(85%)
Diabetes mellitus	2(15%)
Cerebrovascular disease	2(15%)
Others	9(69%)

Table 4
Three-Level Coding Framework for Interview Data

Verbatim Representative Quotation	Open Coding (Initial Codes)	Axial Coding (Secondary Themes)	Selective Coding (Core Overarching Category)
"He becomes agitated in unfamiliar surroundings and repeatedly demands to return home" (F5) *"Elderly patients perspire with pain yet rarely verbalize discomfort; distress is only discernible via facial expressions" (N8)* *"His hearing and vision are severely impaired; he cannot clearly perceive or comprehend his ward environment" (F3)* *"Care aides only complete routine tasks and never inquire about patients' subjective experience" (N6)*	a1 Fear-induced silence triggered by unfamiliar ward environments a2 Silent unexpressed pain a3 Silence stemming from sensory deprivation a4 Unrecognized unmet care needs	silenced patient experiences	Negotiated order of preventive practice
"We teach patients diaphragmatic breathing to prevent pneumonia and ankle pump exercises for venous thromboembolism prophylaxis" (R1) *"We perform skin assessment and repositioning during daily ward rounds" (N3)* *"Vital sign and bowel function monitoring are completed daily; laxatives are administered for ≥ 3 days of constipation" (N2)* *"We preface all clinical procedures with verbal orientation to clarify upcoming care activities" (N7)* *"Curtains are drawn open during morning care to maximize natural light, eliminating circadian disorientation" (N8)* *"We provide radios for patients to maintain sensory connection with external stimuli" (N9)*	b1 Early mobilization and rehabilitation interventions b2 Physiological and metabolic homeostasis management b3 Therapeutic communication and cognitive orientation training b4 Circadian rhythm regulation b5 Sensory support interventions	Clinical practice of implemented non-pharmacological preventive measures	
"Optimal preoperative rest would greatly reduce perioperative anxiety for patients" (F2) *"My father exhibited postoperative agitation, yet nursing staff remained patient and empathetic, which alleviated my own distress as a caregiver"* *"Prolonged caregiving has exacerbated my lumbar strain and*	d1 Preoperative supportive care during admission waiting periods d2 Family caregiver reassurance during postoperative care d3 Physical exhaustion of primary caregivers	Facilitators and barriers of family caregiving dynamics	

Verbatim Representative Quotation	Open Coding (Initial Codes)	Axial Coding (Secondary Themes)	Selective Coding (Core Overarching Category)
varicose veins, leaving me physically exhausted" (F1) *"Many family caregivers normalize postoperative confusion and fail to recognize early delirium manifestations" (N3)* *"Private care aides only deliver basic activities of daily living support without targeted cognitive stimulation" (N5)*	d4 Limited caregiver health literacy regarding delirium d5 Lack of formalized training for informal care providers		
"Non-pharmacological prophylaxis is perceived as discretionary and frequently deprioritized" (N1) *"No standardized delirium screening assessment tools are available on the ward" (N9)* *"Individual nurses are assigned over a dozen patients, precluding consistent delivery of targeted preventive interventions" (N7)* *"Senior nurses prioritize monitoring patient emotional status, while junior staff focus exclusively on physiological vital signs" (N3)* *"Agitation in one delirious patient disrupts rest for all cohabitating ward patients" (N4)*	c1 Absence of standardized delirium prevention clinical pathways c2 Barriers to routine implementation of delirium screening tools c3 Insufficient nursing staffing ratios c4 Heterogeneous clinical experience across nursing cohorts c5 Limitations of shared inpatient physical environments	systemic facilitators and structural barriers	

3.2 Cross-Validation with Participant Observation Data

Between June 1 and June 14, 2026, the researcher conducted 8 consecutive days of field participant observation with a total duration of 56 hours. The daily observation schedule covered morning nursing assessments, postoperative ward rounds, routine non-pharmacological delirium preventive care, as well as evening and night shifts when sundown syndrome and delirium-related behavioural fluctuations frequently occur, aiming to fully capture the actual implementation of nurses' preventive interventions and ward environmental context.

