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Comparison of Modified Aldrete Score Versus Speeds Criteria for Evaluating Postoperative Recovery in Patients Undergoing General Anaesthesia

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KEYWORDS
Modified
Anesthesia
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ABSTRACT:

Background: Postoperative recovery is crucial for patients under general anesthesia to ensure patient stability, optimize hospital resources, and improve surgical outcomes. The Modified Aldrete score, and SPEEDS criteria are widely used to assess postoperative recovery. The Modified Aldrete score evaluates activity, breathing, consciousness, circulation, and SpO2, with a total score of 10, and considers a score of ≥9 as optimal for recovery. SPEEDS criteria involve a "YES" or "NO" response for parameters like Saturation, Pain, Extremity movement, Emesis, Dialogue, and Stable vital signs. A "YES" for all parameters indicates readiness to progress to phase II recovery. This study aims to prevent postoperative complications and ensure safe patient discharge.

Objectives: This study aims to compare the efficacy and accuracy of the Modified Aldrete score and SPEEDS criteria in evaluating postoperative recovery in patients undergoing general anesthesia.

Results: The Modified Aldrete score showed a higher proportion of patients (52%) meeting recovery criteria compared to SPEEDS (42%). It also demonstrated higher sensitivity (91%), specificity (60%), and accuracy (78%) than SPEEDS.

Conclusion: The Modified Aldrete Score is a more reliable tool for assessing postoperative recovery, with improved sensitivity, specificity, and accuracy compared to SPEEDS criteria.

Introduction

General anesthesia is a controlled state of unconsciousness and loss of reflexes achieved through specific anesthetic drugs. These drugs induce unconsciousness, amnesia, analgesia, muscle relaxation, and suppression of autonomic reflexes, making the patient unresponsive to external stimuli . Effective airway management is crucial during this state, often facilitated by devices such as laryngeal mask airways or endotracheal tubes (1).

Anesthesia is administered in stages as outlined by Guedel's Classification. This classification includes:

- **Stage 1 - Analgesia or Disorientation:** Characterized by sedation and analgesia with the patient remaining conscious, followed by loss of consciousness.
- **Stage 2 - Excitement or Delirium:** Marked by disinhibition, delirium, and increased autonomic responses. Rapid-acting medications are used to transition to the next stage.
- **Stage 3 - Surgical Anesthesia:** The desired state for surgery, with reduced respiratory activity and muscle relaxation, divided into four planes for optimal surgical conditions.
- **Stage 4 - Medullary Paralysis and Respiratory Arrest:** An overdose stage leading to severe central nervous system depression and potential respiratory arrest(2) .

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The intubation technique is pivotal for maintaining airway patency. It typically involves placing the patient supine, monitoring vital signs, preoxygenating, and using induction agents like propofol and muscle relaxants for endotracheal tube insertion .

Recovery from anesthesia involves three phases: Early Recovery (Phase 1), Intermediate Recovery (Phase 2), and Late Recovery (Phase 3). Effective management of these phases is vital for optimizing patient flow and resource use(3) .

To assess postoperative recovery, various scoring systems have been developed. The Modified Aldrete Score (MAS) and SPEEDS Criteria are commonly used tools. The MAS evaluates activity, respiration, circulation, consciousness, and oxygen saturation, while the SPEEDS Criteria assesses saturation, pain control, extremity movement, emesis, dialogue orientation, and stable vital signs . These scoring systems are crucial for determining patient readiness for discharge and ensuring safe transitions from the operating room (4,5).

Objective of the Study

This study aims to compare the efficacy of the Modified Aldrete Score and SPEEDS Criteria in evaluating postoperative recovery in patients undergoing general anesthesia. By examining the sensitivity, specificity, and accuracy of these scoring systems, we aim to identify the most effective tool for predicting recovery and facilitating efficient patient transitions from the operating room to discharge .

