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# SHAPE Score vs. ASA Grading: A Comparative observational Study for Preoperative Risk stratification for adults undergoing elective surgery

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**Abstract**
**Background:**
Effective preoperative risk stratification is critical for optimizing surgical outcomes. However, the American Society of Anesthesiologists (ASA) Physical Status Classification System widely used is limited by subjectivity and lack of organ-specific assessment. The Silverman-Holt Aggregate Preoperative Evaluation (SHAPE) score addresses these limitations through a multidimensional framework.
**Objectives:**
To compare the efficacy of ASA grading and SHAPE scoring systems in preoperative evaluation of adult patients, presenting for elective surgery across different age groups and genders. Patient's fitness for surgery and predictability of peri operative complications if any were compared.
**Methods:**
This prospective observational study included 500 adult patients undergoing elective surgery under general or regional anesthesia at a tertiary institution from January to December 2019. Patients were divided equally into ASA and SHAPE assessment groups by random allocation using lottery chit method. Demographic data, perioperative complications, and ICU admissions were recorded. Associations between age and ASA/SHAPE scores were analyzed using the chi-square test.
**Results:**
Demographic characteristics were comparable across groups ($p > 0.05$). A significant association was observed between age and ASA grade ($\chi^2 = 70.54$, $p = 0.0001$), age and SHAPE score ($\chi^2 = 27.82$, $p = 0.0001$). While ASA grades increased with age, SHAPE scores demonstrated superior granularity, revealing subtle risk elevations particularly in older adults.
**Conclusion:**
Both ASA grading and SHAPE scores reflect increased peri operative risk with advancing age. SHAPE scoring offers more detailed stratification by incorporating organ-specific dysfunctions and physical examination findings. These results support the SHAPE system's potential as a more precise tool for preoperative assessment, warranting further validation in diverse clinical settings.

**Keywords:** Anesthesia, Preoperative Care, ASA Grading, SHAPE scoring, Risk Assessment, Peri operative Complications.

## Introduction

Preoperative risk stratification remains a central tenet of safe surgical practice, as it informs clinical decisions, anticipates peri operative complications, guides postoperative monitoring, and facilitates clear communication with patients and families.[1] In this context, The American Society of Anesthesiologists (ASA) Physical Status Classification System has long been the global standard for assessing preoperative fitness due to its simplicity and ease of use.[2, 3] However, despite its widespread adoption, the ASA grading system is limited by subjectivity, lack of granularity, and inability to account for specific organ dysfunctions or complex comorbidities. Its broad categories may group clinically dissimilar patients under the same class, potentially leading to inaccurate risk estimation and suboptimal peri operative planning.[4] To counteract these inherent limitations, alternative models such as the Silverman-Holt Aggregate Preoperative Evaluation (SHAPE) score have been developed.[5] SHAPE score system offers a more detailed and structured assessment by evaluating major organ systems individually and incorporating a formal airway evaluation and physical examination. This multidimensional approach provides a comprehensive view of peri operative risk, enhances standardization, and facilitates interdisciplinary communication.[5] Given its potential for greater precision, especially in high-risk surgical patients, this study aims to compare the efficacy of ASA grading with SHAPE scoring, thereby assessing whether SHAPE scoring offers an effective and detailed approach in preoperative assessment.

## Methodology

### Study Design and Ethical Approval

This prospective observational study was conducted at Karpaga vinayaga Institute of medical Sciences Hospital. Written informed consent was obtained from all participants prior to their inclusion in the study, after providing them with detailed information regarding the study's purpose, procedures and potential benefits to ensure the voluntary nature of their participation. Participants were assured of confidentiality and the right to withdraw at any time without affecting their medical care.

### Study Population

The study included adult patients admitted for elective surgical procedures either under either general or regional anesthesia scheduled between January 2019 and December 2019. All Patients planned for surgery were considered eligible.

### Inclusion Criteria

- Adult patients aged 18 years and above.
- Scheduled for elective surgical procedures under general or regional anesthesia.
- Able to provide informed written consent and comprehend study procedures.
- Underwent preoperative assessment within 48 hours prior to surgery.
- Medically stable at the time of surgery, without acute infections or unstable chronic conditions.