In terms of research procedure, field observation was completed prior to semi-structured interviews to avoid observer bias caused by pre-interview subjective presuppositions. All 10 interviewed family primary caregivers were recruited from the family members of the 13 observed elderly hip fracture patients, while the 10 nurses were frontline staff responsible for caring for these observed cases. This paired sampling design enabled data triangulation: objective behavioural records from participant observation were cross-validated and supplemented by the subjective perceptions and underlying barriers reflected in interviews.

The derived findings were further compared, integrated and cross-verified with the themes and subthemes extracted from interview data through thematic analysis, as presented in Supplementary File 1.

3.3 Situational Overview

Through 198 open codes, this study mapped the complex ecosystem of non-pharmacological delirium prevention. These codes were further categorised into four axial categories: (1) patients' silencing elements; (2) clinical practice of non-pharmacological preventive interventions; (3) facilitators and barriers of family caregiving dynamics; (4) systemic supports and tensions. Drawing on Clarke's situational analysis framework, the integrated participant observation and semi-structured interview dataset was synthesised to develop the situational map (Fig. 1). This visual diagram systematically illustrates dynamic interactions across diverse contextual stakeholders and conditions and intuitively demonstrates how multi-layered contexts collectively facilitate or hinder the delivery of bedside non-pharmacological postoperative delirium prevention interventions.

3.3.1 Patients' Silencing Elements

During our exploration of nurses' practice mechanisms and barriers to family caregiver engagement, an underlying theme emerged: patients' silencing elements. This silence is not merely an inability to express oneself, but an ontological aphasia stemming from contextual rupture. Hospitalisation disrupts the familiar daily routines of older adults with hip fractures, stripping away the "reality anchors" that sustain their self-perception and sense of existence—such as familiar clocks, regular radio programmes and the faces of loved ones—all of which disappear within the ward environment. Three primary forms of patient silence were identified from the data: silence of pain, silence of fear, and silence of unmet needs. Older adults seldom verbalise their pain, fears or needs proactively; instead, they convey these indirectly through facial expressions, postures and behaviours. Clinically, such silence is easily overlooked, especially when nurses care for multiple patients simultaneously.

"The elderly sweat from pain but will not say they hurt. You can tell from their facial expressions." (N8)

"She just made me stand right in front of her and refused to let me leave her sight." (F3)

"Patient W, male aged 82, lived alone prior to admission. During admission assessment, he repeatedly rambled about returning home to retrieve cash and attempted to pack his belongings to leave hospital unassisted." (Obs 03)

For frail older adults who live alone and possess inherently limited cognitive reserve, the hospital environment represents a loss of safety. Clinical staff often label such fearful reactions to unfamiliar surroundings as agitation and resort to restrictive interventions rather than addressing the underlying fear. Additionally, older adults tend to suppress their voiced needs due to internalised values of "not troubling others", or impaired hearing and verbal capacity hinder effective communication. This highlights that patients' silencing elements constitute one of the most neglected components of non-pharmacological delirium prevention systems, rendering focus on patients' authentic needs particularly vital.

3.3.2 Mechanisms Underpinning Nurses' Implementation of Non-Pharmacological Postoperative Delirium Prevention Strategies

This section explores the dynamic behavioural patterns adopted by nursing staff when delivering non-pharmacological interventions for POD prophylaxis. Non-pharmacological preventive strategies are defined as medication-free approaches incorporating physical therapy, reorientation, cognitive stimulation and other modalities to prevent or ameliorate POD. Three core dimensions shaping nurses' delivery of these strategies were extracted across the full dataset: (1) the cognitive dimension: nurses' beliefs and understanding regarding the efficacy of non-pharmacological interventions; (2) the practice dimension: the frequency, timing and modalities of strategy delivery; (3) the institutional dimension: how organisational protocols and ward culture shape and constrain clinical practice.

“We avoid medication wherever possible; sometimes pharmacotherapy triggers numerous complications instead.” (N3)

“On postoperative day one, patient in Bed 3 became agitated and pulled at his monitoring leads. The attending ward nurse immediately approached, leaned close to his ear and spoke softly, explaining that the monitor tracked his blood pressure overnight and would be removed the next day, before asking whether he felt unwell anywhere. She then elevated his pillow and adjusted his bedding. Approximately five minutes later, the patient calmed down.” (Obs 2)

Nurses generally acknowledged shared professional responsibility for delirium prevention and alleviating patients’ distress. Participants agreed that nursing practice extends beyond executing medical orders, requiring clinical judgement to proactively deliver patient-centred non-pharmacological interventions, with nurses playing an irreplaceable role in professional decision-making and care delivery.

