

Provincial Clinical Knowledge Topic
Anesthesia – Perioperative Obstructive Sleep Apnea,
Adult – Inpatient
V 1.1

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Revision History

Version	Date of Revision	Description of Revision	Revised By
1.0	November 2018	CKT Complete	Refer to Acknowledgements
1.1	January 2019	Respiratory order content updated	Dr. Kaylene Duttchen

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Important Information Before you Begin

The recommendations contained in this Provincial Clinical Knowledge Topic have been provincially adjudicated and are based on best practice and available evidence. Clinicians applying these recommendations should, in consultation with the patient, use independent medical judgment in the context of individual clinical circumstances to direct care. This knowledge topic will be reviewed periodically and updated as best practice evidence and practice change.

The information in this topic strives to adhere to Institute for Safe Medication Practices (ISMP) safety standards and align with Quality and Safety initiatives and accreditation requirements such as the Required Organizational Practices. Some examples of these initiatives or groups are: Health Quality Council Alberta (HQCA), Choosing Wisely campaign, Safer Healthcare Now campaign etc.

Guidelines

This topic is based on the following guidelines:

Allied Health Sciences Section Ad Hock Nutrition Committee. Aills L, Blankenship J, Buffington C, Furtado M, Parrot J. ASMBs allied health nutritional guidelines for the surgical weight loss patient. *Surgery for Obesity and Related Diseases*. 2008; 4(5): S73-S108.
[http://www.soard.org/article/S1550-7289\(08\)00163-9/pdf](http://www.soard.org/article/S1550-7289(08)00163-9/pdf)

American Society of Anesthesiologists Task Force on Perioperative Management of Patients [trunc]. Practice guidelines for the perioperative management of patients with obstructive sleep apnea: an updated report by the American Society of Anesthesiologists Task Force on Perioperative Management of Patients with Obstructive Sleep Apnea. *Anesthesiology*. 2014 Feb;120(2):268-86. <https://www.guideline.gov/summaries/summary/47893>

Chung F, Memtsoudis, SG, Ramachandran, SK et al. Society of anesthesia and sleep medicine guidelines on preoperative screening and assessment of adult patients with obstructive sleep apnea. *Anesth Analg*. 2016; 123(2): 452-473.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4956681/pdf/ane-123-452.pdf>

National Guideline Clearinghouse (NGC). Guideline summary: Practice guidelines for the perioperative management of patients with obstructive sleep apnea: an updated report by the American Society of Anesthesiologists Task Force on Perioperative Management of Patients with Obstructive Sleep Apnea. In: National Guideline Clearinghouse (NGC) [Web site]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2014 Feb 01. [cited 2017 Apr 03]. Available: <https://www.guideline.gov/>

Rationale

The information within this Provincial Clinical Knowledge Topic provide information for the patient diagnosed with obstructive sleep apnea and health care team of the increased risk of postoperative morbidity. Informing the patient of this risk is key to both engage the patient to promote appropriate compliance (thereby decreasing risk) and to share the responsibility for outcomes that occur when patients are non-compliant.

- Up to 90% of people considered to have a moderate-to-severe Obstructive Sleep Apnea (OSA) diagnosis are undiagnosed (*Anesth Analg*. 2016;11(5):1-9.).

- A large percentage of patients do not have a confirmed diagnosis of OSA prior to surgery
- Research provides evidence that patients with OSA have an increased risk of postoperative complications
- Research has demonstrated an association between OSA and perioperative events including difficult intubation, pulmonary complications, cardiovascular events, resource utilization and death (*Anesth Analg.* 2016;122(5):1321-34).
- Providing pre-hospitalization screening for OSA followed by continuous positive airway pressure (CPAP) treatment in hospital may decrease the occurrence of adverse events requiring further intervention during hospitalization.

Patients diagnosed or suspected to have OSA are at risk of having a difficult airway. Such patients should be managed in accordance with the practice guidelines from the [American Society of Anesthesiologists Task Force regarding Perioperative Management of Patients with Obstructive Sleep Apnea](#)

Goals of Management

This topic seeks to provide evidence based, best practice guidance to decrease potential complications for patients at high risk for OSA or diagnosed OSA during the perioperative period.

Goals of Care

Preoperative

- The goal is to improve OSA screening and diagnosis to identify risk and optimize care perioperatively for patients with suspected OSA.

Intraoperative

- The goal is to manage patients with diagnosed OSA during the intraoperative period with an effort to minimize intraoperative and postoperative complications.

