

An Investigation into the Anesthesia Recovery Needs of Surgical Patients Based on ERG Theory: A qualitative field study

LI YI

85061465@QQ.COM

Affiliated Hospital of Zunyi Medical University

Gongyin Luo

Affiliated Hospital of Zunyi Medical University

Yu Li

Affiliated Hospital of Zunyi Medical University

Jie Zou

Affiliated Hospital of Zunyi Medical University

Dexing Liu

Affiliated Hospital of Zunyi Medical University

HaiYing Wang

Affiliated Hospital of Zunyi Medical University

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Abstract

Aim: To explore the multidimensional needs of patients in the Post-Anesthesia Care Unit (PACU) based on Alderfer's ERG (Existence, Relatedness, Growth) theory and to construct an explanatory framework to inform recovery-oriented nursing strategies.

Design: A qualitative field study.

Methods: Fieldwork was conducted from January to June 2024 in the PACUs of a tertiary hospital in southwestern China. Participants were recruited using purposive and maximum variation sampling. Data were collected through 62 field observations and 17 semi-structured interviews. Data analysis followed Colaizzi's seven-step method. Methodological rigor was ensured through triangulation, member checking, intercoder reliability ($Kappa > 0.80$), and researcher reflexivity.

Results: A total of 5,349 expressions of need were identified and categorized into existence ($n = 4,038$), relatedness ($n = 731$), and growth ($n = 580$) needs. Existence needs predominated, including pain relief, physiological comfort, and safety assurance. Relatedness needs involved respect, communication, and emotional support, while growth needs reflected desires for rehabilitation knowledge and self-reflection. A dynamic interaction model showed that needs progress toward higher levels as physiological stability improves, but may regress rapidly to existence needs under adverse conditions such as pain, hypoxia, or environmental disturbances.

Conclusion: Grounded in ERG theory, this study elucidates the structure and dynamic transitions of PACU patients' needs, highlighting their fluid and non-linear nature.

Implications for the profession and/or patient care: Findings support the development of dynamic, responsive nursing strategies to improve comfort, engagement, and recovery quality.

1. Introduction

Patient experience is a core indicator of healthcare quality, reflecting both subjective perceptions and objective interactions throughout the entire care process (Malathi & Jasim, 2022; Zehra et al., 2025). The World Health Organization also identifies the improvement of patient experience as a fundamental strategy for advancing global patient safety (World Health Organization, 2021). In the Post-Anesthesia Care Unit (PACU), a critical transition period for physiological recovery and psychological adjustment, service quality directly influences patient safety, postoperative rehabilitation, and satisfaction (Marie & Kerry, 2018). During this period, patients frequently exhibit multidimensional and rapidly fluctuating needs driven by residual anesthetics, surgical stress, and unfamiliar environments (Lu et al., 2016; Liang et al., 2022; Zhang et al., 2022).

Existing research on PACU patients has largely focused on isolated symptoms or physiological indicators. Although such studies identify common discomforts and inform targeted interventions, they do not systematically capture patients' concurrent subjective needs (Zeng et al., 2024; Li et al., 2025).

Recent qualitative studies have explored PACU experiences more holistically, yet their small samples, limited scope, and absence of a guiding theoretical framework restrict the comprehensive classification of patient needs (Zhang et al., 2022; Dahlberg et al., 2024; Sig et al., 2025). Consequently, current evidence often remains fragmented or confined to medical and procedural perspectives, lacking rigorous qualitative inquiry that reveals the full spectrum of co-occurring patient needs.

To address this gap, the present study applies Alderfer's Existence–Relatedness–Growth (ERG) theory to deconstruct the intrinsic correlations and parallelism of patient needs across these three dimensions (Yang et al., 2023). The theory's emphasis on non-linear, dynamically shifting motivational states makes it particularly suitable for explaining the rapid, context-dependent transitions observed in the PACU. Field study methodology, characterized by direct observation and situational immersion, further enables the capture of complex real-time interactions between patients and the healthcare environment—elements that traditional controlled studies often overlook (Benov et al., 2022).

2. Subjects and Methods

2.1 Subjects This study utilized purposeful sampling in conjunction with maximum variation sampling. Fieldwork was conducted in two post-anesthesia care units (PACUs) at a tertiary hospital located in southwestern China, spanning from January to June 2024. The inclusion criteria for interviewed patients were PACU patients aged 18 years or older who could clearly express themselves 30 minutes after extubation. Exclusion criteria included patients who were drowsy, had not regained orientation, were delirious, or had other conditions that could impair effective communication. For observed patients, the inclusion criteria were all post-surgical patients transferred to the PACU; exclusion criteria were patients requiring isolation due to special medical conditions or those needing family accompaniment. To ensure maximum variation, patients of different ages, genders, and surgical types were included. The sample size was determined by the principle of information saturation.