Nevertheless, inconsistent perceptions existed within the cognitive dimension.

“The scope of feasible non-pharmacological measures is quite limited.” (N8)

“We currently lack standardised delirium prevention workflows on our ward.” (N5)

“Although we conduct nutritional scale assessments, we pay little attention to serum albumin levels or personalised dietary guidance for patients… nutritional monitoring remains superficial.” (N1)

“Patient Y’s urinary catheter had been in situ for four days. During ward rounds, physicians decided to retain it for another two days for observation. However, the patient repeatedly tugged at the catheter. During a night shift round, the nurse noticed blood staining at the urethral meatus, contacted the medical team for catheter removal, and the patient slept soundly overnight thereafter.” (Obs 14)

Marked inconsistencies were observed in the practical execution of non-pharmacological prevention. Some nurses proactively identified early delirium signs and implemented timely interventions, whereas heavy workloads, absence of standardised protocols, and insufficient sensitivity to delirium symptoms caused other nurses to miss optimal early intervention windows. This mismatch between cognition and practice represents the core issue to be unpacked within the third, institutional dimension.

In summary, delivery of non-pharmacological delirium prevention constitutes a shared responsibility of nursing teams and hospital management, forming an integral component of institutional nursing quality and patient safety culture. However, within the specific context of POD prophylaxis, nursing staff lack consistent clarity regarding implementation boundaries, operational workflows and integration with routine ward care. Examples of unresolved cross-shift discrepancies include prioritisation criteria for different non-pharmacological interventions, the appropriate scope of nurses’ autonomous roles in delirium screening and prevention, and methods to sustain non-pharmacological care amid heavy clinical workloads. Ongoing negotiation and adjustment within daily practice are therefore required to resolve these variations.

3.3.3 Family Caregivers’ Roles and Unmet Needs in Non-Pharmacological POD Prevention

Family caregiver support and engagement represent another complex factor influencing the feasibility of non-pharmacological delirium prevention for older hip fracture patients. Ambiguity and uncertainty surrounding

caregivers' designated care roles were prominent themes in the data.

While all participants universally recognised the value of family involvement in delirium prevention:

"For adults aged over 65, family carries immense personal significance." (N8)

"Given their advanced age, we prefer family members to stay beside patients—they are far more likely to listen to their relatives." (N2)

"I feel I ought to stay with him more." (F4)

"Patient's son, aged 65, provided continuous bedside care for three consecutive days. Observational data recorded him frequently rubbing his lower back while seated beside the bed. As nurses explained non-pharmacological prevention measures, he nodded repeatedly, before stating: 'I cannot remember all this; you nurses can just carry out these steps yourselves.'" (Obs 40)

Although medical staff expect family caregivers to act as collaborative partners in delirium prevention, caregivers are often provided with no clear, standardised operational guidance in real clinical practice. They remain confused about how to participate, when to intervene, and where their scope of responsibility lies. Nearly all family caregivers fail to accurately identify POD. When patients experience confusion, incoherent speech or disrupted sleep-wake cycles after surgery, caregivers rarely recognise these as pathological signs; instead, they attribute such manifestations to normal postoperative physiological responses. They assume delirium symptoms will subside spontaneously over time and therefore see no need to request extra medical support.

"I only found out about delirium by searching online. He suddenly became a completely different person, and AI explained what delirium is, yet I still had no clue how to prevent it." (F1)

"I didn't know this condition existed. I thought he just didn't have enough strength to talk after major surgery." (F3)

"I reckon it's the anaesthetic from his recent operation. He'll get better little by little once the anaesthetic wears off." (F6)

Patient J repeatedly attempted to pull out his intravenous cannula. His family initially strongly opposed physical restraints, commenting, "It's cruel to tie him up." After the patient dislodged the line and developed bleeding, and the family proved unable to manage him on their own, they voluntarily requested: "Nurse, please restrain him to stop him hurting himself again." (Obs 33)

These cognitive biases and behavioural patterns together form an invisible barrier that prevents family caregivers from engaging effectively in delirium prevention. Caregivers are not unwilling to offer assistance, but they lack the knowledge of how to help; they are not reluctant to ask for support, but they cannot identify the appropriate timing to seek professional help. Such information asymmetry and cognitive gaps create substantial implementation barriers to delivering non-pharmacological preventive interventions within the micro context of ward care. In practice, the effectiveness of caregiver participation heavily depends on ward culture, nurses' communication awareness, as well as the time and energy available to family caregivers. To date, systematic negotiation and consensus among all relevant stakeholders on this matter have yet to be established.