### Exclusion Criteria:

- Undergoing emergency or urgent surgical procedures.
- Planned surgery under local anesthesia or sedation without general or regional anesthesia.
- Presence of severe systemic disease
- Inability or refusal to provide informed written consent.
- Cognitive impairment or communication barriers preventing reliable assessment or consent.
- Patients with incomplete clinical data or lost to follow-up.

### Sample Size Determination

The sample size was determined based on prior literature indicating moderate effect sizes in risk stratification comparisons from study by Bhavana et al comparing ASA grading and SHAPE scores.[7] Confidence level (α): 95% (two-tailed) Power (1 − β): 80% Allocation ratio: 1:1. were set. The minimum sample size required was calculated as 250 patients per group.

### Preoperative Assessment

All enrolled patients underwent a comprehensive preoperative evaluation conducted by experienced anesthesiologists prior to surgery. The evaluation included a thorough review of medical history, physical examination, and assessment of comorbid conditions.

### Data Collection

Demographic data (age, height, weight) and clinical variables were recorded. The planned type of anesthesia (general or regional), incidence of postoperative ICU admission, and any perioperative complications (such as respiratory events, cardiovascular instability, or surgical site infections) were documented for each patient. The patients were divided into two groups: one group was evaluated using the American Society of Anesthesiologists (ASA) Physical Status Classification,[6] while the other group was assessed using the Silverman-Holt Aggregate Preoperative Evaluation (SHAPE) score.[5]

**Table 1 American Society of Anesthesiologists (ASA) Physical Status Classification**

| ASA PS Classification | Definition | Examples, including, but not limited to: |
|---|---|---|
| ASA I | A normal healthy patient | Healthy, non-smoking, no or minimal alcohol use |

| | | |
|---|---|---|
| **ASA II** | A patient with mild systemic disease | Mild diseases only without substantive functional limitations. Examples include (but not limited to): current smoker, social alcohol drinker, pregnancy, obesity (30 < BMI < 40), well-controlled DM/HTN, mild lung disease |
| **ASA III** | A patient with severe systemic disease | Substantive functional limitations. One or more moderate to severe diseases. Examples include (but not limited to): poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥ 40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, premature infant PCA < 60 weeks, history (> 3 months) of MI, CVA, TIA, or CAD/stents. |
| **ASA IV** | A patient with severe systemic disease that is a constant threat to life | Examples include (but not limited to): recent (< 3 months) MI, CVA, TIA, or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis |
| **ASA V** | A moribund patient who is not expected to survive without the operation | Examples include (but not limited to): ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction |
| **ASA VI** | A declared brain-dead patient whose organs are being removed for donor purposes | — |

**Figure 1 : Silverman-Holt Aggregate Preoperative Evaluation**

**SHAPE™ (Silverman-Holt Aggregate Preoperative Evaluation)**

**A**

| ASA PS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CNS | PSYCH | ENDO | CARD | VASC | RS | LPS | GI | KUB | GENDER SPECIFIC | NMS | EENT | HEME | FLUID & ELECTROLYTES |
| | | | | | | | | | | | | | |

**S**

| Surgical Risk / Invasiveness | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**P**

| Physical factors affecting Mask ventilation | |
|---|---|
| **Predictor** | **Score** |
| **Age Score** | |
| 15–55 yrs | 0 |
| 56–80 yrs | 0.5 |
| >80 yrs | 1.0 |
| **History & Physical Score** | |
| None | 0 |
| Habitual snoring | 0.5 |
| Possible sleep apnoea | 2 |
| Probable/definite sleep apnoea | 3 |
| **Body Mass Index Score** | |
| ≤ 30 | 0 |
| 31–45 | 1 |
| 46–60 | 2 |
| > 60 | 4 |
| **Internal/external airway pathology Score** | |
| Present, unlikely to be significant | 0.5 |
| Possible, moderate deformity | 2 |
| Obstruction/Impending obstruction | 5 |
| **Miscellaneous factors Score** | |
| Large beard or edentulous | 0.5 |
| Moderately distorted facial anatomy | 2 |
| Significantly distorted facial anatomy | 5 |
| Persistent aspiration risk (eg, term pregnancy, Zencker's diverticulum, obstruction) | 5 |