MATERIALS AND METHODS

This prospective observational study was carried out over 5 months at the Department of Anaesthesiology, Chettinad Hospital Research Institute (CHRI), Kelambakkam, Chennai, Tamil Nadu, involving 100 patients aged 18 years and older undergoing general anesthesia with endotracheal tube intubation. Inclusion criteria comprised patients aged 18 years or older with ASA physical status I-III, undergoing elective or emergency procedures with endotracheal intubation. Exclusion criteria included those receiving spinal anesthesia or nerve blocks, pregnant patients, those undergoing ophthalmic or cardiac procedures, and those who refused to participate. Ethical approval was granted by the Institutional Human Ethics Committee (IHEC) under reference number IHEC I/2493/24, and informed consent was obtained from all participants. Recovery was assessed using the Modified Aldrete Score (MAS) and SPEEDS Criteria. The MAS evaluates recovery based on activity, respiration, consciousness, circulation, and oxygen saturation, scoring up to 10 points, with a score of 9 or higher indicating recovery. The SPEEDS Criteria assess recovery through a simple "YES" or "NO" response to parameters including saturation, pain, extremity movement, emesis, dialogue, and stable vital signs. Data were recorded every 10 minutes for 30 minutes post-extubation in the Post-Anesthesia Care Unit (PACU) and analyzed using descriptive statistics and diagnostic tests to determine the efficacy of these scoring systems in predicting postoperative recovery and facilitating safe patient discharge.

Result

Gender Distribution

Table 1: Gender Distribution in the Study Population

Gender	Percentage
Male	37%
Female	63%

This distribution indicates a higher female representation in the study, which could be relevant if certain surgical outcomes or recovery metrics differ by gender. The skew toward female participants might be due to the inclusion of obstetrics and gynecology cases.

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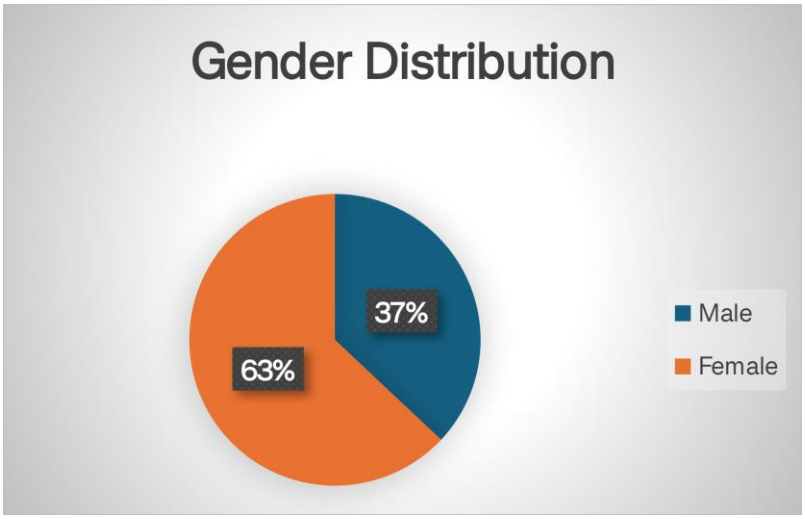
Figure 1: Gender Distribution in the Study Population