Postoperative

- The goal is to ensure appropriate monitoring, analgesic regimes, and therapy to minimize postoperative complications for patients with diagnosed or suspected OSA.

Keywords

- BMI
- Body Mass Index
- CPAP
- Obstructive Sleep Apnea
- OSA
- PAP therapy
- STOP-Bang

Clinical Decision Support

STOP-Bang Scoring Model

The Stop-Bang Scoring Model is a questionnaire used to screen for obstructive sleep apnea. The STOP-Bang Scoring Model can be found here:

1. Snoring

Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?

Yes _____ No _____

2. Tired

Do you often feel tired, fatigued, or sleepy during daytime (such as falling asleep during driving or talking to someone or do you feel tired after you have what you consider a reasonable night sleep)?

Yes _____ No _____

3. Observed

Has anyone observed you stop breathing or choking/gasping during your sleep?

Yes _____ No _____

4. Blood pressure

Do you have or are you being treated for high blood pressure?

Yes _____ No _____

5. BMI

BMI more than 35 kg/m²?

Yes _____ No _____

6. Age

Age over 50 years old?

Yes _____ No _____

7. Neck circumference

Neck circumference greater than 40 cm?

Yes _____ No _____

8. Gender

Gender male?

Yes _____ No _____

Low risk of OSA: answering yes up to two questions

Intermediate risk of OSA: answering yes to three to four questions

High risk of OSA: answering yes to five to eight questions

OR answering yes to two or more of Questions 1 – 4 and male gender

OR answering yes to two or more of Questions 1 – 4 and BMI greater than 35 kg/m²

OR answering yes to two or more of Questions 1 – 4 and neck circumference of:

Males: 17"/43 cm

Females: 16"/41 cm

Aldrete Score

The Aldrete score is used to evaluate the patient condition/sedation post anesthesia according to activity, respiration, circulation, level of consciousness and colour. The Aldrete score can be found here.

<https://www.thecalculator.co/health/Aldrete-Score-Calculator-796.html>

Epworth Sleepiness Scale

The Epworth Sleepiness Scale (ESS) is a questionnaire used to assess day time sleepiness. The ESS can be found here:

<https://www.sleepapnea.org/assets/files/pdf/ESS%20PDF%201990-97.pdf>

Decision Making

The management of perioperative OSA can be divided into preoperative, intraoperative, postoperative considerations.

Given the large number of patients not yet diagnosed with OSA or are diagnosed with OSA and not adherent to positive airway pressure (PAP) therapy, it is useful to divide patients into three classification of patients’:

1. Patients’ diagnosed with OSA and adherent to PAP therapy
2. Patients’ diagnosed and OSA and not adherent to PAP therapy
3. Patients’ who are determined to be high risk for OSA (based on [STOP-Bang Scoring Model](#) Questionnaire) but are not yet diagnosed with OSA.

PAP therapy:

Includes continuous PAP, bi-level PAP or automatically adjusting PAP.

