International Journal of Clinical and Experimental Medicine Research, 2026, 10(2), 158-164
https: //www.hillpublisher.com/journals/ijcemr/
ISSN Online: 2575-7970
ISSN Print: 2575-7989

Research Progress on Thirst Management and Nursing During PACU in Postoperative Patients Undergoing General Anesthesia

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How to cite this paper: Ting Shen, Shengjie Yao. (2026) Research Progress on Thirst Management and Nursing During PACU in Postoperative Patients Undergoing General Anesthesia. *International Journal of Clinical and Experimental Medicine Research*, 10(2), 158-164.
DOI: 10.26855/ijcemr.2026.03.019

Received: January 31, 2026
Accepted: February 28, 2026
Published: March 31, 2026

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Abstract

General anesthesia is one of the commonly used anesthesia methods for surgical patients. Patients need to be resuscitated in the post-anesthesia recovery room (PACU) after surgery until their vital signs are stable. During the anesthesia recovery period, patients are susceptible to various factors such as anesthesia drugs and pain, which can cause agitation during the anesthesia recovery period. This not only affects the recovery effect, but can also affect the patient's life safety and postoperative recovery due to excessive limb movements. Thirst is a common and important issue affecting the recovery of postoperative patients under general anesthesia in the post-anesthesia recovery room. The reasons for thirst during PACU in patients after general anesthesia are multifaceted, including the influence of anesthetic drugs, surgical procedures, and mechanical ventilation, fluid imbalance and metabolic changes, and psychological factors. This article reviews the pathological causes, evaluation tools, intervention measures, and personalized nursing plans for thirst during PACU in patients after general anesthesia. The aim is to provide a scientific basis for clinical nursing, to improve patient comfort and rehabilitation quality after surgery, and at the same time, to increase the awareness and attention of medical staff to thirst during PACU in patients after general anesthesia.

Keywords

Postoperative general anesthesia; PACU; Thirst management; Progress in Nursing Research

1. Introduction

General anesthesia, also known as general anesthesia, involves the reversible inhibition of the central nervous system through inhalation, intravenous, or intramuscular injection of anesthetic drugs. As the drug is metabolized and excreted in the body, the patient's consciousness and physiological reflexes will gradually return to normal. In general anesthesia surgery, anesthetic drugs can inhibit glandular secretion, and tracheal intubation and mechanical ventilation are also important predictors of postoperative thirst. After general anesthesia, patients often experience insufficient oral mucosal moisture, which can directly cause obvious thirst due to physiological changes [1]. After general anesthesia, patients often experience symptoms of thirst during PACU, which not only affects their comfort but may also trigger negative emotions such as anxiety and irritability, and even increase the risk of complications such as delirium, delaying the recovery process [2]. With the promotion of the Enhanced Recovery Surgery (ERAS) concept, the importance of optimizing perioperative procedures, reducing surgical trauma and stress, and minimizing complications is becoming increasingly prominent. Therefore, scientific and effective thirst management and nursing are crucial for the recovery of patients after general anesthesia.

2. Definition and Pathological Causes of Postoperative Thirst

2.1 Definition of postoperative thirst

Thirst, also known as dry mouth syndrome, is a subjective symptom characterized by dry lips, sticky saliva, and abnormal taste. Thirst is divided into two types: osmotic and hypovolemic. When the plasma osmotic pressure slightly increases by 1% to 2%, and the extracellular sodium concentration only increases by about 2 mEq/L compared to the normal value, the osmoreceptors in the brain respond to cell dehydration, stimulating the release of antidiuretic hormone and reducing water loss [3, 4]. When the compensatory mechanism provided by osmotic changes is not working, the feeling of thirst is activated. The mechanism of hypovolemic thirst is closely related to the decrease in intravascular volume caused by insufficient extracellular fluid, and its physiological regulation mainly relies on the synergistic effect of the renin angiotensin aldosterone system and the adrenergic nervous system [5, 6]. In the pathological state of decreased effective circulating blood volume, the activity of renin secretion by renal glomeruli is significantly enhanced, which in turn promotes an increase in angiotensin II levels. This series of biochemical reactions ultimately activates the central thirst center and triggers drinking behavior.