**I**

| Intubation predictors* | |
|---|---|
| **Predictor** | **Score** |
| **Mallampati class** | |
| I or II | 0 |
| III | 1 |
| IV but improves with vocalizing | 3 |
| IV with no improvement with vocalizing | 4 |
| **Ability to prognath** | |
| No overbite, good extension | 0 |
| No overbite, poor extension | 1 |
| Overbite, easily reversed | 0.5 |
| Overbite, barely able to reverse | 2 |
| Overbite, unable to reverse | 4 |
| Can't understand request to prognath | 0.5 |
| **Mouth opening** | |
| > 4 cm | 0 |
| 3–4 cm | 1 |
| 2–3 cm | 4 |
| < 2 cm | 5 |
| Moderate TMJ Ankylosis | +0.5 |
| Severe TMJ | +2 |
| **Neck mobility (degrees°) & Size** | |
| > 60°, normal size | 0 |
| > 60°, short neck | 0.5 |
| 30°–60°, normal neck | 0.5 |
| 30°–60°, short neck | 2 |
| 10°–30°, normal neck | 3 |
| 10°–30°, short neck | 4 |
| <10° or immobilized | 5 |
| Down syndrome | +2 |
| Diabetes with lax joints | +2 |
| Rheumatoid or comparable subluxation risk | +2 |
| Moderate airway deviation or narrowing | +2 |
| Obstruction or impending obstruction | +5 |
| Radicular s/s on extension | +5 |
| **Thyromental distance** | |
| > 6 cm | 0 |
| 4–6 cm | 0.5 |
| 3–4 cm | 1 |
| 2–3 cm | 2 |
| < 2 cm | 4 |
| ***Intubation history** | |
| Moderate difficulty | 3 |
| Pronounced difficulty | 4 |
| Impossible | 5 |

**RIN**

| Code | Conditions/issues |
|---|---|
| A | Aspiration risk despite pretreatment |
| B | Bleeding risk |
| C | Communication problem |
| Dx | Diagnosis or prior anaesthetic problem indicative of anaesthesia-specific risks |
| E | Emergency |
| I | ICD in place |
| L | Latex allergy |
| M | Management issues |
| O | Morbid obesity |
| P | Pregnancy |
| T | Tracheostomy |
| W | Withdrawal risk |

**Final SHAPE™ Risk**

**American Society of Anesthesiologists (ASA) Physical Status Classification:**

The investigators used the ASA Physical Status Classification for preoperative risk assessment for first set of patients. Each patient was assigned to one of six ASA categories based on their overall physical health and the presence of systemic disease: ASA I for normal healthy patients; ASA II for patients with mild systemic disease; ASA III for those with severe systemic disease; ASA IV for patients with severe systemic disease posing a constant threat to life; ASA V for moribund patients not expected to survive without the operation; and ASA VI for brain-dead patients whose organs were being removed for donor purposes.[6] (Table 1)

**Silverman-Holt Aggregate Preoperative Evaluation**

Subsequently, the investigators employed the Silverman-Holt Aggregate Preoperative Evaluation (SHAPE) score to other set of patients, evaluated each major organ systems including cardiovascular, respiratory, renal, hepatic, neurological, hematologic, and endocrine individually. Each system was assigned a severity score ranging from 1 (normal function) to 5 (severe dysfunction or failure). Beyond organ-specific scoring, SHAPE scoring system incorporated structured physical examination findings and a comprehensive airway assessment, critical for anticipating potential intubation difficulties and anesthesia-related risks. These individual organ scores were then aggregated to produce a composite risk profile that reflected the patient's overall physiological reserve and peri operative risk.[5] (figure 1 )

**Statistical Analysis**

All collected data were systematically entered into a structured database to ensure accuracy and consistency. Data management and statistical analyses were performed using SPSS software version 20.0 (IBM Corp., Armonk, NY, USA). Categorical variables (ASA grading, SHAPE scores) were presented as frequency counts and percentages.
The Chi-square test was used to analyze associations between categorical variables and to compare the classification efficacy of ASA grading versus SHAPE scoring systems regarding perioperative outcomes. Statistical significance was defined as $p < 0.05$.

