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A Scoping Review on the Application of FAS in Postoperative Active Pain Management Among Surgical Patients in China

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Abstract: *Objective*: To conduct a scoping review on the application status of the Functional Activity Score (FAS) in postoperative active pain management in China, providing a reference for its standardized and normative promotion. *Methods*: Computerized searches of Chinese and English databases were performed to collect studies published by Chinese scholars from 2005 to July 2025 on the application of FAS in postoperative active pain management. After strict screening, the basic characteristics, application fields, assessment models, evaluation timing, types of functional activities, and clinical outcomes of the included literature were systematically analyzed. *Results*: A total of 18 studies were included, involving surgical types such as thoracic surgery, general surgery, and orthopedics. All studies adopted FAS combined with the Numeric Rating Scale (NRS) for assessment, with evaluation timing mostly concentrated within 72 hours postoperatively. The selected functional activities primarily included respiration-related and limb movements. Evaluation indicators covered pain control, functional recovery, complications, adverse events, patient experience, and tool assessment, with most studies reporting positive outcomes. *Conclusion*: FAS can effectively enhance pain control and promote functional recovery in postoperative active pain management in China, demonstrating high clinical value. However, existing studies exhibit inconsistencies in assessment criteria, selection of activity types, and research quality.

Keywords: Activity pain; Functional activity score; Pain management; Scoping review; Surgical nursing;

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1. Introduction

Postoperative active pain is pain that occurs when the patient performs functional activities after surgery (such as deep breathing, coughing, turning over, walking down, etc.) [1]. Compared with rest pain, it has the characteristics of clear situation, high intensity and significant influence on rehabilitation compliance [2]. Traditional pain assessments, such as numerical rating scale (NRS), are based on subjective perception and do not reflect objective limitations of pain on functional activity [3].

Functional Activity Score (FAS) is an objective assessment conducted by medical personnel according to the actual activity performance of patients, which directly reveals whether pain restricts activities and its degree, and provides a basis for individualized analgesia and optimization of rehabilitation plan [4]. FAS has been introduced into the domestic nursing field since 2015, and has undergone three or four levels version development [5,6]. In 2024, FAS was adopted and promoted by the group standard of Adult Postoperative Pain Assessment and Nursing of Chinese Nursing Association, providing authoritative guidance for the standardized application of FAS [7].

Studies have shown that multi-dimensional assessment combining NRS (pain intensity) with FAS (functional limitation) can more comprehensively capture patient pain experience, improve the targeting of analgesic strategies, and improve rehabilitation compliance and clinical outcomes [8–10]. However, the application status, specific evaluation mode (different activity types and grade standards), effect evaluation indicators and clinical value of FAS in different specialties/operations (such as impact on pain control, functional recovery, complication prevention and patient experience) in postoperative pain management in China lack systematic arrangement and comprehensive evaluation.

Therefore, guided by the PRISMA extended version list applicable to the scope review report published by Tricco et al., this study systematically combs the research evidence of FAS in the management of postoperative active pain in China from 2005 to 2025, analyzes its application characteristics, evaluation mode and effect evaluation indicators, and discusses its clinical value and limitations [11]. The aim is to provide a reference for standardized and standardized application of FAS, and lay a foundation for future high-quality research and development of digital tools.

2. Materials and methods

2.1. Establish research questions

The research questions were as follows:

(1) What are the characteristics of FAS in active pain management among Chinese postoperative patients?
(2) In clinical practice, what evaluation modes and effect evaluation indicators are used for active pain management based on FAS?
(3) What clinical value does FAS reflect in the management of postoperative active pain in China?

2.2. Inclusion and exclusion criteria

Inclusion criteria are as follows:

(1) Adult patients aged ≥ 18 years who have undergone surgical procedures (orthopedics, general surgery, thoracic surgery, etc.);
(2) FAS is clearly used for assessment or management of active pain in the study;
(3) Clear description of the assessment method and/or management strategy of active pain (including assessment tools, timing and operation details);
(4) Chinese and English literatures writen and published by China scholars;
(5) Published from 2005 to 2025.

Exclusion criteria are as follows:

(1) Full text unavailable or incomplete or incorrect information;
(2) Studies focusing only on resting pain without involvement of active pain;

(3) Literatures with chronic pain as the main study object.