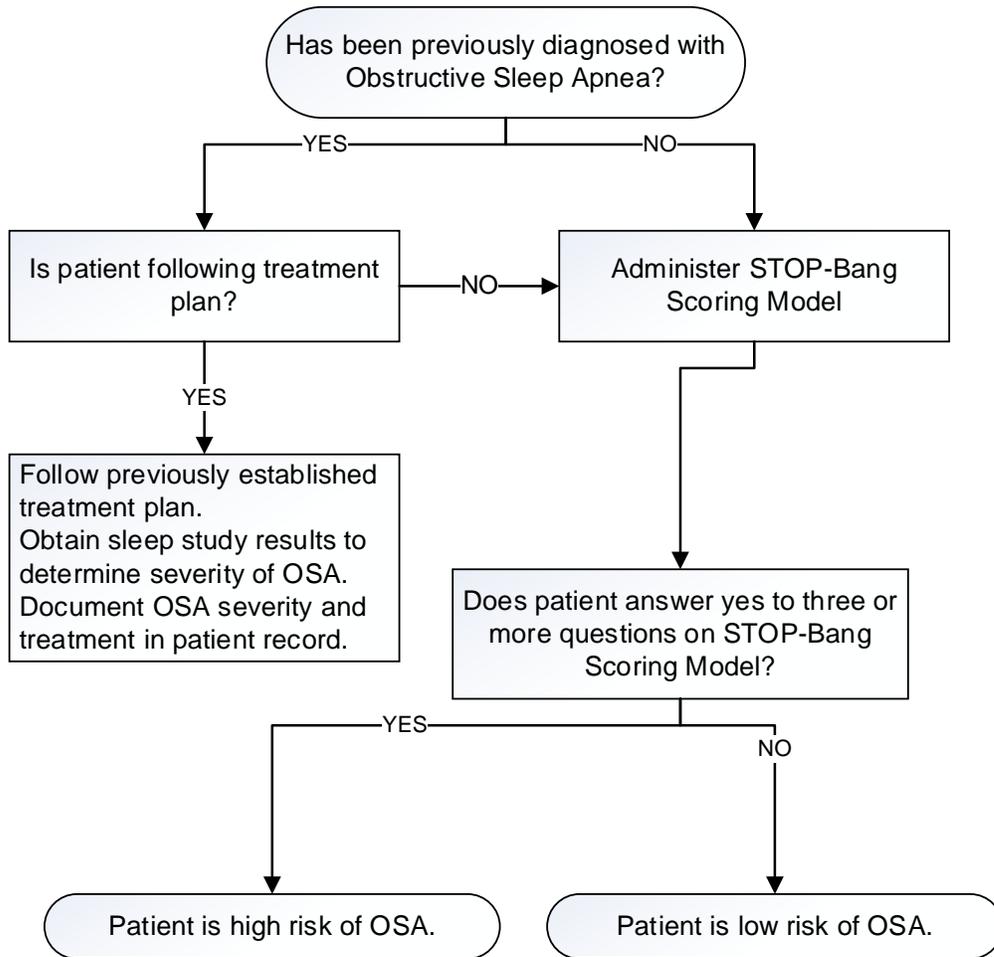
Apnea Hypopnea Index (AHI):

Indication of the severity of sleep apnea through the number of apnea and hypopnea events per hour of sleep.

The [Determining Risk of Obstructive Sleep Apnea Algorithm](#) suggests an approach to dividing patients into these groups as the STOP-Bang score increases both the incidence of OSA and severity of OSA increase. That is, patients with high STOP-Bang scores are likely to have severe OSA.

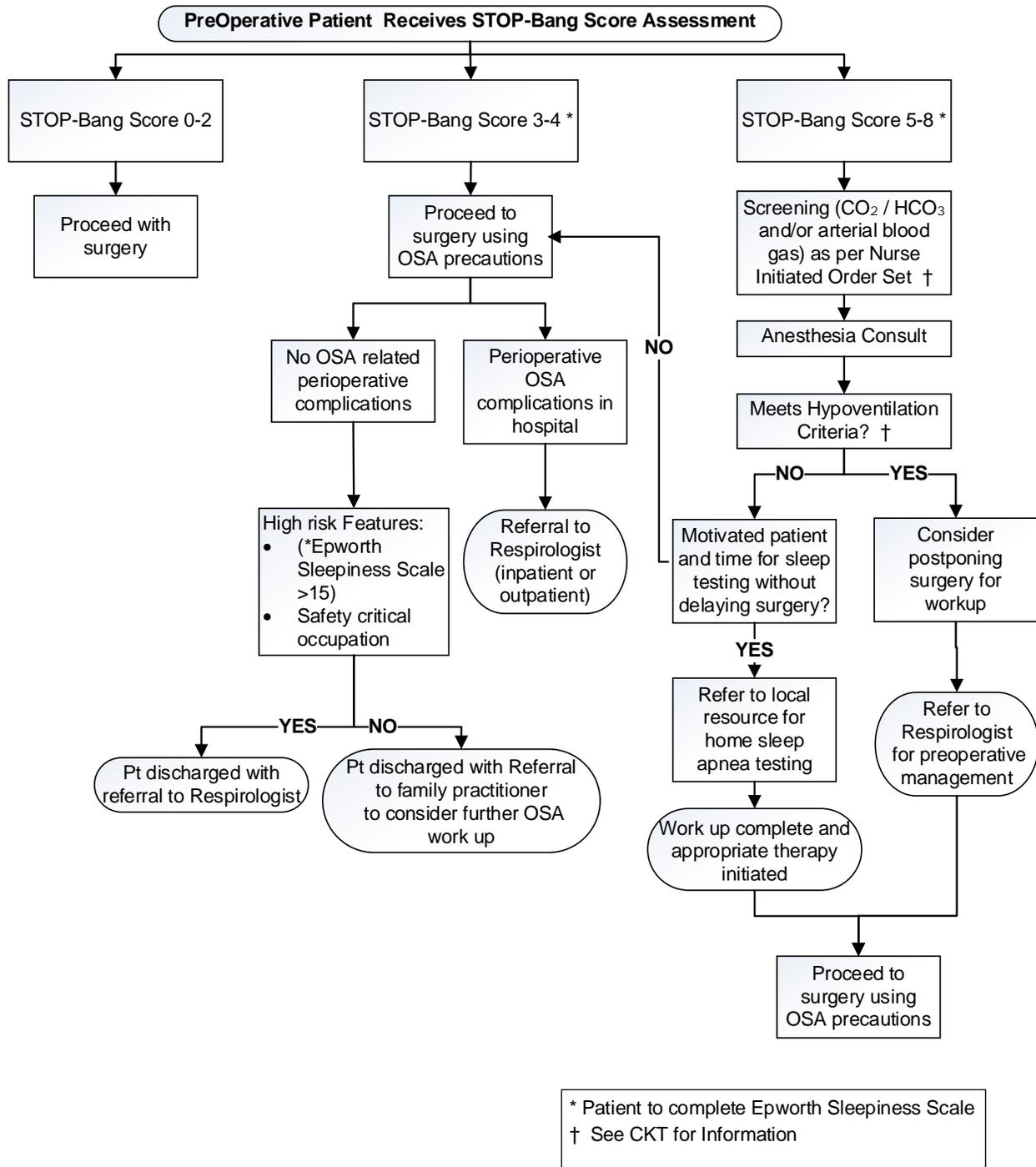
Severity of OSA disease increases with increasing score response to the STOP-Bang Scoring Model.