2.2 Methods

2.2.1 Electronic devices

One Patriot voice recorder, Excel software, and NVivo 15.0 qualitative analysis software.

2.2.2 Development of a Semi-Structured Interview Guide

Interview Outline: Based on Kallio's interview outline design framework, (Kallio et al., 2016) and incorporating the ERG theory and research objectives, a semi-structured interview outline was developed. The guide was reviewed by the chairperson of the Guizhou Province Anesthesia Nursing Society and qualitative research experts. It was refined through two pilot interviews, resulting in the final version: (1) What is your deepest feeling in the PACU? (2) What physical discomfort or physiological needs do you have in the PACU? (3) Are you concerned about your safety, health, or belongings in the

PACU? (4) What aspects of care do you hope to receive more attention to? (5) In what ways do you expect respect in the PACU?

2.2.3 Researchers' Preparation

Researcher Role and Preparation: The primary researcher, an anesthesia nurse with 2 years of PACU experience, served as an observer and limited participant. They maintained situational immersion to capture authentic data while avoiding any influence on patient recovery or clinical workflow. Reflective journals were written after each observation and interview, addressing potential biases through bracketing. A second researcher—a graduate student trained in qualitative methods—assisted with coding and analysis.

2.2.4 Data Collection Methods

Field research is rooted in situational data collection(Wang et al., 2021). Data were obtained from direct observations and semi-structured interviews. The observation process consists of three stages: descriptive observation, focused observation, and selective observation. Upon entering the field, the researcher begins with descriptive observation, aiming to describe the general recovery conditions of PACU patients, establish trust with medical staff, and gain an overall understanding of the setting. After integrating into the PACU environment, the researcher conducted focused observation, with daily observation periods scheduled from 09:30 to 16:00. Guided by the ERG theory, the researcher observed patients' behaviors, verbal expressions, interactions with medical staff, and physiological responses throughout the recovery process. Observation records were documented using a standardized form that included three categories of indicators: (1) physiological responses (e.g., breathing patterns, facial expressions, body movements); (2) verbal interactions (e.g., self-reports, calls for assistance, articulations of needs); and (3) non-verbal behaviors (e.g., eye contact, gestures, avoidance behaviors). All records were completed on the same day, supplemented with field notes to capture contextual details when necessary. In parallel, representative patients across different ages and surgical departments were selectively approached for interviews, which were conducted and audio-recorded after obtaining informed consent. During interviews, the researcher posed one question at a time, with follow-up probes tailored to respondents' narratives. The researcher primarily listened attentively, avoided leading prompts, and sought to understand the unfolding context of each interview. Attention was also given to participants' facial expressions, body language, and other non-verbal cues to maintain sensitivity to the research relationship.

2.2.5 Data Analysis Methods

Qualitative research data organization and analysis are conducted simultaneously(Im et al., 2023). Within 24 hours of each field observation, the researcher transcribed the interview recordings verbatim and repeatedly verified the accuracy of the transcripts against the audio files. At the same time, combining the collected data and personal recollections, field notes are organized, and reflections and insights from the day's field research are recorded. This study employs Colaizzi's seven-step analysis

method(Tu et al., 2025) to analyze field notes and interview transcriptions, guided by the ERG theory. This study adopts a method where two researchers analyze the same set of data, conducting a research group meeting at each stage of clustering categories and generating structures, discussing and recording any contentious codes and themes, and seeking expert opinions to ultimately reach consensus on coding and categorization.

2.3 Quality Control

This study adopts Guba and Lincoln's(Norman,2017) quality control strategies for qualitative research. For credibility, interviews reached saturation at the 15th case, and five member checks were completed. No new themes emerged. Triangulation was conducted using observation records, interviews, and self-reflection comparisons to ensure data completeness. For transferability, maximum variation sampling covered multiple types of patients. To ensure coding reliability, two trained researchers independently coded 20% of the transcribed data using an initial codebook developed from the ERG theory and inductive reading. Inter-coder agreement was calculated using Cohen's Kappa; discrepancies ($Kappa < 0.8$)(Odegard et al., 2022) were discussed in weekly analytic meetings, the codebook was revised iteratively, and a final consensus codebook was applied to the entire dataset. For confirmability, bracketing strategies were employed to reduce subjective influence. Recordings, transcriptions, and field notes were preserved throughout, and researchers used reflective journals to control biases.

2.4 Ethics

The study was approved by the Medical Ethics Committee of Zunyi Medical University Affiliated Hospital (KLL-2024-638), and all participants provided informed consent. This study adheres to the provisions of the Declaration of Helsinki.