**Results**

**Table 2: Comparison of Age and Gender Distribution Between Group ASA and Group SHAPE**

| Variable | Category | Group ASA (n, %) | Group SHAPE (n, %) | ($\chi^2$) | p-value |
|---|---|---|---|---|---|
| Age Group (years) | 20–30 | 82(32%) | 81(32%) | 0.49 | 0.50 |
| | 31–40 | 49(20%) | 53(21.2%) | | |
| | 41–50 | 52(21%) | 49(20%) | | |
| | 51–60 | 47(19%) | 40(16%) | | |
| | 61–70 | 20(0.08%) | 17(0.7%) | | |
| Gender | Male | 138 (55%) | 130 (52%) | $\chi$ 0.51 | 0.50 |
| | Female | 112 (45%) | 120 (48%) | | |

- **(n, %)- number and frequency,** p-value < 0.05 will be considered statistically significant, Chi-square test

**Table 3: Distribution of ASA Grades Across Different Age Groups in group ASA**

| Age Group (Years) | ASA Grade I (n, %) | ASA Grade II (n, %) | ASA Grade III (n, %) | ($\chi^2$) | p-value |
|---|---|---|---|---|---|
| 20–30 | 60 (24%) | 19(8%) | 3(1.2%) | 70.54 | 0.0001 |
| 31–40 | 29(12%) | 17(7%) | 3(1.2%) | | |
| 41–50 | 19(8%) | 25(10%) | 8(3.2%) | | |
| 51–60 | 10(4%) | 27(11%) | 10(4%) | | |
| 61–70 | 3(1.2%) | 6(2.4%) | 11(4.4%) | | |

- **(n, %)- number and frequency,** p-value < 0.05 will be considered statistically significant, Chi-square test

**Table 4: Age-Wise Distribution of SHAPE Scores Among Participants in Group SHAPE**

| Age Group (Years) | SHAPE Score < 10 (n, %) | SHAPE Score > 10 (n, %) | $\chi^2$ | p-value |
|---|---|---|---|---|
| 20–30 | 60 (24.0%) | 21 (8.4%) | 27.82 | 0.0001 |
| 31–40 | 34 (13.6%) | 19 (7.6%) | | |
| 41–50 | 28 (11.2%) | 21 (8.4%) | | |
| 51–60 | 12 (4.8%) | 38 (15.2%) | | |
| 61–70 | 7 (2.8%) | 10 (4.0%) | | |

- **(n, %)- number and frequency,** p-value < 0.05 will be considered statistically significant, Chi-square test.

**Table 5**

| Group ASA | | | | Group SHAPE score | | |
|---|---|---|---|---|---|---|
| Age group | Un anticipated difficult airway | Un planned post op ventilation | At PACU >24 hours | Predicted difficult airway | Planned post op elective ventilation | Predicted at PACU >24hrs |
| **20–30** | | | | | | |
| **31–40** | 1 | | | | | |
| **41–50** | 1 | 2 | | 4 | 1 | |
| **51–60** | 1 | 2 | 2 | 2 | 3 | 2 |
| **61–70** | | | 4 | | | 4 |

Chi square test. p value not statistically significant

**Results**

Out of 500 patients, two groups were formed with 250 participants in each group. **Table 2** presents the demographic comparison of patients classified under the ASA grading and SHAPE scoring systems based on age and gender. The age distribution is divided into five categories (20–30, 31–40, 41–50, 51–60, and 61–70 years). Both groups show a similar distribution across age categories, with the highest concentration of patients in the 20–30 age group (32% in both ASA and SHAPE groups). The chi-square test indicates no statistically significant difference in age distribution ($\chi^2 = 0.49$, $p = 0.50$).

Similarly, gender distribution is comparable between the two groups, with males constituting 55% in the ASA group and 52% in the SHAPE group, while females account for 45% and 48% respectively. The chi-square test again shows no significant difference in gender distribution ($\chi^2 = 0.51$, $p = 0.50$). Overall, the demographic characteristics between the two groups are well matched, with no statistically significant differences in age or gender.

**Table 3** illustrates the distribution of ASA grades (I, II, and III) among patients across five age groups in the ASA group. The majority of ASA Grade I patients are found in the younger age groups, particularly 20–30 years (24%) and 31–40 years (12%), indicating that younger patients tend to have fewer comorbidities and better physical status. Conversely, the prevalence of ASA Grade III increases with age, with the highest proportion observed in the 61–70 age group (4.4%), followed by 51–60 years (4%).