2.3. Search strategy

Computerized search of China Knowledge Net, Wanfang Data Knowledge Service Platform, VIP, Web of Science, PubMed, Cochrane Library, Springer link, Embase was performed.

A combination of subject words and free words was used for retrieval. Taking Zhiwang as an example, the Chinese search formula is as follows: (SU='Activity Pain' OR SU='Activity Pain' OR SU ='Functional Activity Pain' OR SU ='Functional Activity Pain Score' OR SU='FAS') AND (SU='Postoperative Pain Management' OR SU='Postoperative Pain Care' OR SU ='Postoperative Pain Assessment' OR SU ='Accelerated Rehabilitation Surgery') AND (SU=' Patient ' OR SU="Adult' OR SU='postoperative patient') NOT (SU=' child ' OR SU=' infant ' OR SU=' adolescent '); Take Cochrane library as an example, the English search formula is as follows:

#1 (pain NEAR/3 management):ti,ab,kw OR "pain control":ti,ab,kw OR analgesia:ti,ab,kw

#2 (postoperative NEXT pain):ti,ab,kw OR (post NEXT surgical NEXT pain):ti,ab,kw OR (post NEXT procedural NEXT pain):ti,ab,kw #3 #1 AND #2 #4 ("activities of daily living":ti,ab,kw OR "mobility limitation":ti,ab,kw OR "recovery of function":ti,ab,kw OR (functional NEXT activit*):ti,ab,kw OR (physical NEXT activit*):ti,ab,kw OR mobil*:ti,ab,kw OR ambulat*:ti,ab,kw)

#5 #3 AND #4

2.4 Literature screening and data extraction

Two investigators independently screened the literature. According to the search formula and reference tracking, the bibliography of the literature obtained from the search results was imported into Note Express. Duplicate articles were eliminated by using the duplicate check function. Obviously irrelevant articles were excluded by reading the title and abstract, and then the literature was screened by reading the full text. For the articles that were difficult to determine or had differences, consensus was reached through joint discussion. When the opinions were inconsistent, the third investigator made a judgment. Information on the included articles was collated using uniform tables, including title, author, publication date, study type, sample size, adult patients undergoing surgical procedures, duration of intervention, intervention method, control method, pain assessment tool, functional activity on which FAS assessment was based, outcome measures/evaluation indicators, main findings and conclusions of the study.

3. Results

3.1. Retrieved result

4395 articles were obtained in the initial search, 587 articles were obtained after removing duplicate articles, 322 articles were obtained after reading titles and abstracts one by one, and 19 articles were obtained after reading full texts. Since the sample size was small (only 15 cases), there was controversy, and 18 articles were included after discussion by the research group [5, 6, 8-10, 12-24] .

3.2. Basic characteristics of included literature

Among the 18 articles, 17 articles were Chinese, 1 article was English, 7 articles were randomized controlled trials, 10 articles were quasi-experimental studies, and 1 article was methodological study. See **Table 1** for basic characteristics of included literatures.