3. Results

3.1 General Information of Research Subjects

Over the course of 123 days of field observation, researchers engaged with or observed 4,049 patients transferred to the Post-Anesthesia Care Unit (PACU) following surgery. This engagement led to the creation of 62 field diaries, comprising a total of 85,671 words. The distribution and number of surgical types are detailed in Fig. 1. Additionally, 17 semi-structured interviews were conducted, resulting in 312 minutes of recordings and 20,521 words of transcribed text. Following the principle of information saturation, no new themes emerged after the fifteenth interviewee. Saturation was confirmed after conducting two additional interviews for verification. The general characteristics of the respondents are presented in Table 1.

Table 1
General Information of Respondents

Serial Number	Department	Age (years)	Gender (Male/Female)	ASA Classification	Height (cm)	Weight (kg)
1	Burn and Plastic Surgery	58	Male	☒	170	80
2	Thyroid and Breast Surgery	36	Female	☒	160	60
3	Urology	22	Male	☒	171	55
4	Orthopedics	61	Male	☒	160	60
5	Gastrointestinal Surgery	55	Female	☒	152	50
6	Orthopedics	32	Female	☒	149	37.5
7	Kidney Transplant	38	Male	☒	170	62
8	Hepatobiliary Surgery	67	Female	☒	152	52
9	Gastrointestinal Surgery	29	Female	☒	163	93
10	Orthopedics	71	Female	☒	150	40
11	Reproductive Medicine	37	Female	☒	164	74
12	Ear, Nose, and Throat	29	Male	☒	168	68
13	Optometry	64	Female	☒	145	45
14	Reproductive Medicine	32	Female	☒	150	60
15	ear, Nose, and Throat	49	Male	☒	170	69
16	Thoracic Surgery	55	Female	☒	156	53
17	Thyroid and Breast Surgery	33	Male	☒	165	74

3.2 Coding Construction

Preliminary coding was conducted using Alderfer's ERG theory as a framework, identifying primary themes corresponding to existence, relatedness, and growth needs. Sub-themes were further refined

through inductive analysis, forming a more detailed thematic network in conjunction with specific patient experiences (refer to Table 2).

Table 2
Coding framework of patients' needs during anesthesia recovery based on ERG theory (with representative quotes)

Representative quotes	Primary Concepts (Frequency)	Class (Number of Concepts, Frequency)	Theme (Number of Concepts, Frequency)
<i>"I feel so sleepy, I can't keep my eyes open." (Interview P02) / "After extubation, the patient remains relatively drowsy. Even when aroused, they fall back asleep quickly." (Field Journal 5)</i>	1.Desire for Sleep (422)	Basic Physiological Needs (7, 2129)	existence (19, 4038)
<i>"The wound hurts like being cut by a knife." ((Interview P03) / "It was observed that general orthopedic patients are prone to postoperative acute pain during the recovery period."(Field Journal 15)</i>	2. Pain Relief (302)		
<i>"My stomach is turning over; I feel like vomiting." (Interview P02) / "I feel like my stomach is churning violently." (Interview P05)</i>	3. Nausea and Vomiting (241)		
<i>" I feel like I can't breathe."(Interview P06) /" After tube removal, oxygen saturation drops rapidly." (Field Journal 11)</i>	4. Breathing Difficulties (224)		
<i>"My chest feels heavy" (Interview P08)/"My heart feels like it's going to jump out" (Interview P15)</i>	5. Chest Tightness and Palpitations (221)		
<i>"Could I have some water? My mouth is so dry." (Interview P05) / "Just moisten my mouth, please." (Field Journal 10)</i>	6. Thirst (218)		
<i>"I'm hungry – when can I eat?" (Field Journal 20)/"I'm very hungry. When can I eat?" (Interview P12)</i>	7. Hunger (201)		
<i>"The catheter is bothering me; I feel like I need to pee." (Field Journal 28)/ "I want to defecate."(Interview P15)</i>	1.Abnormal Sensation of Urination and Defecation (276)	Abnormal Sensation Resolution Needs (7, 842)	
<i>"My throat feels uncomfortable; it's like something is stuck."(Field Journal 32) /"It feels like there's phlegm in my throat, but I can't cough it up." (Interview P10)</i>	2. Sensation of Foreign Body in Throat (221)		
Note: Frequency is defined as the number of times the topic was recorded in both interviews and field notes.			