2.2 Causes

2.2.1 Effects of anesthetic drugs

During general anesthesia surgery, anesthetic drugs act on the hypothalamic thirst center, leading to dry mouth, and tracheal intubation and mechanical ventilation are also important predictors of postoperative thirst. After general anesthesia, patients often experience insufficient oral mucosal moisture, which can directly cause obvious thirst due to physiological changes. Tracheal intubation, as a strong stressor, stimulates the patient's mouth and throat, causing discomfort such as foreign body sensation, bloating, itching, etc [7-9]. During mechanical ventilation, the patient's mouth cannot be closed, which accelerates the evaporation of saliva and leads to thirst. After tracheal extubation, it is necessary to fast for a period of time, and in order to reduce the circulatory load after cardiac surgery, it is necessary to limit the patient's fluid intake, which often exacerbates symptoms of thirst. Dysphagia after extubation is a common complication, and persistent dysphagia can delay the recovery of a normal diet and exacerbate thirst sensation. Compared to general anesthesia, local anesthesia and regional anesthesia usually have shorter preoperative drinking and fasting periods due to the shallow surgical site, limited anesthesia range, and shorter surgical time [10]. Therefore, the causes of postoperative thirst, such as prolonged fasting, use of anticholinergic drugs, and mechanical ventilation, are significantly less than those of general anesthesia [6]. In summary, general anesthesia surgery is more prone to experiencing thirst symptoms compared to other types of surgery.

2.2.2 Surgical procedures and mechanical ventilation

Intraoperative endotracheal intubation and mechanical ventilation can cause dryness of the respiratory mucosa, accelerate the evaporation of saliva and oral water, and increase the patient's thirst. In addition, factors such as blood loss and cell dehydration during surgery can also lead to a decrease in effective blood volume, an increase in plasma colloid osmotic pressure, and ultimately trigger thirst.

2.2.3 Fluid imbalance and metabolic changes

Preoperative fasting and water deprivation time are generally prolonged; intraoperative fluid loss and restrictive infusion strategies can lead to insufficient water in the patient's body, causing thirst. The metabolic rate of postoperative patients increases, and their demand for water also increases accordingly, further exacerbating thirst symptoms [11, 12].

2.2.4 Psychological factors

Surgery, as a stressor, can cause patients to experience psychological states such as tension and anxiety, activate the sympathetic nervous system, and promote the occurrence of thirst. In addition, patients' concerns and uncertainties about postoperative recovery can also increase psychological burden and exacerbate thirst.

3. Postoperative Thirst After General Anesthesia Affects Patient Prognosis

Thirst is a subjective feeling that can trigger a strong desire to drink water, and its essence is an important feedback regulation mechanism for maintaining fluid homeostasis. By stimulating individuals' drinking behavior, the body's water and salt balance can be restored, which can cause postoperative dehydration and other problems in patients. Postoperative thirst is the most intense symptom experienced by patients during the recovery period of general

anesthesia after extubation, and it is also one of the main reasons affecting patient prognosis and postoperative satisfaction, with an incidence rate as high as 47.3%-100%, even exceeding pain [13]. At present, postoperative thirst is mainly quantified through subjective assessment tools and classified into three levels: mild, moderate, and severe. A decrease in oral moisture may cause mild thirst. Saliva has multiple functions, such as lubricating the oral cavity, protecting mucous membranes, antibacterial, and digestive properties [14]. When saliva secretion decreases, the pH value of the oral environment increases, mucosal lubrication decreases, and the balance of the microbiota begins to be affected. This change creates a favorable environment for the reproduction of opportunistic pathogens, but may not cause obvious thirst symptoms in patients. Moderate thirst not only exacerbates the patient's physiological stress response, increases the body's oxygen consumption and metabolic needs, but also has the most significant impact on triggering adverse emotional reactions such as anxiety and irritability. These psychological stress reactions not only affect the patient's own rehabilitation experience but may also increase the difficulty of doctor-patient communication [15, 16]. Severe thirst represents the most severe postoperative thirst state, with patients having a strong and unbearable desire to drink water. Although severe thirst accounts for only 23.2% of postoperative thirst patients, severe thirst may cause symptoms such as nausea and vomiting, not only increasing the risk of delirium, but also serving as a warning signal for issues such as insufficient blood volume, electrolyte imbalance, and metabolic abnormalities. The degree of postoperative thirst is positively correlated with poor prognosis in patients. If moderate to severe postoperative thirst is not identified and intervened in a timely manner, it may increase the incidence of postoperative complications, prolong hospitalization, have adverse effects on disease prognosis, and ultimately hinder the patient's recovery process. Based on this, constructing a highly specific postoperative stratified assessment system for moderate to severe thirst has important clinical value for achieving precise risk assessment, implementing targeted prevention strategies, and optimizing tiered intervention plans [17, 18].