Table 1. Basic characteristics of included literatures

Author and study type	n	Surgery type	Intervention time and method	FAS Tool Type	Functional activity	Outcome indicator
Li et al. 2019 [17] (RCT)	50	Traditional thoracotomy or thoracoscopic surgery	48h after operation (B)	3	Deep breathing, coughing, expectoration	1,2,3
Li et al. 2019 [18] (RCT)	60	Laparoscopic or open surgery	Postoperative 24h (A)	4	Effective cough, bed roll	1,2
Zhu et al. 2020 [21] (RCT)	49	Resection of huge liver cancer	1–3 days after surgery (A)	3	Effective cough	1,2,3,4
Li et al. 2020 [9] (RCT)	40	Underwent initial unilateral total hip arthroplasty	One week after operation (A)	4	Slip knee flexion, hip abduction	1,2,4
Xu et al. 2021 [10] (RCT)	62	Fracture surgery	Postoperative to discharge (A)	3	Fracture surgery joint function exercises	1,4
Zhang 2023 [24] (RCT)	42	Receive hip arthroplasty	7 days after operation (A)	4	Sitting up in bed, standing by bed, getting out of bed	1,2
Wang et al. 2023 [23] (RCT)	84	Unilateral lobectomy	Postoperative to discharge (A)	4	Effective coughing, deep breathing, movement of the affected limb	1
Tong et al. 2016 [6] (Methodology study)	84	Thoracotomy or laparotomy	Postoperative 24h	4	Effective cough	5
Cheng et al. 2015 [5] (Quasi-experimental study)	70	Thoracotomy or laparotomy	Postoperative 24h (A)	3	Effective cough	1,2,4
Cheng 2016 [8] (Quasi-experimental study)	73	Thoracotomy or laparotomy	Postoperative 24h (A)	4	Effective cough	1,2,4,5
Huang et al. 2017 [12] (Quasi-experimental study)	36	Gastrointestinal tumor resection	1–3 days after surgery (A)	3	Effective coughing, sitting up in bed, standing up, walking	1,2
Tang et al. 2018 [13] (Quasi-experimental study)	37	Resection of huge liver cancer (diameter ≥ 10cm)	1–3 days after surgery (A)	3	Effective cough	1,2,3
Ying 2018 [14] (Quasi-experimental study)	40	Elective thoracotomy or epigastric surgery	Postoperative 24h (A)	3	Deep breathing, coughing	1,2,4
Wang 2019 [15] (Quasi-experimental study)	74	TKR or HA	48h after operation (A)	3	Ankle motion, knee flexion motion	1,2,3,4,5
He et al. 2019 [16] (Quasi-experimental study)	40	Patients undergoing laparoscopic radical gastrectomy for gastric cancer	1 day before surgery to 72 hours after surgery (A)	3	Effective cough, roll over in bed, get out of bed and walk	1,2
Sun 2020 [19] (Quasi-experimental study)	75	Lung cancer patients undergoing thoracoscopic lobectomy under general anesthesia	1–3 days after surgery (A)	4	Effective cough	1,2,4
Man et al. 2020 [20] (Quasi-experimental study)	95	Open thoracolumbar surgery	3 days after operation (A)	4	Axis turning	1,2,4
Lei et al. 2022 [22] (Quasi-experimental study)	53	Closed thoracic drainage	During postoperative chest tube indwelling (C)	4	Turn over, get out of bed	1,2,3,4

Note: A: Active pain assessment using FAS combined with NRS;B: Self-controlled multifunctional chest strap fixation; C: Modified chest tube fixation.

(1) Pain control indicators include: pain intensity assessment (resting/active NRS/FAS score, 24-hour ambulatory pain intensity, highest/lowest pain score, FAS score), pain control effect (Houston Pain Questionnaire, Postoperative Pain Self-Management Behavior Questionnaire, Moderate to Severe Pain Incidence Rate, Analgesic Pump Pressing Ratio Before Activity, Analgesic Regimen Adjustment Rate, PCA Usage Pattern, etc.), Pain Impact Dimension (Interference with Respiration/Cough), Chronic Pain Index (Chronic Pain Incidence Rate after Discharge), etc.;
(2) Functional recovery indexes included: first time out of bed, first anal exhaust time, postoperative hospital stay, functional activity quantification (walking distance), joint function score, rehabilitation compliance (rehabilitation activity completion rate), etc.;
(3) Complication-related indicators included: nausea and vomiting, dizziness and lethargy, skin itching and other adverse reactions during analgesia, deep vein thrombosis, hypoxemia, atelectasis, pneumonia and other common complications, catheter prolapse and other adverse events;
(4) Patient experience indicators include: pain control satisfaction, sleep quality, pain on the emotional impact of patients.
(5) Instrument evaluation indexes include reliability and validity, nurse approval, etc.

3.3. Characteristics of FAS application in postoperative active pain management

The characteristics of FAS applications are as follows:

(1) Distribution of surgical types: The 18 included studies covered multiple surgical specialties. In terms of the distribution of surgical types, thoracic surgery and general surgery were the main application fields of FAS. Traditional thoracotomy or thoracoscopic surgery accounted for 5 articles, general surgery accounted for 5 articles, including gastrointestinal tumor resection and liver cancer resection, and another 3 articles were mixed studies with surgical site of chest or abdomen; orthopedic surgery accounted for 5 articles, involving hip replacement, knee replacement, fracture surgery and thoracolumbar surgery;
(2) FAS instrument types: 4-grade FAS and 3-grade FAS, 9 articles each, each accounting for 50%;
(3) Characteristics of functional activity types: The functional activities included in the study can be divided into two categories: respiratory related activities were most widely used in 13 studies (#%), mainly including effective cough, deep breathing, expectoration, etc.; limb motor activities were found in 10 articles (#%), including turning over, sitting up, joint flexion and extension, getting out of bed and walking, etc.