Representative quotes	Primary Concepts (Frequency)	Class (Number of Concepts, Frequency)	Theme (Number of Concepts, Frequency)
"I feel the bandage on my arm is too tight; I have no sensation in my fingers." (Interview P17) / "The spot where they did the puncture feels numb." (Field Journal 7)	3. Local Numbness (116)		
"I feel dizzy and lightheaded." (Interview P14) / "My head feels muffled and uncomfortable." (Interview P09)	4. Dizziness (115)		
"The patient exhibits extremely agitated symptoms" (Field Journal 30)/"I feel very agitated." (Interview P12)	5. Irritability (68)		
"It's itching so badly where they put adhesive." (Interview P16) / "Possible allergic reaction, patient is experiencing severe itching" (Field Journal 26)	6. Skin Itching (38)		
"He's trying to hit people after waking." (Field Journal 34) / "I want to pay now with cash!" (Field Journal 42)	7. Delirium (8)		
" Doctor, could you give me an extra blanket?" (Interview P14) / " I'm so cold. Could you cover me up with the quilt more securely?" (Interview P09)	1. Cold sensation (286)	temperature improvement needs(3, 529)	
"A young man weighing 280 jin woke up drenched in sweat and immediately kicked off the quilt." (Field Journal 38)	2. Sensation of heat (128)		
"The patient is experiencing chills, which may indicate a postoperative acute infection." (Field Journal 34) / "Patients undergoing flap transplantation often experience severe tremors during the recovery period." (Field Journal 52)	3. Chill (115)		
"Is the operation done?" (Interview P15) / "Is my pathology benign or malignant?" (Interview P17)	1.Awareness of Surgical Situation (409)	Safety Needs (2, 731)	
"Where is this place? " (Field Journal 58) / "I don't know where I am. I'm completely disoriented." (Field Journal 49)	2. Environmental Cognition (322)		
Note: Frequency is defined as the number of times the topic was recorded in both interviews and field notes.			

Representative quotes	Primary Concepts (Frequency)	Class (Number of Concepts, Frequency)	Theme (Number of Concepts, Frequency)
<i>"Can you prop up my foot? This posture is uncomfortable."(Field Journal 62) /"Could you help me turn onto my side? (Field Journal 33)</i>	1.Local Position Adjustment (218)	Position Change Needs (2, 336)	
<i>"Raise the head of the bed a bit – it helps me breathe." (Interview P17) /"Raise the head of the bed 30 degrees to facilitate breathing." (Field Journal 11)</i>	2. Head of Bed Elevation (118)		
<i>"I heard staff talking about me – I didn't feel respected." (Interview P05) / "She said I was fat; it hurt." (Interview P12)</i>	1.Desire for Respect (289)	Emotional Needs (2, 574)	Relationships (4, 731)
<i>"I don't see nurses around; I feel uncared for." (Interview P01) / "A nurse held my hand and it calmed me." (Interview P15)</i>	2. Care from Medical Staff (285)		
<i>"Please tell my husband I'm done with surgery."(Field Journal 20) /"I hope to let my family know as soon as possible that my surgery has ended now, so they won't worry." (Interview P17)</i>	1.Family Awareness (89)	Social Support Needs (2, 157)	
<i>" don't cry, it's just a minor surgery. Look, I had my stomach cut open and I wasn't afraid.." (Field Journal 25) /"What's your illness?"/"Your IV fluid is almost gone, hurry and get the nurse to change" (Field Journal 38)</i>	2. Peer Communication (68)		
<i>"Will I be able to have breast reconstruction?" (Field Journal 60) /"How long until I can drink water and eat?" (Interview P03)</i>	1.Postoperative Rehabilitation Knowledge Needs (422)	Self-Actualization Needs (2, 580)	Growth (2, 580)
<i>"If I had known, I would have cared for my health better." (Interview P11) / "I will make sure to follow the doctor's advice and have regular check-ups from now on." (Field Journal 52)</i>	2. Self-Reflection and Improvement (158)		
Note: Frequency is defined as the number of times the topic was recorded in both interviews and field notes.			

Table 3

Dynamic interaction of patient needs during anesthesia recovery based on ERG theory: progression, regression, and resonance mechanisms