Determining Risk of Obstructive Sleep Apnea Algorithm



<p>STOP-Bang Score 3 - 4: Mild increased risk of OSA, likely to be mild-moderate in severity. Document results in patient record.</p>	<p>STOP-Bang Score 5 - 6: Significantly increased risk of moderate to severe OSA. Document results and inform anesthesiologist prior to surgery. (Anesthesia consult may be considered)</p>	<p>STOP-Bang Score 7 - 8: Highly likely to have severe OSA. Patient to have anesthetic consult at PreOperative Clinic if within local practice. Receive order for blood gas. Document results and inform anesthesiologist prior to surgery.</p>
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Pre-Operative Management for Patients with STOP-Bang Score 3 to 8 Algorithm



Pre-Operative Management for Patients with STOP-Bang greater than 6

Criteria for Delaying Surgery

Patients with uncontrolled systemic disease should be evaluated and optimized by appropriate specialist prior to proceeding with surgery. Specifically, in patients at risk of OSA, the following criteria related to hypoxia, hypoventilation and pulmonary hypertension should be considered for workup and optimization prior to proceeding to surgery:

It is helpful to evaluate the patient for uncontrolled systemic diseases or additional concerns with ventilation and/or gas exchange including:

Table 1: Criteria for Further Workup Prior to Surgery

Hypoventilation	Resting hypoxemia in the absence of other cardiopulmonary disease	Pulmonary Hypertension
CO ₂ / HCO ₃ > 27 mmol/L	Hypoxemia < 90% on room air*	Signs of right ventricle dysfunction (RV)
CO ₂ on AM Arterial Blood Gas > 45 mmHg (if available)	PaO ₂ < 60 mmHg	Dilated RV
		RV dysfunction (subjective)
		Right atrium (RA) dilation or right atrium pressure (RAP) estimated > 10mmHg
		Tei Index/RIMP >0.75 or Tricuspid annular plane systolic excursion (TAPSE) <1.8 cm

***Note:** The SpO₂ has to be adjusted for altitude in Calgary zone in consultation with pulmonology rather than 93%.

This group of patients whether they have been diagnosed with obstructive sleep apnea and are not adhering to recommended therapy or those without a diagnosis but are screened as high risk should receive further investigation prior to surgery and potentially have their scheduled surgeries delayed.

If these criteria have been investigated and optimized by appropriate specialities, the patient may proceed to surgery after assessment of risk versus benefit.

Best Preoperative Practice for Surgical Patients with Known Obstructive Sleep Apnea who are Adherent to PAP Therapy

Patient and healthcare team should be aware the diagnosis of OSA may be associated with increased postoperative morbidity.