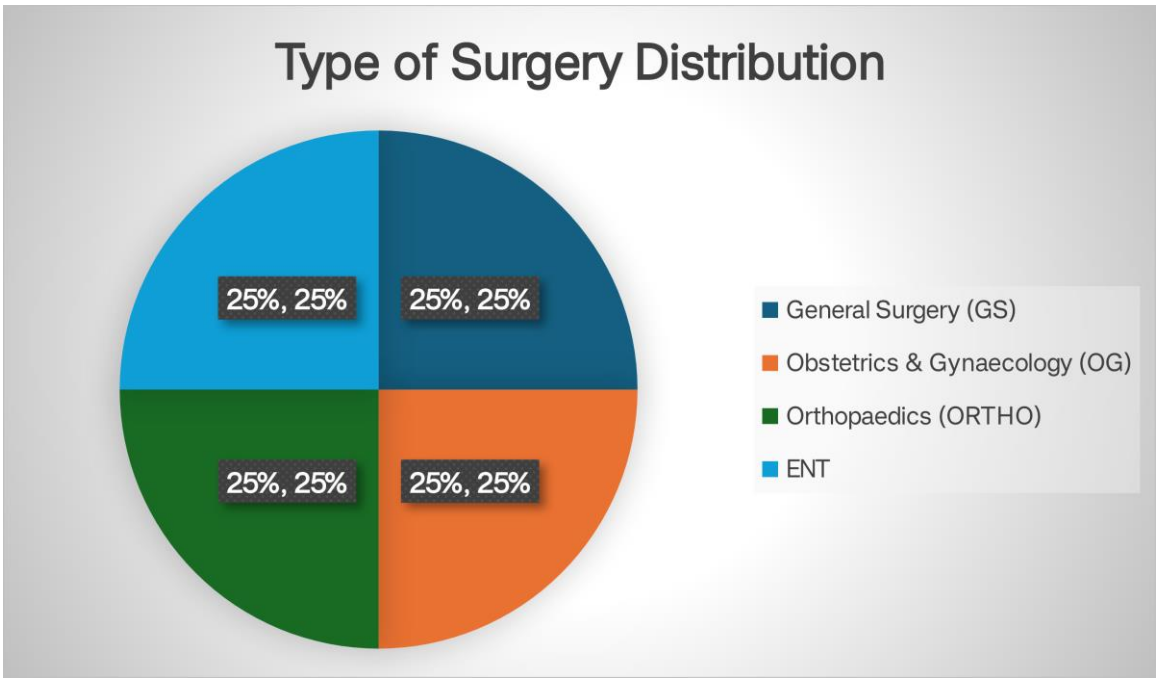
Type of Surgery Distribution

Table 2: Distribution of Surgery Types in the Study Population

Type of Surgery	Percentage
General Surgery (GS)	25%
Obstetrics & Gynaecology (OG)	25%
Orthopaedics (ORTHO)	25%
ENT	25%

The equal distribution of patients across these four surgical categories ensures a balanced comparison of recovery profiles and the impact of surgery type on postoperative recovery.

Figure 2: Distribution of Surgery Types in the Study Population



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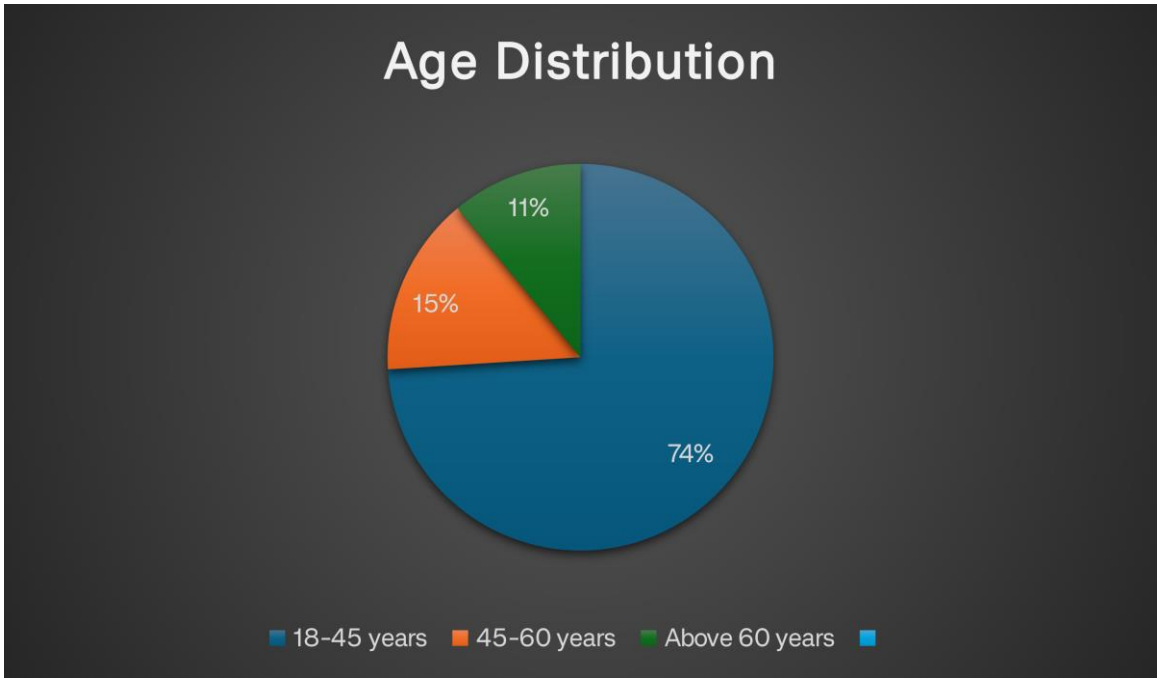
Age Distribution

Table 3: Age Distribution of Study Participants

Age Group	Percentage
18-45 years	74%
45-60 years	15%
Above 60 years	11%

The majority of patients are younger adults (18-45 years), which can influence recovery rates as younger individuals generally recover more quickly from anesthesia and surgery. This age distribution may need to be considered when generalizing results to an older population.