Mechanism type	Typical transition (need level)	Representative dynamic quote	Clinical / theoretical interpretation
Progression (Upward shift)	Existence → Relatedness / Growth	<i>"My throat doesn't hurt now... nurse, is the operation finished?" (Field Journal 37) / "I feel better now... is my family waiting outside?" (Field Journal 18)/"It hurts so much... Can you help me?", After the nurse provided pain relief, the patient gradually relaxed and continued to ask,"Nurse, did my surgery go smoothly? " (Field Journal 26)</i>	When physiological discomfort is relieved and safety restored, patients begin to seek interpersonal connection or recovery information, indicating an upward transition from survival to higher-order psychological needs.
Regression (Downward shift)	Growth / Relatedness → Existence	<i>"I wanted to ask something, but suddenly I feel nauseated again." (Interview P12) / "I don't want to talk now... my chest feels tight again." (Interview P13) / "I was talking, but suddenly I felt cold, started shivering, Can you give me a blanket?" (Field Journal 17)</i>	Renewed distress such as pain, nausea, chill, or dyspnea interrupts relational or cognitive engagement, forcing regression to survival-level needs focused on immediate safety and comfort.
Resonance (Mutual reinforcement)	Relatedness ↔ Growth	<i>"The nurse told me the surgery went well, and I felt relieved... I should try to breathe more deeply." (Interview P17) / "She said I did great; I want to cooperate well now." (Interview P16) / The nurse comforted the patient, who then said gratefully, "Thank you for your care. I will follow your advice and I'm sure I'll recover soon." (Field Journal 53)</i>	Positive nurse–patient communication and reassurance generate emotional–cognitive resonance, strengthening self-directed recovery motivation and promoting stable progression toward rehabilitation readiness.

3.3 Dynamic Transformation of Patient Needs in the PACU

- Table 3 encapsulates the dynamic evolution of patient requirements during anesthesia recovery, mirroring the adaptable and context-sensitive nature of human motivation as outlined by ERG theory. Immediately following anesthesia, the need for existence prevails as patients endure pain, dryness of the airway, shivering, or nausea. As these discomforts are alleviated and consciousness gradually returns, patients display an upward trajectory—inquiring about the success of the surgery, the presence of family, or the schedule for discharge. This transition signifies the temporary engagement of relational and growth needs once physiological safety is ensured. However, this progression is fragile and can be easily disrupted by environmental or clinical stimuli. The resurgence of pain, hypoxia, nausea, or a sensation of coldness can swiftly redirect patients' focus

back to immediate physical safety, reflecting a regression mechanism. For example, a patient expressed, "I was conversing, but suddenly I felt cold, began shivering, and asked, 'Can you give me a blanket?'" Such instances vividly illustrate how physical discomfort can suspend higher-order needs and refocus the patient's attention on survival. These abrupt downward shifts underscore the fragility of recovery needs amidst fluctuating physiological and sensory conditions typical of the PACU.

- The interplay between relatedness and growth needs highlights the reciprocal influence and interactive effects between these two motivational dimensions. When nurses offer verbal reassurance ("The surgery went well"), gentle touch, or affirmation ("You did great"), patients experience psychological security and a renewed willingness to cooperate ("I should breathe more deeply," "I'll try to follow the nurse's instructions"). These emotional-cognitive interactions reinforce upward motivation and act as a buffer against regression. Collectively, these mechanisms indicate that patient needs in the PACU are not static but dynamically shifting states influenced by physiological recovery and interpersonal interaction. The conceptual model (Fig. 2) illustrates this dynamic interplay, with existence needs forming the base and relatedness and growth needs evolving in tandem under continuous contextual modulation.

4. Discussion

4.1 Priority of existence Needs: Physiological Safety Assurance and Comfort Optimization

Survival needs emerged as the most fundamental and prominent concerns during post-anesthesia recovery, encompassing 19 concepts with a total of 4,038 mentions (Table 2). These needs reflect patients' physiological responses, safety concerns, and comfort requirements. The subcategory of basic physiological needs includes eight concepts describing postoperative discomfort. Among these, the most frequently mentioned was the "desire for sleep" (422 mentions), which corresponds to the sleep-promoting effects of general anesthetics on neurons in the ventrolateral preoptic nucleus of the hypothalamus (Jiang-Xie et al., 2019; Deng et al., 2022). This finding highlights the importance of minimizing unnecessary disturbances, provided that vital signs are stable, to help patients meet their sleep needs and support early recovery. "Pain relief" (302 mentions) was the next most common concept, consistent with the findings of Zhang et al. (2022) and Lu et al. (2016). Since acute postoperative pain is among the most prevalent symptoms during recovery, anesthesia care providers must accurately assess pain intensity, characteristics, and location, and implement individualized, preemptive analgesic strategies to reduce breakthrough pain. The second major subcategory, the need to resolve abnormal sensations, reflects outward manifestations of underlying physiological issues. Providers should identify the causes of these sensations based on patient complaints and act promptly. For example, "abnormal sensations related to urination and defecation" (276 occurrences) are frequently mentioned. These sensations, consistent with findings by Zhang et al. (2022) and Lu et al. (2016), are often linked to catheter-induced discomfort. Similarly, the "foreign body sensation in the throat" is mostly