A similar trend is seen for ASA Grade II, which peaks in the 51–60 age group (11%), suggesting a gradual increase in moderate systemic disease with advancing age. The distribution differences across age groups are statistically significant, as indicated by a chi-square value of 70.54 and a p-value of 0.0001 ($p < 0.05$). This suggests a strong association between increasing age and higher ASA grade, reflecting a decline in overall physical status with age.

Table 4 presents the distribution of SHAPE scores categorized as <10 and >10 across different age groups within the SHAPE group. A clear trend is observed, wherein younger patients predominantly have SHAPE scores <10, while higher scores (>10), indicative of increased perioperative risk, are more frequent in older age groups.

Specifically, 24% of participants aged 20–30 years had SHAPE scores <10, while only 8.4% in the same age group had scores >10. In contrast, the 51–60 age group shows a reversal of this trend, with only 4.8% having SHAPE scores <10 and a substantial 15.2% scoring >10. The 61–70 age group also shows a higher proportion of participants with SHAPE scores >10 (4%) compared to those scoring <10 (2.8%).

The chi-square test yields a value of 27.82 with a p-value of 0.0001, indicating a statistically significant association between age and SHAPE score. This suggests that as age increases, there is a notable rise in SHAPE scores, reflecting greater systemic involvement and higher perioperative risk in older individuals.

**Discussion**

The comparative analysis reveals a significant association between increasing age and higher risk stratification in both ASA and SHAPE systems, with SHAPE offering greater sensitivity in detecting elevated perioperative risk and offers valuable insights into their applicability across diverse patient populations.

The initial comparative analysis between the two groups ASA and SHAPE focused on demographic variables such as age and gender to ensure that the study groups were similar at baseline. The results indicated that both groups were well-matched demographically, However, no statistically significant differences in age distribution ($\chi^2 = 0.49$, p = 0.50) or gender distribution ($\chi^2 = 0.51$, p = 0.50) was found.

Approximately 32% of participants in both groups belonged to the 20–30 age, followed by 20–21% in the 31–40 range, and a declining trend in older age categories. This consistent distribution validates the comparative integrity of the two groups and rules out age or gender as potential confounding variables in subsequent analyses.

In terms of gender, the male-to-female ratio was relatively balanced, with males comprising 55% in Group ASA and 52% in Group SHAPE. The near-equivalence in gender distribution supports the comparability of groups and affirms that any observed differences in risk classification or outcomes are likely attributable to the scoring methods rather than demographic disparities.

The distribution of ASA grades across different age categories revealed a statistically significant association between age and ASA classification ($\chi^2 = 70.54$, p = 0.0001). A clear age-related trend was observed: younger patients were predominantly assigned ASA Grade I, whereas older patients had a greater proportion of higher ASA grades (II and III).

For instance, 24% of participants in the 20–30 age group were classified as ASA Grade I, with only 1.2% in ASA Grade III. Conversely, in the 61–70 age group, only 1.2% fell under ASA I, while 4.4% were categorized as ASA III. This trend aligns with clinical expectations, as systemic comorbidities tend to accumulate with age, leading to higher ASA classifications.

Moreover , the ASA grading system's limitation becomes evident in the compressed granularity of grades. With only three grades used effectively in the present study population (I to III), the classification system may fail to capture subtle but clinically significant variations in physiological reserve and specific organ dysfunctions.

The SHAPE scoring system, by contrast, offers a more detailed picture of physiological impairment by assigning severity scores to individual organ systems and incorporating physical examination and airway evaluation. The present study showed a significant association between age and SHAPE score classification ($\chi^2 = 27.82$, p = 0.0001), with a trend toward higher SHAPE scores in older patients.

Among participants aged 20–30, 60 individuals (24%) had SHAPE scores <10, indicating low perioperative risk, while only 21 (8.4%) had scores >10. In contrast, in the 51–60 age group, only 12 (4.8%) scored <10, while 38 (15.2%) scored >10, suggesting a substantial shift toward higher preoperative risk in older populations.

