**Clinical Anesthesiology (/Section/Clinical-Anesthesiology/1)**

AUGUST 22, 2019

# Scoring Systems to Detect Severe OSA Compared

A modified STOP-Bang algorithm designed specifically to detect severe cases of obstructive sleep apnea (OSA) does not seem to offer significant improvement over the questionnaire's original approach, Belgian researchers have concluded. The investigators also found that the DES-OSA score is the best of the commonly used OSA scales when it comes to detecting severe OSA among surgical patients.

(/aimages/2019/AN0819_008a_25771_600.jpg)

As Eric P. Deflandre, MD, PhD, reported, several clinical scoring systems have been proposed to detect OSA patients, including STOP-Bang (Table 1), the Perioperative Sleep Apnea Prediction score (Table 2), the OSA50 score (Table 3) and the DES-OSA score (Table 4). For each scoring system, the likelihood of OSA increases as the score increases.



**Table 1. Classic STOP-Bang Score**

| | |
|---|---|
| **S** | Snoring |
| **T** | Tiredness |
| **O** | Observed apnea |
| **P** | High blood pressure |
| **B** | Body mass index >35 kg/m$^2$ |
| **a** | Age >50 years |
| **n** | Neck circumference >40 cm |
| **g** | Gender, male |

**Table 2. P-SAP Score**

| |
|---|
| Age ≥43 years |
| Body mass index >30 kg/m$^2$ |
| High blood pressure |
| Male gender |
| Mallampati class III or IV |
| Retrognathia or micrognathia |

| |
|---|
| Snoring |
| Thyromental distance <6 cm |
| Type 2 diabetes |

**P-SAP,** Perioperative Sleep Apnea Prediction score

**Table 3. OSA50 Airway Score**

**O**besity (waist circumference)
- >102 cm in males (3 points)
- >88 cm in females (3 points)

**S**noring (3 points)

**A**pnea, observed (2 points)

Age >**50** years (2 points)

**Table 4. DES-OSA Score**

| Item | 1 Point | 2 Points | 3 Points |
|---|---|---|---|
| **Mallampati classification** | — | II | III and IV |
| **Distance from thyroid to chin, cm** | >6 | 5-6 | <5 |
| **Body mass index, kg/m$^2$** | >28 | >39 | >41 |
| **Neck circumference, cm** | >37 | >42 | >48 |
| **Gender** | Male | | |

There are eight items in the STOP-Bang scoring system, with each item assigned 1 point. Those scoring 0 to 2 are classified as being at low risk for moderate to severe OSA; those scoring 5 to 8 are classified as being at high risk for moderate to severe OSA. In 2016, the developers of the STOP-Bang scoring system proposed a new algorithm for detecting OSA in high-risk patients (*Chest* 2016;149[3]:631-638).

The new algorithm affects patients whose STOP-Bang scores fall in the midrange, at 3 or 4. In these cases, additional criteria may be used. These patients may be judged as high risk if, in addition to having 2 or more points from the "STOP" section of the algorithm, they also score an additional point for body mass index, neck circumference or sex from the "Bang" section of the algorithm (Table 5).

**Table 5. Newer, Expanded Version of STOP-Bang**

Assess STOP-Bang score, as per Table 1.

If score is 3 or 4, *and* there are ≥2 points from the "STOP" section, *and* the patient has one or more of the following elements from the "Bang" section, then the patient is considered high risk:

• Male gender • Body mass index >35 kg/m2 • Neck circumference >40 cm

If no points from the Bang section, then the patient is considered intermediate risk.

"The first aim of our study was to compare STOP-Bang's classic approach with this new one with respect to detecting severe OSA," said Dr. Deflandre, the head of anesthesiology at Clinique Saint-Luc Bouge, in Namur, Belgium. The investigators also sought to compare both STOP-Bang approaches with the three other clinical scoring systems in terms of their ability to detect severe OSA.

To do so, they prospectively enrolled 293 patients into the study, all of whom were scheduled for elective surgery. During the preoperative anesthesia visit, an investigator collected scores for all five of the questionnaires. All patients underwent overnight polysomnography.

A blinded investigator then correlated the results of the clinical scores with the apnea–hypopnea index derived from the polysomnogram. Finally, the scores were statistically compared using sensitivity, specificity, Youden Index (a measure of a yes/no diagnostic test), positive predictive value, negative predictive value, kappa coefficient and the area under the receiver operating characteristic (AUROC) curve (Table 6).