3.3.4 Systemic Supports and Tensions Within Delirium Identification Frameworks

This section delineates the diverse discursive standpoints shaping nursing staff's delivery of non-pharmacological POD prevention for older hip fracture patients, summarising systemic supports and associated tensions across three key domains: gaps in delirium screening tool utilisation, inadequate staffing ratios, and restrictive physical ward environments.

"Where interventions are deemed optional, they are often omitted entirely." (N8)

"The foundation of delirium prevention is patience with older adults, yet our heavy daily workloads leave little time to pause and listen to patients fully." (N7)

"Our ward rooms hold five beds; with four patients sharing this space, noise is unavoidable." (F4)

"The early shift nurse was allocated 12 patients. During shift handover, she briefly reviewed patients whom she subjectively judged to be at elevated risk of postoperative delirium based on personal clinical experience, with the sole purpose of confirming the absence of accidental catheter self-extraction risk before finishing handover. When one patient attempted to mobilise independently, she was occupied with alternative nursing tasks and unable to respond promptly." (Obs 11)

Clinical observation revealed that core delirium interventions—including early identification, reorientation support, cognitive stimulation and early mobilisation—are not embedded within standard core nursing competencies. Nurses desire extended time to deliver non-pharmacological care and enable family visits for high-risk patients, yet existing staffing models leave them unable to fulfil these intentions due to resource constraints. Furthermore, suboptimal ward physical environments create unavoidable barriers to prevention. These findings demonstrate that improving the efficacy of non-pharmacological delirium prophylaxis cannot rely solely on raising individual nurses' awareness; comprehensive institutional resource allocation and structural systemic support are essential prerequisites.

4 Discussion

This study adopted a mixed qualitative approach combining 8 consecutive days of participant observation and semi-structured interviews with 10 orthopaedic nurses and 10 family caregivers, and further applied Clarke's situational analysis framework to systematically deconstruct the whole contextual ecosystem of non-pharmacological prevention for POD in elderly hip fracture patients. Methodologically, the triangulation of objective on-site nursing behavioural observation and subjective stakeholder interview narratives effectively avoided single-data bias, which overcame the limitation that most existing domestic and foreign studies only relied on interview self-report to explore intervention barriers. The biggest innovation of this research lies in breaking through the single technical perspective of POD non-pharmacological prevention, and interpreting the implementation gap of bedside preventive measures as a dynamic game and negotiation process among patients, nurses, family caregivers, ward environment and institutional resource systems; meanwhile, the study re-conceptualised elderly inpatients' postoperative silent behaviour as a contextual adaptive coping process rather than simple communication dysfunction, which supplements the theoretical understanding of delirium high-risk population's unmet care needs in orthopaedic settings. Based on 198 open codes extracted from original data, four core axial themes were summarised, and a situational map was drawn to visualise the multi-subject interactive relationship behind intervention practice.

This study identified that non-pharmacological prevention for POD in older adults with hip fractures represents a sophisticated negotiation process nested in multi-layered relational networks, rather than a standalone clinical duty. Such an observation stands in contrast to the results reported by Prosper[26].Nurses operate within overlapping relational networks, navigate conflicting physical ward environments, face structural constraints of departmental resource and staffing allocation, and reconcile competing professional value frameworks prioritizing patient experiential well-being, clinical operational efficiency, and standardized patient safety metrics. These divergent priorities are frequently misaligned, requiring continuous iterative negotiation embedded within daily clinical care workflows.