due to the stimulation of the tongue root and throat during endotracheal intubation (Yang et al., 2024), and patients often feel soreness or irritation in the throat after awakening. Nurses should promptly explain this cause to patients to alleviate their anxiety. The high frequency of safety-related needs (731 mentions) underscores deficiencies in preoperative information delivery and intra-recovery communication, echoing findings by Lu et al. (2016). Many patients urgently sought information about surgical outcomes upon awakening, likely due to anterograde amnesia associated with benzodiazepines. Therefore, proactive communication by recovery room staff can effectively address these concerns. Although positional change needs comprised only two concepts, with 33 mentions, they remain clinically important. Prolonged intraoperative immobilization leaves patients in a single position, making the recovery period a key opportunity for early mobilization. Encouraging position changes or limb movement can improve comfort (Zhang et al., 2023). Wang et al. (2024) reported that elevating the head of the bed to 30° improves respiratory function and reduces post-extubation hypoxia. In summary, existence needs are the core focus of patients during the anesthesia recovery period. Ensuring both physiological safety and comfort should be achieved through graded symptom management. These needs directly correspond to commonly used safety and recovery assessment indicators in the PACU. This alignment guides PACU nurses in monitoring patients according to their needs and in providing personalized recovery interventions.

4.2 Relatedness Needs: Dignity Maintenance and Support System Reconstruction

Relational needs were mentioned less frequently than survival needs. However, they significantly influence patients' subjective experiences and their long-term trust in care. The desire for respect (289 mentions) often arose from inadvertent verbal offenses by healthcare staff and aligns with the "need for attention/recognition" described by Dahlberg et al. (2024) in postoperative transfer experiences. Based on ERG theory, this study classifies the need for emotional connection as a "relatedness need". "Dignified care" is a core indicator in the safety standards of the Chinese Hospital Association (Huang et al., 2023), highlighting the importance of standardized communication protocols in the PACU. The need for family involvement (89 mentions), though mentioned less frequently, reflects patient concern about family anxiety during recovery. Current research on family involvement in anesthesia recovery focuses largely on pediatric populations (Hu & Gao, 2024), while models for adult family participation warrant further exploration in future studies.

4.3 Growth Needs: Window Period Interventions for Health Empowerment

The concept and frequency of mentions of growth needs are the least among the three categories, accounting for 10.84%. However, 72.76% of these pertain to postoperative rehabilitation knowledge needs (422 occurrences), indicating that the recovery period is a critical window for empowering patients' health. This finding aligns with the conclusions of Liang et al. (2022) and colleagues. The post-anesthesia recovery period is the first physiological and psychological rehabilitation phase that patients

experience after surgery. After awakening, healthcare personnel should provide effective health education and psychological support to help patients manage postoperative rehabilitation stress and build confidence in their recovery. Additionally, the 158 occurrences related to self-reflection and improvement indicate an awakening of patients' awareness of self-health management after surgery. Medical staff should guide and encourage patients to stimulate their intrinsic motivation for change, instead of merely delivering health education in a one-way manner.

4.4 Dynamic Interaction Model of Patient Needs during Anesthesia Recovery: Applicability Analysis Based on ERG Needs Theory

- This study indicates that patients have three types of needs during recovery: existence, relational, and growth, which align with Sun et al.'s (2024) findings. Moreover, it extends previous research by qualitatively deconstructing these needs through the lens of ERG theory and introduces a dynamic interaction model that underscores their interdependence. Existence needs are predominant in the early stages of recovery and lay the groundwork for subsequent relational and growth needs. Once established, relational and growth needs may emerge either sequentially or concurrently (see Table 3); they do not adhere to a rigid hierarchy but operate in parallel, reinforcing one another. Patients who feel respected, well-informed, and actively engage in rehabilitation knowledge tend to interact more closely with nursing staff and often exhibit a stronger motivation for recovery. This dynamic interaction fosters a positive feedback loop that supports comprehensive recovery. However, environmental or clinical disturbances (e.g., noise, hypoxia, or insufficient information) can disrupt this equilibrium and lead to a regression to existence-level needs, manifesting as anxiety, heightened nociceptive sensitivity, or other physiological demands. This oscillation between progression and regression mirrors a cyclical regulatory mechanism that is consistent with both the dynamic interaction model and the contextual flexibility highlighted in ERG theory (Wang, 2023). These insights suggest that anesthesia care providers should continuously evaluate patient needs throughout the recovery process, rather than concentrating solely on stable vital signs. A heightened awareness of the psychological state and communication quality, coupled with early identification of need regression, can inform targeted interventions. By addressing relational and growth needs through clear communication, increased patient autonomy, and active involvement, providers can enhance patients' coping mechanisms and recovery outcomes, thereby improving the overall quality of care.