Consideration should be given in obtaining results of the sleep study and the recommended PAP setting before surgery.

Patients should continue to wear their PAP device at appropriate times during their stay in the hospital, both preoperatively and postoperatively.

Facilities should consider having PAP equipment available for perioperative use or have patient bring own PAP equipment to surgical facility. PAP equipment should be used intraoperatively if the patient is sedated as well as while the patient is admitted to PACU if the patient received a general anesthetic for the surgical procedure.

Best Preoperative Practice for Surgical Patients with Known Obstructive Sleep Apnea Who Are Poorly Adherent to [PAP Therapy](#)

Patient and healthcare team should be aware untreated OSA may be associated with increased postoperative morbidity.

Consideration should be given to obtaining results of the sleep study and the recommended PAP setting before surgery.

Additional evaluation for preoperative cardiopulmonary optimization should be considered in patients with known OSA who are non-adherent or poorly adherent to PAP therapy and have uncontrolled systemic conditions or additional problems with ventilation or gas exchange such as hypoventilation, hypoxemia, or pulmonary hypertension (refer to Table 1: [Criteria for Further Workup Prior to Surgery](#)).

Facilities should have PAP equipment for perioperative use or have the patient bring their own PAP equipment with them to the surgical facility. PAP equipment and clinical expertise should be used intraoperatively if the patient is sedated as well as while the patient is admitted to PACU if the patient received a general anesthetic for the surgical procedure.

Untreated OSA patients with optimized comorbid conditions may proceed to surgery, provided strategies for mitigation of postoperative complications are implemented. The risks and benefits of the decision should include consultation with the surgeon and the patient.

Patients should be encouraged to wear their PAP device at appropriate times during their stay in the hospital, both preoperatively and postoperatively.

Best Preoperative Practice for Surgical Patients Who Have a High Probability of Moderate to Severe OSA – STOP-Bang greater than 5

A preoperative anesthesia consultation is recommended for surgical patients with high probability of OSA.

Patient and healthcare team should be aware that a high probability of OSA may increase postoperative morbidity.

Additional evaluation for preoperative cardiopulmonary optimization should be considered in patients who are high risk for OSA and have uncontrolled systemic conditions or additional problems with ventilation or gas exchange (refer to [Table 1: Criteria for Further Workup Prior to Surgery](#)).

Patients who have a high probability of having OSA may proceed to surgery, provided strategies for mitigation of postoperative complications are implemented. The risks and benefits of the decision should include consultation with the surgeon and the patient.

Patients should be advised to notify their primary medical provider that they were found to have a high probability of having OSA, thus allowing for appropriate referral for further evaluation.

Providers should consider admission to a surgical facility capable of initiating PAP post-operatively for patients with STOP-Bang score greater than or equal to 5.

Patients with suspected OSA should receive a higher level of post-operative monitoring and possible introduction of PAP Therapy.

Monitoring options include:

- Continuous pulse oximetry
- Monitored bed with continuous pulse oximetry
- Admission to critical care environment.
- An increase in the level of post-operative monitoring should be considered as the risk for severe OSA increases.
- Initiation of new PAP Therapy should be considered for patients assessed as high risk of severe OSA by the STOP-Bang Score.

Note: Intermittent pulse oximetry or continuous bedside oximetry without continuous observation does not provide the same level of safety.

Decisions for at risk patients and the assessment for likelihood and severity of OSA should include the [STOP Bang Score](#), post-operative need for sedative analgesics and recurrent post-operative respiratory events.

Location of Surgery

Surgery at a facility that may not initiate or sustain PAP is reasonable for patients with a STOP-Bang score of 3 to 5 with multidisciplinary team awareness of the patient's increased OSA risk.

Patients with a STOP-Bang score greater than or equal to 6 are at higher risk of Perioperative OSA. Surgery should be considered at a facility with ability to initiate and sustain [PAP therapy](#) postoperatively.

Intra-Operative Management for Patients at High Risk for OSA or Known OSA

Patients at high risk for OSA (refer to [Table 1: Criteria for Further Workup Prior to Surgery](#)) are susceptible to both airway collapse and sleep deprivation. It is important to consider the risk of postoperative respiratory compromise from effects of sedation, opioids and inhaled anesthetics due to this population's risk of respiratory depression.

Use of local anesthesia or peripheral nerve blocks should be considered when feasible.

Consider neuraxial anesthesia (spinal/epidural) when possible.