3.4. FAS based assessment mode and effect evaluation index of postoperative active pain

Evaluation mode: FAS was combined with NRS was used in all studies. Most studies (n=,#%) included this assessment model as part of the intervention approach.

Early postoperative period (within 72h after surgery) was the concentrated period of FAS application, and 13 studies (#%) selected this time for evaluation. In addition, 4 studies were evaluated 7 days after surgery, and 1 study was evaluated during catheterization.

The outcome indicators and effects are as follows:

(1) Pain control indicators: the most core evaluation indicators, 17 studies (#%) all included such indicators, covering pain intensity evaluation, pain control effect, pain impact degree and other aspects, and all of them were positive outcomes;

(2) Functional recovery indicators: 15 studies (#%) were used, mainly to evaluate the first time out of bed, hospital stay, functional exercise compliance, etc., and all of them were positive outcomes;
(3) Complications and adverse event indicators: 6 studies were used, of which 2 studies had negative outcomes;
(4) Patient experience indicators: 12 studies received attention, including pain control satisfaction, sleep quality, etc., of which 3 had negative outcomes. 6 studies mentioned measures related to complications, of which two had negative outcomes. 3 studies used instrumental assessment measures and all had positive outcomes.

4. Discussion

4.1. Analysis of FAS application in postoperative active pain management

The results of this review showed that FAS application in active pain management after surgery in China presented the following characteristics: thoracic surgery and general surgery were the main fields of FAS application in the distribution of operation types, which may be related to the need for respiratory function exercises such as deep breathing and cough after such operations.

After thoracoabdominal surgery, patients are often afraid to breathe deeply and cough due to incision pain, which is essential to prevent pulmonary complications, so accurate active pain assessment is needed to guide pain management. Although orthopedic surgery accounts for a relatively small proportion, its application value is equally important, especially after joint replacement, the patient's joint function exercise directly affects the surgical effect and rehabilitation process. In addition, it should be noted that effective cough was also used as the evaluation basis of FAS after some abdominal surgery. The patient did not have respiratory tract disease, which may be related to anesthesia. That is to say, the selection of functional activities needs to consider both anesthetic factors and surgical factors.

The three-grade FAS and four-grade FAS accounted for half of the application, indicating that there are different choices for FAS classification criteria in clinical practice. The four-level FAS can distinguish the influence of pain on functional activities more carefully, but the three-level FAS is relatively simple in operation and convenient for clinical application. The choice of FAS level should be based on the patient's condition, the training level of the healthcare staff, and the management needs of the department.

4.2. FAS evaluation model and its advantages

This study found that all included studies used FAS combined with NRS, which had the following advantages:

(1) Comprehensive evaluation: NRS mainly reflected the subjective pain perception of patients, while FAS objectively evaluated the impact of pain on functional activities. The combination of NRS and FAS could comprehensively evaluate the pain status of patients from two dimensions of subjective perception and functional impact, providing more comprehensive information for formulating individualized analgesia programs. This joint assessment model is consistent with the multidimensional concept of pain management and helps to improve the accuracy and effectiveness of pain assessment;
(2) Targeted guidance for analgesia: Traditional resting pain assessments often do not accurately reflect the patient's true pain experience while performing functional activities. The introduction of FAS enables medical staff to adjust analgesic strategies according to patients 'functional activity needs, achieving "on-

demand analgesia", which not only ensures that patients can complete necessary functional exercises, but also avoids adverse reactions caused by excessive analgesia;

(3) Promote early rehabilitation: Early functional exercise after surgery is one of the core concepts of accelerated rehabilitation surgery. FAS-based activity pain assessment can help patients overcome activity avoidance behavior caused by pain fear, promote patients to actively participate in rehabilitation exercises, thus shortening hospital stay and improving rehabilitation results.