5. Limitations and Future Directions

Although this study offers valuable insights into patients' needs during anesthesia recovery from the perspective of ERG theory, it is important to note some limitations. Firstly, as a single-center qualitative field study, the research may have limited applicability to other contexts. Secondly, theme frequency was utilized solely as a descriptive indicator, not as a measure of prevalence. Future studies should refine and operationalize the ERG-based framework, develop measurable indicators of patient needs, and empirically investigate the mechanisms behind their dynamic transformation during recovery. Expanding

research across various cultural and institutional contexts will further validate and enhance the generalizability of the proposed model.

6. Conclusion

This study reveals that patients' needs during anesthesia recovery fluctuate dynamically across existence, relatedness, and growth levels, forming a non-linear interaction consistent with ERG theory. Existence needs dominate the early recovery phase, while relational and growth needs emerge as physiological stability improves. The identified progression, regression, and resonance mechanisms highlight the importance of timely comfort measures, empathetic communication, and individualized psychological support. These findings provide a theoretical foundation for developing dynamic, need-based nursing interventions that enhance safety, comfort, and patient engagement in the post-anesthesia recovery process.

Declarations

Declaration of AI and AI-assisted technologies in the writing process In preparing this work, the author(s) utilized ChatGPT (OpenAI) to assist with language editing and enhance the clarity of expression. Following the use of this tool, the author(s) reviewed and edited the content as necessary and take(s) full responsibility for the publication's content.

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CRedit Author Contributions

1. Yi Li: Investigation – conducting fieldwork, data collection; Writing – Original Draft – preparation and drafting of the initial manuscript. Visualization – preparation and creation of figures, models, and visual materials.
2. Gongyin Luo: Investigation – conducting observations, interviews, and data collection.
3. Yu Li: Supervision – oversight and leadership in research planning, coordination, and execution.
4. Jie Zou: Formal Analysis – application of analytical techniques, coding reliability assessment, and data interpretation.
5. Dexing Liu: Writing – Review & Editing – critical revision of the manuscript; Methodology – design of research methods and analytical framework.
6. HaiYing Wang: Validation – verification of experimental results and consistency checks across datasets.