Consider continuous capnography or other automated ventilation methods due to undetected airway obstruction risk for this population if using moderate sedation.

During sedation, consider oral appliance or CPAP.

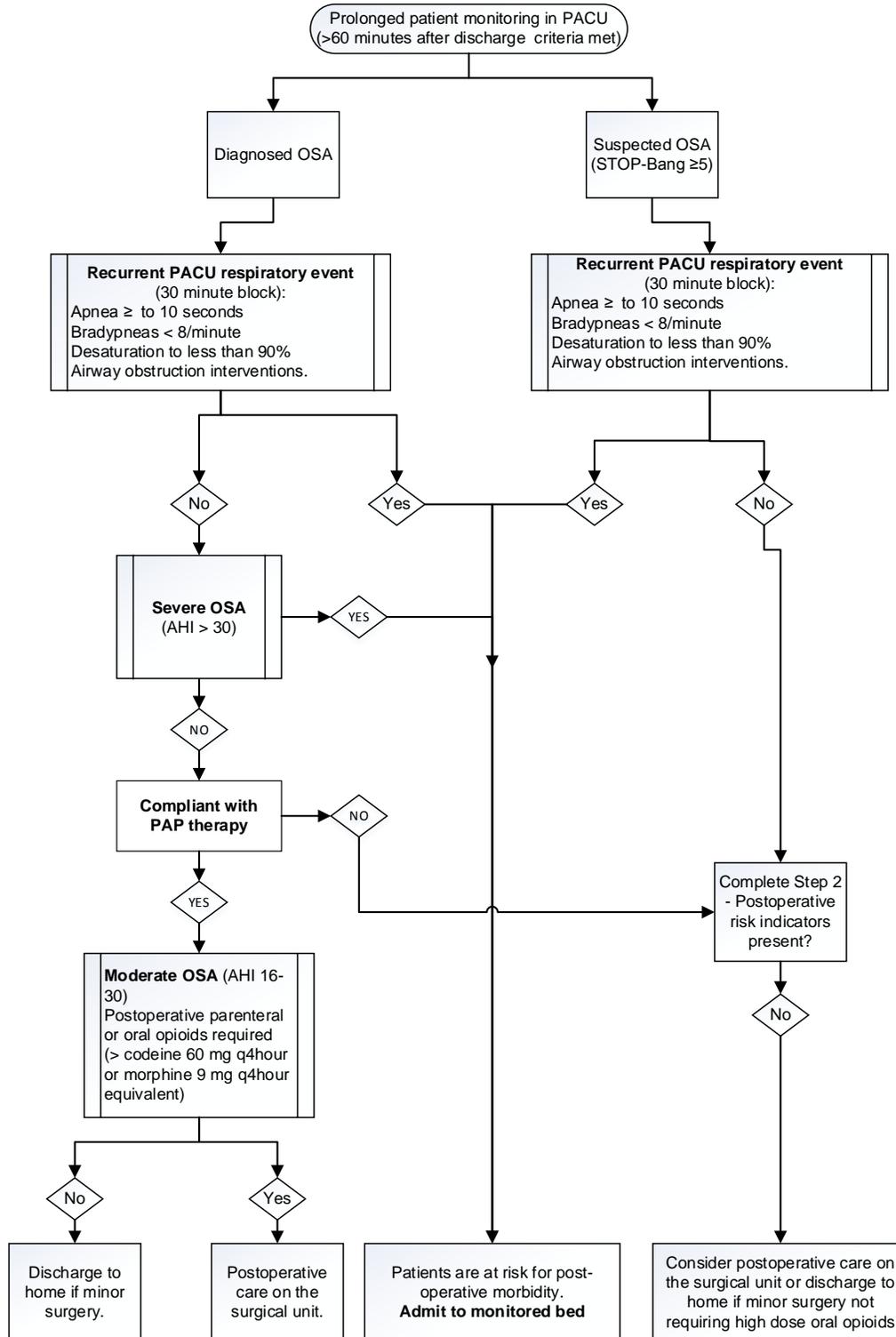
Before extubating patients, ensure there is a full reversal of the neuromuscular block.

Patients should be extubated while awake unless there is a medical or surgical contraindication.

Position the patient in the lateral, semi-fowlers, or other position except the supine position when possible for extubation and recovery.