Figure 3: Age Distribution of Study Participants



Modified Aldrete Score Assessments (0 to 30 mins)

Table 4: Recovery Parameters at 0 and 30 Minutes Post-Extubation (Modified Aldrete Score)

Parameter	0 mins	30 mins
Activity (Movement of 4 extremities)	17%	74%
Breathing (Deep breathing ability)	11%	57%
Circulation (+20% pre-anesthesia level)	61%	81%

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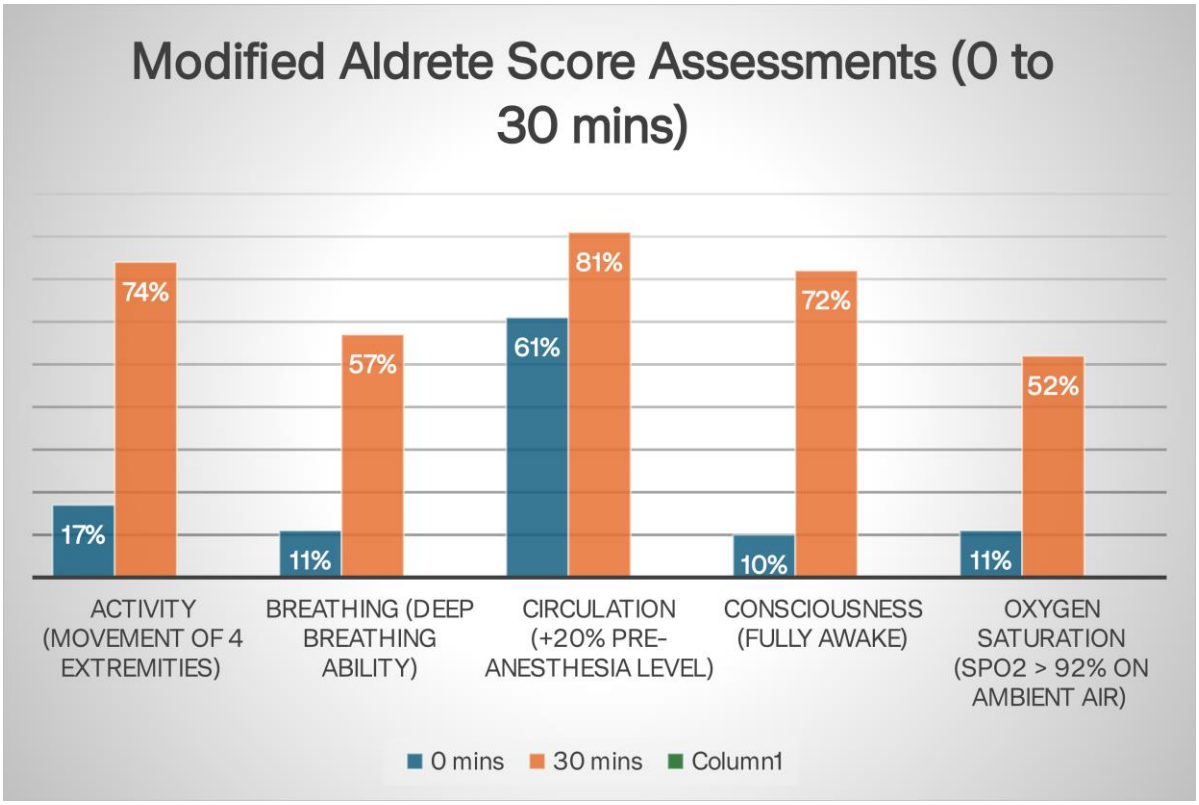
Parameter	0 mins	30 mins
Consciousness (Fully awake)	10%	72%
Oxygen Saturation (SpO2 > 92% on ambient air)	11%	52%

The Modified Aldrete Score shows a significant improvement across all parameters within the first 30 minutes postoperatively, indicating effective recovery from anesthesia.