4.3. Timing and clinical significance of FAS application

The significance of FAS application are as outlined:

(1) Scientificity of timing of evaluation: This review showed that FAS application was concentrated within 72 hours after operation. Early postoperative pain is the most severe period, but also the high risk period of complications, timely and accurate assessment of active pain is helpful to early detection of problems and timely intervention. At the same time, this period is also the critical period for patients to start functional exercise, FAS application can provide security for the safe development of functional exercise;

(2) Importance of continuous evaluation: Although most studies focused on the early postoperative period, some studies extended the evaluation time to 7 days after operation, until discharge, and even to 2 months after discharge, which reflected the continuity and dynamics of FAS application. Pain is a dynamic process, and the patient's functional status is constantly recovering, so continuous evaluation and dynamic adjustment of analgesia regimen are required.

4.4. Multidimensional evaluation of FAS application effect

This review showed that all studies achieved positive outcomes in pain control measures, indicating that FAS-based active pain management has a significant advantage in controlling pain intensity and improving pain control. This may be related to FAS's ability to more accurately identify patients' analgesic needs and thus achieve individualized analgesia.

15 studies showed positive outcomes in functional recovery indicators, including earlier time out of bed for the first time, shorter hospitalization days, and improved compliance with functional exercise. This shows that FAS can not only effectively control pain, but more importantly, it can promote the functional recovery of patients, which is of great significance for the overall rehabilitation of surgical patients.

Although there were 3 studies with negative outcomes in terms of patient experience indicators. Overall, the use of FAS still improved patient satisfaction with pain control and quality of sleep. From the characteristics of 3 studies with negative outcomes in patient experience, it may be related to the short observation time (all 3 studies had observation time within 24h after surgery). The improvement brought by FAS may be gradual, especially in terms of changing patient behavior and treatment adjustment. If the study observation time is short, its cumulative effect may not be fully demonstrated.

4.5. Challenges and future developments of FAS applications

FAS application still faces many challenges and limitations in the process of popularization, and needs future improvement and optimization of clinical practice:

(1) Insufficient standardization in historical period: The included studies in this review showed that before the publication of the group standards of the Chinese Nursing Association, different studies had differences

in FAS grade selection, functional activity types, and evaluation timing. It should be noted that in 2024, the Chinese Nursing Association has implemented the group standard of "Adult Postoperative Pain Assessment and Nursing," which clearly defines the application specification of FAS and provides a unified standard for clinical practice;

(2) Medical staff training needs to be strengthened: accurate application of FAS depends on professional knowledge and skills, but there are few relevant training studies at present, and the understanding and application level of medical staff are inconsistent, which affects the application effect. It is urgent to formulate systematic training programs;

(3) The quality of research evidence needs to be improved: the proportion of randomized controlled trials in existing studies is low (only 7 out of 18 included), the sample size is generally small, and the lack of multi-center, large-sample high-quality studies limits the popularization value of evidence.

Higher quality studies need to be carried out in the future to provide strong support.

In order to overcome the challenges and promote the development of FAS, continuous efforts should be made in the following directions:

(1) Promoting standardized application guidelines: Since the Chinese Nursing Association has issued a group standard containing FAS standardization specifications in 2024, the future focus should be shifted to the clinical application and implementation effect evaluation of this standard to ensure that medical institutions at all levels can accurately understand and implement unified standards. It can further improve the selection basis of FAS and functional activities at different levels, and promote the development of systematic evaluation and meta-analysis in the future;

(2) Develop digital assessment tools: With the help of medical informatization development, develop digital tools based on mobile devices or electronic medical records, realize standardization, convenience and digitalization of assessment, and improve efficiency and accuracy;

(3) Expand the application field: on the basis of FAS mainly used in thoracic surgery, general surgery and orthopedics, explore its potential in neurosurgery, urology, gynecology and other surgical specialties, and expand the application scope and value;

(4) Deepen the mechanism research: In-depth research on the mechanism of FAS to improve pain management effect, including its influence on patients 'pain perception, rehabilitation behavior, psychological state, etc., to provide theoretical support for scientific application.

5. Conclusion

This scope review systematically combs the application status of FAS in the management of postoperative active pain in China. The results showed that FAS showed good clinical results in pain control and functional recovery. However, during the period 2015–2023 covered by this review, FAS use was not highly standardized and the quality of research evidence was limited. It is gratifying that the Chinese Nursing Association has issued relevant group standards in 2024, providing authoritative guidance for the standardized application of FAS. In the future, we should focus on the clinical promotion and implementation of this standard, the development of high-quality research and the development of digital tools, so as to promote the standardized application of FAS in postoperative pain management and provide more accurate and effective pain management services for patients.

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Disclosure statement

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