In this study,(Table 5) the ASA grading system was associated with several unanticipated perioperative complications, including unplanned postoperative ventilation in four patients (aged 41–60 years), unexpected difficult airways in three patients (30–60 years), and postoperative ICU stays exceeding 24 hours in six patients (55–70 years). These findings highlight ASA's limitations in predicting specific surgical risks, particularly those related to airway and critical care needs. In contrast, the SHAPE scoring system showed greater predictive accuracy. Elective postoperative ventilation was successfully anticipated in four patients (41–60 years), difficult airways were correctly predicted in six patients (41–60 years), and extended ICU care needs were identified preoperatively in six patients (51–70 years). These results underscore SHAPE's capacity to detect subtle deteriorations in health status that may not elevate a patient's ASA grade but are nonetheless clinically significant. The SHAPE system's organ-specific scoring allows identification of high-risk patients even within younger age groups, provided there is organ dysfunction. This level of detail is particularly useful in tailoring anesthetic plans, predicting potential intraoperative complications, and determining the need for postoperative ICU monitoring.

Similar to findings by Bhavana et al., our study demonstrated that SHAPE scoring was more effective than ASA grading, emphasizing its enhanced accuracy in peri operative risk prediction. Moreover, Numerous studies have evaluated the reliability and predictive value of the ASA Physical Status (ASA PS) classification.[7] Study by Kay HF et al. found that ASA PS effectively predicts postoperative length of stay, inpatient costs, and complication rates in patients undergoing surgery for isolated orthopedic fractures, highlighting its value in surgical risk stratification and resource planning.[8] Thomas J. Hopkins et al. study examined the relationship between ASA PS and postoperative mortality within 48 hours, noting a decline in mortality risk over recent decades for both emergency and elective surgeries among patients classified between ASA 2E and 4E.[9]

Woodfield JC et al. further supported the predictive capability of ASA PS in relation to postoperative wound infections revealed that even with effective antibiotic prophylaxis, ASA PS remained a significant risk factor for infection, highlighting its continued relevance in preoperative risk assessment.[10]

In contrast, Anila D. Malde emphasized that ASA PS lacks the ability to differentiate between dysfunctions in specific organ systems or to cumulatively assess risk in patients with multisystem involvement. Moreover, it does not incorporate surgical invasiveness or identify specific anesthetic risks, which restricts its usefulness for more detailed and nuanced clinical decision-making.[11] But however, According to Gen Li et al., ASA physical status demonstrated strong correlation with 27 Elixhauser comorbidities and key demographic factors, affirming its reliability in preoperative assessment in their retrospective cohort study of 56,820 surgical cases.[3] Wolters et al., in their prospective study of 6,301 surgical patients showed significant correlation of ASA physical status classification with key perioperative variables, including intraoperative blood loss, duration of postoperative ventilation, ICU stay, complications, and mortality.[12]

However, the present study findings underscore the enhanced sensitivity and granularity of the SHAPE scoring system compared to ASA grading. Although both systems show expected age-related trends, SHAPE allows a more refined categorization of risk, particularly in mid-age and older adults where the physiological spectrum is wide and complex.

The limitations of ASA grading are evident in its broad categorization, which risks grouping heterogeneous patient profiles under the same risk class. As the data show, ASA classification does not distinguish between different types or severities of organ dysfunction within the same grade. SHAPE, on the other hand, quantifies each system's impairment and integrates airway and examination findings, offering a multidimensional view of the patient's health status.

In clinical practice, this translates to better-informed decisions about preoperative optimization, anesthesia technique selection, intraoperative vigilance, and postoperative surveillance

**Future Research**

The SHAPE scoring system's comprehensive nature also aligns well with modern perioperative medicine's shift toward personalized care and predictive analytics

The SHAPE system's complexity may present practical challenges, such as increased time for assessment and the need for clinician training. In high-volume settings or emergency scenarios, this could limit feasibility. Therefore, further research is warranted to evaluate the time-efficiency, inter-rater reliability, and real-world utility of SHAPE in diverse surgical populations. Prospective multicentric studies with larger sample sizes can help determine if the improved stratification accuracy offered by SHAPE translates into better clinical outcomes and resource utilization.

**Conclusion**

In conclusion, the comparative analysis of ASA grading and SHAPE scoring systems based on age and gender distributions demonstrates that while both methods reflect general health trends across age groups, the SHAPE scoring system offers superior granularity, specificity, and clinical relevance. The significant associations between SHAPE scores and age, alongside the limitations observed with ASA grading, suggest that SHAPE scoring may provide a more robust framework for preoperative risk assessment.

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