Figure 4: Recovery Parameters at 0 and 30 Minutes Post-Extubation (Modified Aldrete Score)



SPEEDS Criteria Assessments (0 to 30 mins)

Table 5: Recovery Parameters at 0 and 30 Minutes Post-Extubation

Parameter	**0 mins**	**30 mins**
Saturation (SpO2 > 90% on room air)	8%	58%
Pain Control (VAS < 4)	91%	51%
Emesis Control (Without emesis)	91%	68%
Extremity Movement (All 4 extremities)	31%	79%
Dialogue Orientation (Oriented to time, person, place)	79%	97%
Stable Vitals	85%	96%

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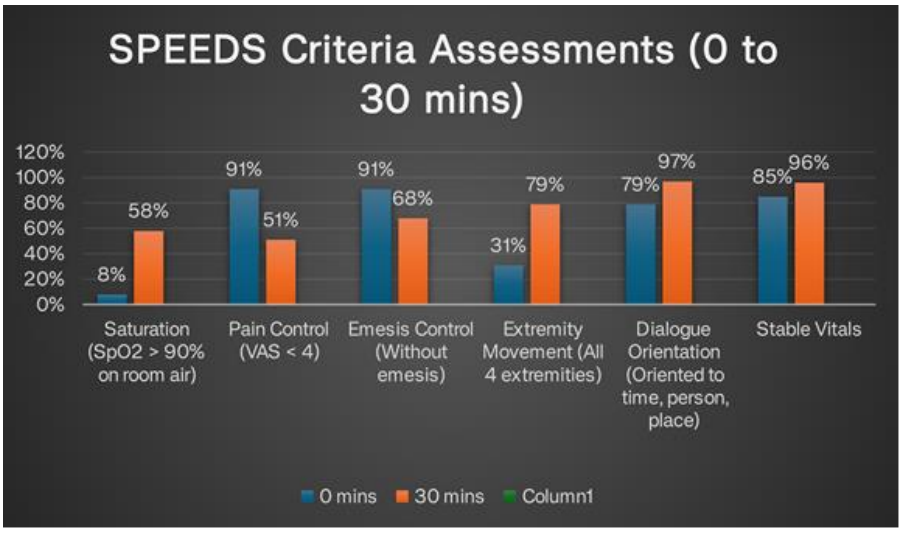
The SPEEDS Criteria also demonstrate substantial recovery, particularly in dialogue orientation and extremity movement, though pain control and emesis management show some deterioration, which may warrant closer monitoring or intervention strategies in the immediate postoperative period.

Figure 5: Recovery Parameters at 0 and 30 Minutes Post-Extubation



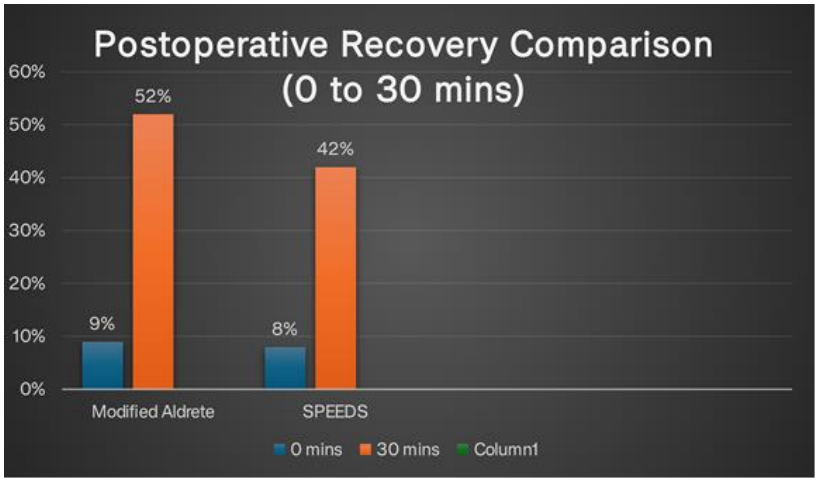
Postoperative Recovery Comparison (0 to 30 mins)

Table 6: Percentage of Patients Meeting Recovery Criteria at 0 and 30 Minutes Post-Extubation

Assessment Tool	**0 mins**	**30 mins**
Modified Aldrete	9%	52%
SPEEDS	8%	42%

Both scores indicate progressive recovery, with the Modified Aldrete Score showing a slightly higher percentage increase. This could suggest it is more sensitive to early changes in recovery status compared to the SPEEDS Criteria.