4. Assessment Tool for Postoperative Thirst After General Anesthesia

4.1 Subjective evaluation tools

(1) Visual Analog Scale (VAS): Patients are asked to self-assess their thirst level through a straight line marked with 0-10 points. A score of 0 indicates no thirst, while a score of 10 indicates extreme thirst. This method is easy to operate and master, and can be performed at the bedside, making it convenient to assess the patient's thirst status at any time [19].

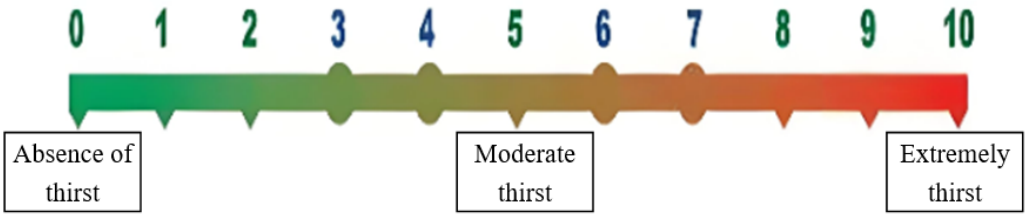

Figure 1. VAS evaluation of patient thirst status.

(2) Numerical Rating Scale (NRS): NRS is a one-dimensional assessment scale developed on the basis of the Visual Analog Scale (VAS), and the two have a high correlation. This scale consists of 11 points ranging from 0 to 10, representing different levels of thirst. 0 indicates no thirst, and 10 indicate the strongest sense of thirst. Patients score based on their own level of thirst.

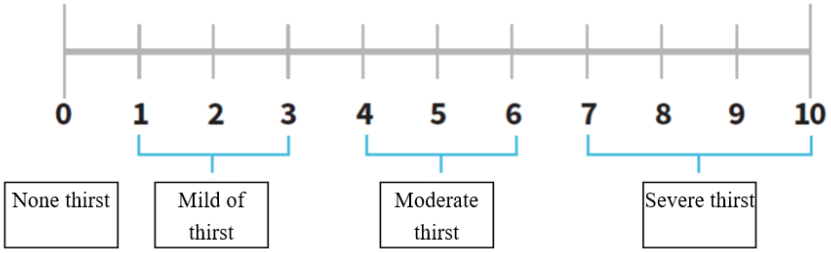

Figure 2. NRS evaluation of patient thirst status.

(3) Perioperative Patient Thirst Discomfort Scale (PTDS): Used to evaluate the comfort and thirst of patients during the perioperative period (before and after surgery), with a total of 7 items, using the Likert 3-level scoring method, where 0 represents "no distress", 1 represents "mild distress", and 2 represents "very distress", with a total score of 0-14 points. The higher the score, the more severe the patient's thirst discomfort [20].

Table 1. Perioperative Patient Thirst Discomfort Scale (PTDS)

Assess the following symptoms of the patient:			
	No trouble	slight trouble	Very trouble
01 Do you feel dry in your mouth?			
02 Do you feel dry lips?			
03 Do you feel thick tongue coating?			
04 Do you feel thick saliva?			
05 Do you feel a dry throat?			
06 Do you feel bad breath?			
07 Do you want to drink water?			
Total score			

Notes: Using the Likert 3-level scoring method, where 0 represents "no distress", 1 represents "mild distress", and 2 represents "very distress", with a total score of 0-14 points.