No universally standardized clinical pathway for POD prevention has been established to date[27], justifying the adoption of situational analysis methodology[17]. Combined interview and observational data enable comprehensive contextual mapping of non-pharmacological intervention delivery, alongside conceptualization of patients' silenced contextual processes, visualized in the situational map (Fig. 1) illustrating dynamic interactions between human, material, and institutional stakeholders.

The primary theoretical contribution of this research is the reconceptualization of perioperative silent behavioral manifestations among elderly hip fracture patients as a dynamic contextual process of silenced elements, rather than an inherent fixed trait or isolated communication deficit of older adults. Existing literature confirms that inpatient silence among elderly patients is not incidental behavior, but an adaptive coping strategy emerging from cognitive decline, physical functional impairment, and overprotective family substitution of patient self-expression[28, 29]. Such silence typically emerges when patients feel marginalised, struggle to comprehend what is happening and the underlying reasons, which in turn fosters a sense of distrust towards nursing staff and relatives[30, 31]. Additionally, traditional Chinese cultural norms framing forbearance and pain tolerance as virtuous conduct further suppress overt articulation of distress among elderly hospitalized patients[32]. Silent patient manifestations carry critical diagnostic clinical information, and clinicians must avoid misclassifying silence as patient compliance, instead interpreting suppressed verbalization as a red flag for incomplete clinical assessment[33]. To mitigate hidden risks induced by patients' unvoiced demands and silent coping modes, two targeted measures are proposed clinically: first, formulate a standardised preoperative dual assessment protocol covering pain and cognitive function, to guide low-expression elderly patients to actively report discomfort; second, place bedside reality orientation aids in each ward, such as large-font wall clocks, family photo display boards and date reminder cards, to carry out continuous orientation intervention.

Current guidelines generally recommend multifaceted bundles consisting of early mobilisation, sleep optimisation, adequate analgesia and reorientation stimulation to reduce the incidence of POD among older patients with hip fractures[34, 35]. The findings of the present study indicate that the implementation of these recommendations is impeded by multiple barriers, including excessive ward occupancy accompanied by persistent environmental noise, the absence of standardised prevention protocols, difficulties in deploying delirium assessment tools, variations in nurses' clinical experience, and heterogeneous willingness and capacity for care provision among family caregivers. These inhibiting factors align with those reported in prior literature[36]. In future, specific standard operating procedures could be drawn up for the non-pharmacological prevention of delirium in elderly patients with hip fractures during the perioperative period, clearly defining the timing, specific content and responsible personnel for various interventions, such as early mobilisation, sleep interventions and sensory support. Secondly, a dedicated 15-minute nursing slot should be scheduled during each shift, specifically for non-pharmacological prevention on the postoperative day. This slot should be separate from routine, time-pressured nursing tasks to ensure sufficient time is allocated for orientation interventions and circadian rhythm adjustment. At the same time, regular

specialised training on the recognition and non-pharmacological prevention of postoperative delirium should be provided to nurses in orthopaedic wards, and the use of assessment tools should be incorporated into the annual nursing competency assessment.

This study identifies that facilitators and barriers to caregiver participation are not static constructs, but dynamically evolve across patient perioperative disease trajectories and caregiver adaptation phases. Targeted informational support and optimized bidirectional clinical communication function as primary catalysts for sustained caregiver engagement, consistent with empirical findings published by Grebe et al. [37] Nursing staff should deliver tiered, longitudinal informational and emotional support aligned with progressive caregiver adaptation stages, spanning structured admission health education, continuous perioperative communication, and transitional discharge follow-up services to establish a full-cycle caregiver engagement support system. In addition, as non-family care models continue to be promoted across China[38], medical nursing assistants will gradually undertake more activities of daily living care. Under this background, a tripartite collaborative mechanism involving nurses, family caregivers and paid nursing assistants can be established: nurses communicate with family members to obtain patients' living habits, cognitive status and past medical history for personalised intervention schemes; meanwhile, nurses deliver systematic training on delirium early warning identification and basic preventive operations to nursing assistants. The three parties can jointly complete ward environmental management, sensory stimulation and behavioural safety supervision for high-risk patients with delirium tendency.