Post-Operative Management for Patients at High Risk for OSA or Known OSA (STOP-Bang greater than 5)

Step 1: Baseline Risk for High Risk Patients Algorithm



Step 2: Postoperative Risk Indicators (monitored bed indicated, irrespective of Baseline Risk Score) for High Risk Patients

If ANY of these risk indicators are present, admit patient to monitored bed:

Airway obstruction interventions, or

Newly required [PAP therapy](#), or

Respiratory failure defined as

- Increasing FiO₂ requirement
- PaCO₂ greater than 50 mmHg, or

Significant risk of myocardial ischemia or dysrhythmia defined as:

- Cardiac monitoring indicated, or

Opioid or sedative requirement not stabilized defined as:

- Uncontrolled pain or delirium, or

Pain-sedation mismatch defined as:

- High pain and sedation scores concurrently

Postoperative Risk of Complications from Sleep Apnea

Other Considerations for possible admission to Monitored Bed:

Significant increase in baseline risk:

- Severity of patient comorbidities and
- Impact of surgery and anesthesia and
 - High risk – major airway surgery/major surgery under General Anesthetic
 - Intermediate risk - peripheral/superficial surgery under General Anesthetic
 - Lower risk - peripheral/superficial surgery with minimal sedation under local or regional anesthesia

Any postoperative indicators of risk:

- Need of oxygen therapy greater than 6 L/minute to maintain oxygen saturation greater than or equal to 94%

Analgesia

Consider regional analgesic technique to reduce or eliminate need for systemic opioids.

Consider the benefit (improved analgesia with decreased need for systemic opioid) and risk (upward spread causing respiratory depression) of using opioids or opioid-local neuraxial mixture.

Avoid or use extreme caution if supplementing patient-controlled analgesia with continuous infusions.

Consider use of nonsteroidal anti-inflammatory medication or other modalities (i.e. ice, transcutaneous electrical nerve stimulation) to decrease requirement for opioid medication.

- Though NSAIDs have a role in decreasing requirements for opioid medication, side effects can be a limitation for use it is important to consider contraindications for all modalities chosen.

Concurrent administration of sedative agents (i.e. benzodiazepines, opioids, antihistamines, phenothiazines and sleeping aids etc.) increases risk of respiratory depression and airway obstruction. These agents should be used with caution.

General Considerations for Monitoring and Respiratory Therapy

Available guidelines provide general recommendations for Clinicians as outlined below and are to be taken into account when exercising clinical judgement. However, the guidance does not override the responsibility of clinicians to make decisions appropriate to the circumstances of each patient.

Patients eligible for discharge home on day of surgery should be assessed in PACU on room air to ensure the patient can maintain their oxygen saturation baseline prior to discharge.

Patients should have continuous administration of supplemental oxygen until the patient can maintain their oxygen saturation baseline while on room air.

- Use of supplemental oxygen may prolong duration of apneic episodes and may minimize detection of atelectasis, transient apnea, and hypoventilation through pulse oximetry.

Unless contraindicated by the surgical procedure, patients with previously prescribed PAP (CPAP or non-invasive modalities) should maintain the [PAP therapy](#) continuously during periods of sleep/rest including daytime sleep.

- Use of patient's personal PAP equipment may increase compliance.

Position patients at high risk for OSA in the lateral, semifowlers, or other recovery position. Avoid the supine position when possible during recovery (refer to [Table 1: Criteria for Further Workup Prior to Surgery](#)).

Continuous pulse oximetry monitoring should be maintained after transfer from the Post Anesthetic Care Unit for patients at [moderate to severe risk for OSA](#).

- Maintain continuous monitoring for the duration the patient is at increased risk as intermittent pulse oximetry or continuous bedside oximetry without continuous observation does not provide the same safety level as continuous monitoring.
- Continuous monitoring may occur within a critical care or stepdown unit, through use of telemetry, or by appropriately trained healthcare professional maintaining constant presence at the patient's bedside.

Consider initiation of nasal CPAP or non-invasive positive pressure ventilation if patient exhibits frequent or severe airway obstruction, apneas greater or equal to 10 seconds, bradyneas less than 8/minute, PaCO₂ greater than 50 mm Hg or hypoxemia less than 90% during postoperative monitoring.

Note: The SaO₂ has to be adjusted for altitude in Calgary zone in consultation with pulmonology rather than 93%.

- Patients at [moderate risk for OSA](#), defined by a STOP-Bang score greater or equal to 3, benefit from continuous monitoring for respiratory events until time of discharge from PACU.
- Patients at [moderate to severe risk for OSA](#), defined by a STOP-Bang score greater than 5, benefit from continuous monitoring for respiratory events for a further 60 minutes prior to considering discharge from PACU.