4.2 Objective evaluation tools

(1) Oral Mucosal Moisture Scale (OMMS): The scale includes lip wetness (0-3 points), tongue wetness (0-3 points), oral mucosal wetness (0-3 points), and saliva secretion (0-3 points), with a total score of 0-12 points, the lower the score, and the drier the mucosa.
(2) Resting saliva flow rate measurement: By collecting the total amount of saliva in the patient's resting state within 5 minutes, calculate the saliva flow rate per minute. This method can indirectly reflect salivary gland function, but the operation is relatively complex and may cause discomfort to patients.
(3) Oral moisture meter: evaluates the degree of oral mucosal moisture by measuring the specific gravity of the water contained under the oral mucosa. This method is easy to operate and can obtain accurate values, providing objective data for research and subsequent treatment.

5. Management Measures for Thirst During PACU in Postoperative Patients Under General Anesthesia

5.1 Moisturizing the oral cavity and stimulating saliva secretion

Use sprays containing trace elements or drugs, such as vitamin C water spray, citric acid spray, etc., to spray onto the lips and mouth, quickly moisten the oral mucosa, and alleviate thirst symptoms. Research shows that oral spray can effectively relieve dry mouth after major abdominal surgery and improve patient comfort [21].

Starting to chew sugar-free gum on the first day after surgery can stimulate salivary glands to secrete saliva, moisten the mouth, and also clean the mouth. However, it should be noted that chewing solids can easily cause suffocation, so this method is limited to postoperative anesthesia patients in a conscious sitting or semi-sitting position.

Cut the cucumber into thin slices and apply it to the patient's lips. The cucumber has sufficient moisture and emits a fragrant aroma, which can stimulate the patient's salivary glands to secrete saliva and relieve thirst.

5.2 Early drinking water management

The discomfort caused by postoperative thirst often puts patients in a strong state of stress, thereby increasing their myocardial oxygen consumption and metabolic burden, delaying or even hindering their recovery [22]. The expert consensus on the assessment and management of postoperative thirst symptoms in adults provides a reference for the best clinical nursing practices to standardize the assessment and management of postoperative thirst symptoms in adults [23]. The concept of Enhanced Recovery Surgery (ERAS) proposes that early recovery of oral water intake

after surgery can promote the recovery of intestinal motility, maintain the intestinal mucosal barrier, prevent bacterial dysbiosis and translocation, thereby reducing the incidence of postoperative infections and shortening hospital stay [24].

(1) Pre-drinking water assessment: In PACU, a comprehensive assessment is required to determine whether the patient can safely drink water, including levels of consciousness, cough and swallowing reflexes, muscle strength recovery, stability of vital signs, and nausea and vomiting. The swallowing reflex examination method mainly evaluates whether the patient's swallowing function has recovered by observing their response to pharyngeal stimulation. For patients who are able to obey instructions and pass evaluations, early water intake measures may be considered.

(2) Drinking position and amount: When drinking water, the patient should be in a semi-seated position, with the head of the bed raised by 15 °-30 ° and the head tilted to one side, to reduce the incidence of coughing. The initial drinking dose and interval time are particularly critical, and giving patients 10ml of water every 15 minutes is a safe, practical, and effective strategy. The total water consumption is limited to 0.5ml/kg, but it needs to be flexibly adjusted according to the specific situation of the patient.

5.3 Drug therapy and auxiliary equipment

Oral or injectable antidiuretic hormone drugs can reduce urine volume, increase urine concentration, and alleviate symptoms of thirst. However, attention should be paid to drug side effects and contraindications. Connecting a high flow oxygen inhalation device with an active humidification function to a mask for patients undergoing tracheal intubation can effectively reduce symptoms such as dry mouth and nasal cavity, sore throat, etc. after extubation [25].

5.4 Appropriate techniques for traditional Chinese medicine

Pressing acupoints such as Shuiquan, Lianquan, and Yifeng can stimulate salivary gland secretion and alleviate thirst symptoms. Research has shown that acupressure can effectively reduce thirst and improve patient comfort after general anesthesia surgery. The use of sprays containing traditional Chinese medicine ingredients, such as menthol spray, can cool the mouth and relieve thirst symptoms.

6. Personalized Care Plans

After general anesthesia, patients often experience symptoms of thirst in the recovery room (PACU), which not only affects their comfort but may also lead to a series of adverse consequences, such as anxiety, irritability, thick sputum, and oral mucosal lesions. In recent years, with the promotion of the Enhanced Recovery Surgery (ERAS) concept, significant progress has been made in personalized care research for thirst during PACU in patients after general anesthesia.