**Table 6. Comparison of Scoring Systems**

| | Sensitivity | Specificity | Youden Index | Positive Predictive Value | Negative Predictive Value | Kappa Coefficient | AUROC |
|---|---|---|---|---|---|---|---|
| **STOP-Bang** | 0.851 | 0.492 | 0.344 | 0.495 | 0.85 | 0.299 | 0.758 |
| **New STOP-Bang** | 0.898 | 0.319 | 0.217 | 0.435 | 0.843 | 0.178 | 0.608 |
| **P-SAP** | 0.917 | 0.335 | 0.252 | 0.45 | 0.873 | 0.206 | 0.749 |
| **OSA50** | 0.981 | 0.151 | 0.133 | 0.403 | 0.933 | 0.102 | 0.702 |
| **DES-OSA** | 0.787 | 0.768 | 0.555 | 0.664 | 0.861 | 0.534 | 0.835 |

**AUROC,** area under the receiver operating characteristic; **OSA50,** obesity, snoring, apnea over 50 yrs; **P-SAP,** Perioperative Sleep Apnea Prediction score

**Classic and New STOP-Bang Compared**

In the first part of the investigation, the researchers found little difference between the new and original approaches to the STOP-Bang algorithm with respect to its ability to detect severe OSA. Indeed, while the new approach slightly—but not significantly—improved its sensitivity from 0.85 to 0.90, its specificity fell significantly, from 0.49 (95% CI, 0.42-0.56) to 0.32 (95% CI, 0.25-0.39; $P<0.05$). Similarly, the Youden Index was significantly lower with the new approach (0.22 vs. 0.34; $P<0.05$), as was the AUROC curve (0.61 vs. 0.7; $P<0.05$).

"Therefore, in order to detect severe OSA, the first conclusion of the study is you should use STOP-Bang with the classical approach, not the new one," said Dr. Deflandre, who spoke at the 2018 annual meeting of the American Society of Anesthesiologists (abstract A2267).

In the second part of the study, the investigators widened the comparison to include all five scoring systems for their respective ability to detect severe OSA. As Table 6 illustrates, the OSA50 score exhibited the best sensitivity, significantly better than both the original STOP-Bang approach and the DES-OSA score. On the other hand, the DES-OSA had the best specificity (0.77; 95% CI, 0.70-0.83), the best positive predictive value (0.66; 95% CI, 0.57-0.74), the highest Youden Index (0.55; 95% CI, 0.5-0.61), and the highest kappa coefficient (0.53; 95% CI, 0.43-0.63).

The investigators noted that, while the study demonstrated the relative superiority of the DES-OSA scale, larger scale research needs to confirm these findings.

**Question Arises How to Use Clinically**

Session co-moderator Ashish Khanna, MD, an associate professor of anesthesiology at Wake Forest School of Medicine, in Winston-Salem, N.C., questioned the clinical applicability of the findings. "Many OSA scores have been around for many years, are very easy to implement, and are used in the preoperative clinic all the time," Dr. Khanna said. "So if I'm trying to practically apply all of this information with a real-world patient, what should I do?"

"I believe the most important thing is that we perform one of these scales to detect OSA patients before surgery, especially severe OSA, since these patients are at greater risk of respiratory complications than other patients," Dr. Deflandre replied.

"Personally, I struggle with the notion of screening everyone for OSA, no matter which score you might use," Dr. Khanna added. "Nevertheless, what do you suggest we do with patients who come to the OR with a high risk of OSA? Do we change our intraoperative management? Do we monitor these patients more aggressively on the floor? Because the real value of a scoring system is not just detection or screening, but that it allows you to do something proactively to prevent postoperative respiratory complications. And this may be especially important once we send these higher risk patients out from the PACU to the relatively under-monitored general care floor."

As Roman Schumann, MD, a professor of anesthesiology at Tufts Medical Center, in Boston, explained, implementing specific orders according to OSA risk can help address these possible issues. "We've struggled with that a little bit, too," he said. "To do something proactive with that information, we ended up implementing an order set for patients who have a STOP-Bang score of 5 or greater.

"That basically puts the patient on the pathway for a different set of PACU discharge criteria with respect to respiratory parameters that need to be met," Dr. Schumann said. "So we're trying to apply practical consequences from that screening."

Dr. Deflandre originally spoke at the 2018 annual meeting of the American Society of Anesthesiologists (abstract A2267).

*—Michael Vlessides*

*Drs. Deflandre and Schumann reported no relevant financial disclosures. Dr. Khanna is on the steering committee for a Medtronic-funded trial using continuous monitoring systems on the general care floor to develop a risk scoring system for cardiorespiratory compromise; he is also part of the company's executive advisory council for its respiratory device and monitoring division.*

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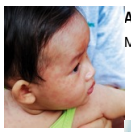

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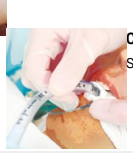

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