Departmental resource allocation and nursing staffing ratios exert profound structural impacts on non-pharmacological delirium prevention. Perioperative prophylaxis commencing in the preoperative admission phase yields maximal clinical efficacy for elderly hip fracture patients[39], representing the critical intervention window for non-pharmacological risk reduction[40]. However, pervasive understaffing and competing clinical task prioritization relegate delirium prevention interventions to the category of "important yet non-urgent" clinical work, consistently deprioritized during high-volume ward operations. Accordingly, nursing management departments should reasonably increase staffing quotas for orthopaedic trauma wards, set up fixed exclusive working hours for POD preventive care, and formulate special perioperative nursing specifications for elderly fracture patients, embedding non-pharmacological delirium prevention items into standard routine nursing workflows.

5 Conclusion

Non-pharmacological POD prevention for elderly hip fracture patients is not merely a checklist of discrete clinical tasks, but a dynamically evolving situational adaptation strategy. This research delivers contextually grounded theoretical perspectives and actionable clinical optimization pathways for geriatric hip fracture delirium prophylaxis, providing localized evidentiary support for delirium care in orthopedic settings across China. Several study limitations must be acknowledged. First, data collection was restricted to a single tertiary hospital, limiting transferability of findings across divergent regional healthcare systems and institutional nursing models. Second, data prioritized nursing and caregiver perspectives; direct patient self-reported experiences were absent from the analytical dataset. Third, while situational analysis enables granular delineation of real-world intervention delivery dynamics, the methodology cannot support quantitative evaluation of long-term clinical efficacy of non-pharmacological protocols.

Future research directions should address these gaps. Subsequent multi-site mixed-methods research is warranted to validate and expand upon the contextual findings presented herein. Specifically, future studies should incorporate in-depth interviews with older adult patients to capture their lived experiences and subjective

interpretations of silence and care. Furthermore, based on the results of this study, a standardized clinical pathway for non-pharmacological delirium prevention should be developed. This pathway can then be tested through pre-post intervention studies or cluster randomized controlled trials to quantitatively assess its impact on delirium incidence and patient outcomes.

Declarations

Conflicts of interest

The authors declare no conflicts of interest.

Competing interests

The authors declare that they have no competing interests.

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Author Contribution

W.Y: conceptualisation, study supervision, review and editing. J.X: data analysis, writing original draft. J.X,Z.L,M.Y: methodology design.J.X,Y.X,J.Z,Z.L: data investigation and collection.J.X,Y.X,J.Z: conceptualisation and data curation. All authors reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Figures

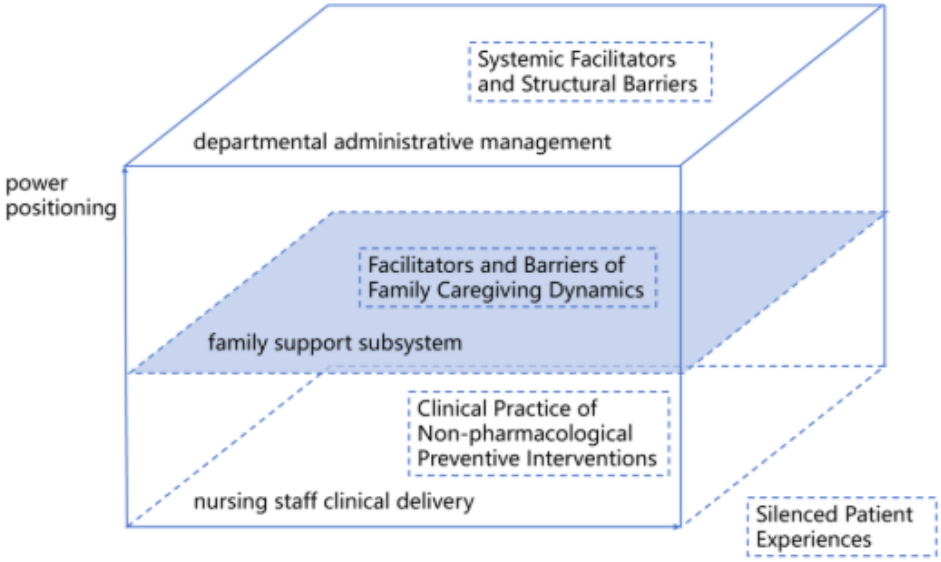

Figure 1

Situational Map of Non-pharmacological POD Prevention for Elderly Hip Fracture Patients

Supplementary Files

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