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Figures

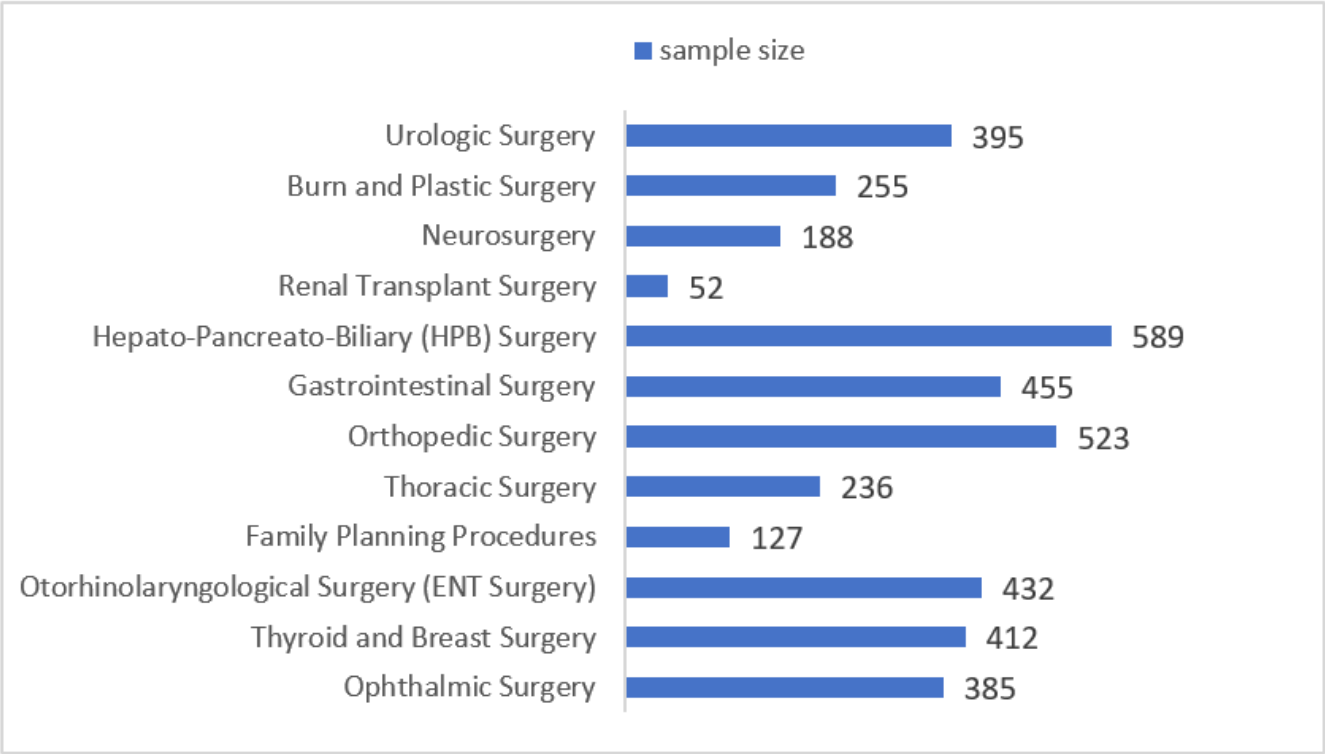


Figure 1

Distribution and Number of Surgical Types

Figure 2. Dynamic Interactive Model of Recovery Needs in the Post-Anesthesia Care Unit (PACU) based on ERG Theory

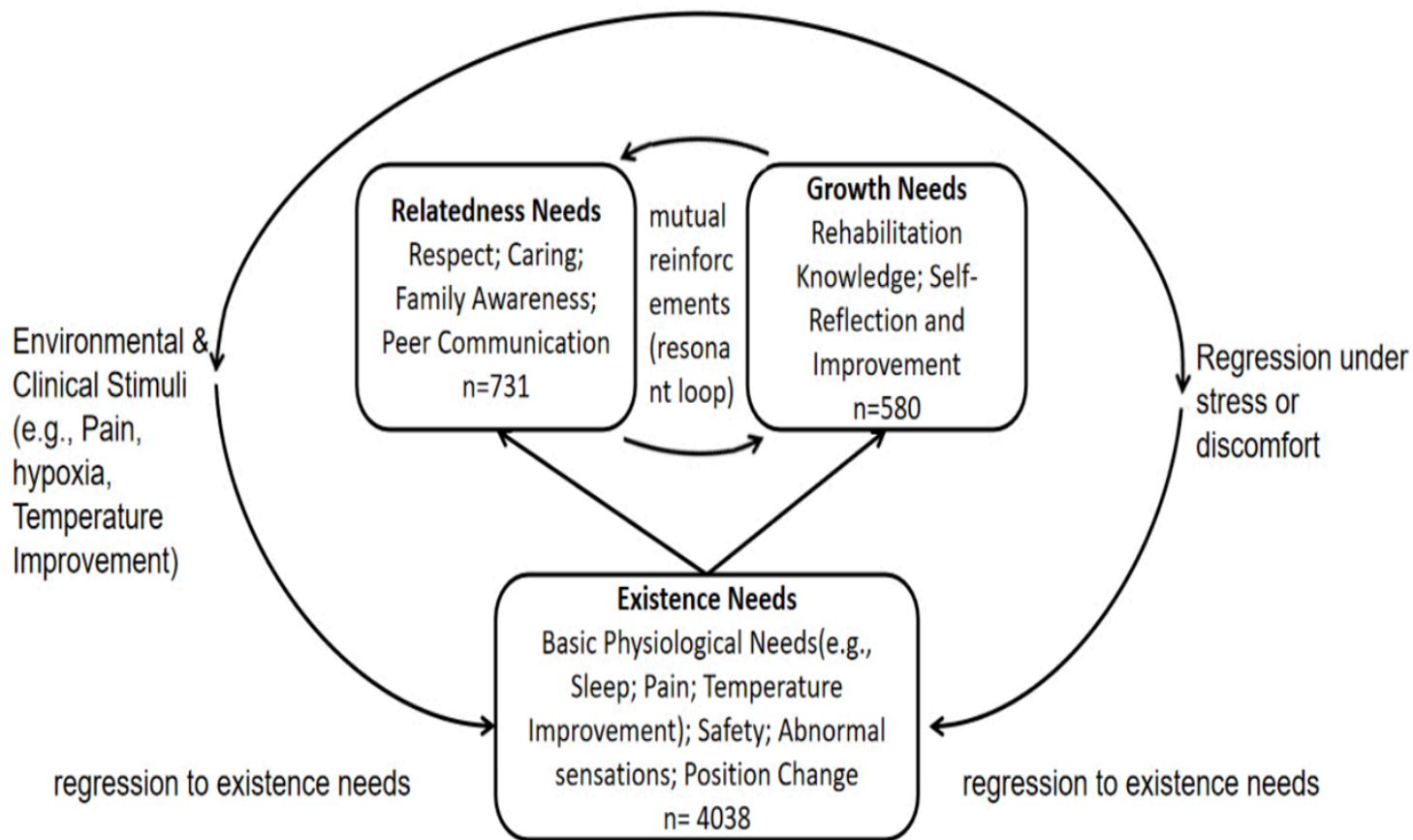


Figure 2

See image above for figure legend.

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