Figure 6: Percentage of Patients Meeting Recovery Criteria at 0 and 30 Minutes Post-Extubation



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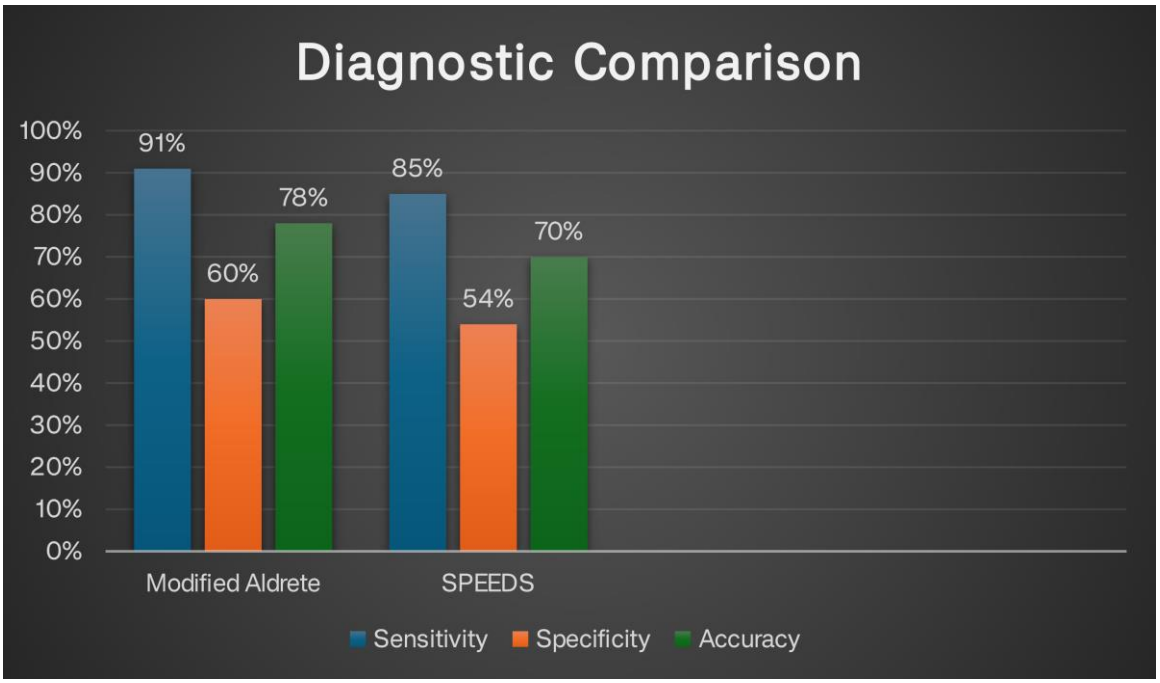
Diagnostic Comparison

Table 7: Comparison of Sensitivity, Specificity, and Accuracy between Modified Aldrete Score and SPEEDS Criteria

Assessment Tool	Sensitivity	Specificity	Accuracy
Modified Aldrete	91%	60%	78%
SPEEDS	85%	54%	70%

The Modified Aldrete Score demonstrates higher sensitivity, specificity, and accuracy compared to the SPEEDS criteria. This indicates it may be more reliable for detecting true positives and negatives in postoperative recovery assessment, making it a potentially superior tool for evaluating immediate recovery from anesthesia.

Figure 7: Comparison of Sensitivity, Specificity, and Accuracy between Modified Aldrete Score and SPEEDS Criteria



DISCUSSION

In this study, the postoperative recovery of 100 patients undergoing general anesthesia was assessed using the Modified Aldrete Score and SPEEDS criteria. The study divided participants into four surgical categories: general surgery, obstetrics and gynecology, ENT, and orthopedics, each with 25 patients. The sample consisted of 63% females and 37% males, and participants were grouped into age categories of 18–45, 45–60, and over 60.

Post-anesthesia recovery was evaluated at 0, 10, 20, and 30 minutes post-extubation in the PACU using both the Modified Aldrete Score and SPEEDS criteria. Initially, most patients showed poor circulation, shallow breathing, restricted movement, and inadequate oxygenation. By the 30-minute mark, the Modified Aldrete Score indicated better recovery outcomes compared to the SPEEDS criteria, with higher sensitivity, specificity, and accuracy.

The Modified Aldrete Score's comprehensive assessment of activity, breathing, circulation, consciousness, and oxygen saturation provided a more reliable measurement of patient recovery than the SPEEDS criteria. This study

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emphasizes the importance of using precise assessment tools to enhance postoperative care and patient safety.

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