6.1 Implementation of diversified nursing measures

Implementing diversified nursing measures is crucial for addressing thirst issues during PACU in postoperative patients undergoing general anesthesia. In terms of drinking water care, patients with good swallowing function recovery and stable vital signs can be given small amounts of water multiple times. The initial water intake dose and interval time are particularly critical. Studies have shown that giving patients 10ml of water every 15 minutes is a safe, practical, and effective strategy. The initial water intake can be limited to 0.5ml/kg. If this water intake does not cause adverse reactions such as coughing, the remaining water can be continued to be consumed according to the patient's needs. When drinking water, patients should sit in a semi-recumbent position, with the head of the bed raised by 15 ° to 30 ° and the head tilted to one side to reduce the incidence of coughing. For patients who are temporarily unable to drink water or have limited access to water, non-oral moisturizing methods can be used to alleviate thirst symptoms. The spray method is a common and effective method. Warm boiled water, 10% glycerol, normal saline, or water containing vitamin C can be loaded into the spray. If the patient's mouth is dry and thirsty, gently press the spray to spray mist like, small particles of water to wet the lips and mouth. In addition, using a clean small towel, a cotton soft towel, or gauze to absorb water and apply it to the patient's lips, or applying cucumber slices or lemon slices to the patient's lips and around the mouth, can not only wet the lips but also stimulate saliva secretion and relieve thirst. Stimulating salivary gland secretion is also an important measure to relieve thirst, which can be divided into mechanical stimulation and taste stimulation. Mechanical stimulation mainly promotes salivary gland secretion by chewing sugar-free gum; Taste stimulation refers to the stimulation of salivary gland secretion through acidic substances, but acidic substances may cause tooth decay and should be used with caution. Acupoint massage is also

an effective auxiliary method. Pressing acupoints such as Shuiquan, Yuji, and Chize can promote the secretion of salivary glands and alleviate symptoms of thirst.

6.2 Targeted care for special populations

There are some special groups of patients after general anesthesia operation, such as elderly patients, children patients, diabetes patients, head and neck surgery patients, etc. Their tolerance and response to thirst are different, so targeted care needs to be given. The saliva secretion function of elderly patients has already decreased, the recovery is slower, and their sensitivity to thirst is reduced, but the risk of dehydration is higher. It is necessary to closely observe dehydration symptoms such as urine volume and skin elasticity, and adjust nursing measures in a timely manner. Children's patients have limited expression ability, so they can use children's special lipstick to keep their lips moist, and choose appropriate nursing methods according to children's characteristics, such as using a children's special small spray bottle for oral spray. Patients with diabetes need to avoid sugary drinks and monitor their blood sugar. High blood sugar will aggravate dry mouth, so the fluid replacement plan should be adjusted according to the blood sugar situation. Patients undergoing head and neck surgery may be involved in the salivary glands or related nerves, and dry mouth may last longer. During nursing, more attention should be paid to oral wetness and recovery of salivary gland function. Multiple methods can be used in combination, such as spray and acupoint massage, to alleviate thirst symptoms.

7. Conclusion and Prospect

The management and care of thirst during PACU in patients undergoing general anesthesia are important steps in improving postoperative comfort and rehabilitation quality. By scientifically evaluating the degree of thirst, implementing effective intervention measures, and developing personalized nursing plans, patients' thirst symptoms can be significantly alleviated, and patient satisfaction can be improved. Although there has been some progress in personalized care for thirst during PACU in patients undergoing general anesthesia, there are still some problems and challenges. Future research can further explore the mechanism of thirst and provide a more scientific theoretical basis for personalized care. At the same time, multi-center and large-scale clinical research should be strengthened to verify the effectiveness and safety of different nursing measures, and to develop more unified and standardized personalized nursing plans. In addition, with the continuous advancement of technology, new technologies and methods can be explored and applied, such as intelligent sensing water dispensers, virtual reality technology, etc., to provide patients with more convenient and comfortable thirst care services, further improving their rehabilitation quality and quality of life.

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