When possible, surgical booking should be alerted of potential prolonged PACU stay for known OSA patients to facilitate Operating Room booking schedule and accommodate prolonged PACU stay. We suggest ensuring a supportive environment for PAP therapy though, at this time, we are unsure of the potential impact on resources this may have for facilities.

Patients at [high risk for OSA](#) should remain in a monitored setting until risk of postoperative respiratory depression is over rather than move to an unmonitored setting including discharge from hospital or unmonitored unit.

- The length of stay may increase compared to patients not high risk for OSA due to this population's risk to develop airway obstruction or central respiratory depression

Observation of patients within an unstimulated environment (i.e. during sleep) can assist in determination of the patient's respiratory function and ability to maintain baseline oxygen saturation breathing.

Note: Commercial monitors for end tidal CO₂ monitoring are available. In theory these monitors may be helpful however, currently, they are not recommended in the guidelines due to lack of evidence.

Order Sets

Obstructive Sleep Apnea Pre-Op, Adult Order Set

Order Set Keywords: Obstructive Sleep Apnea, OSA, PAP, positive airway pressure, STOP-Bang

Risk Assessment/Scoring Tools/Screening: STOP-Bang Screening Tool

Patient Care

- Clinical Communication: Inform patient to bring personal positive airway pressure (PAP) therapy device to hospital on day of surgery if applicable.
- Clinical Communication: Obtain polysomnograph (PSG) results for patients with known OSA if available.
- Clinical Communication: Obtain copy of patient's ECHO results if available.
- Clinical Communication: Send personal PAP therapy machine with the patient to the operating room if applicable.
- Notify Anesthesia that patient meets STOP-Bang assessment criteria for lab testing and anesthesia consult.

Laboratory Investigations

If STOP-Bang score is 5 or greater

- Carbon Dioxide (CO₂), if not done within 6 months

If STOP-Bang score is 7 or greater

- Arterial Blood Gas

Consults and Referrals

- Consult Anesthesia: if CO₂ / HCO₃ is greater than 27 mmol/L

If STOP-Bang score is 6 or greater

- Consult Anesthesia

Obstructive Sleep Apnea Post-Op, Adult Order Set

Order Set Keywords: Obstructive Sleep Apnea, OSA, PAP, positive airway pressure, STOP-Bang

Risk Assessment/Scoring Tools/Screening: STOP-Bang Screening Tool

Patient Care

- Clinical Communication: Apply Positive Airway Pressure (PAP) therapy device if patient is drowsy or sleeping if patient using PAP therapy prior to surgery.
- Clinical Communication: Send copy of Patient Referral Letter to patient's primary community healthcare provider for inclusion in patient health record.
- Notify Anesthesiologist if patient experiences apnea greater than or equal to 10 seconds, respiratory rate less than 8 per minute, oxygen saturation less than 90%, or airway obstruction interventions.
- Notify Anesthesiologist if patient diagnosed with Obstructive Sleep Apnea does not have OSA specific discharge orders from PACU.

Activity

- Position: Maintain semi-fowlers or lateral position. Avoid supine position unless conflicts with surgical orders.

Monitoring – All Patients with OSA

- Monitor vital signs for minimum of _____ hours before discharge from PACU.
- Once Aldrete Score is 7, monitor patient for additional 60 minutes, then can discharge from PACU, if patient still meets discharge criteria.

Respiratory Interventions

Oxygen Therapy: All presentations EXCEPT Acute Coronary Syndrome, pCO₂ retainers and Carbon Monoxide poisoning. All other presentations (including pregnancy and acute stroke) should adhere to the following SpO₂ goals. NOTE: For acute stroke, don't apply supplemental oxygen unless SpO₂ is under 90%:

- Titrate Oxygen to maintain saturation range of SpO₂ 92% to 96%

Oxygen Therapy: Known pCO₂ retainer

- Titrate Oxygen to maintain saturation range SpO₂ 88% to 92 %

Oxygen Therapy: All Acute Coronary Syndromes (ACS)

- When SpO₂ is under 90%, titrate Oxygen to maintain saturation range SpO₂ 90% to 92%

Oxygen Therapy: MHRP Notifications

- Notify MRHP if Oxygen flow increase by greater than 2 LPM from previous to maintain the same level of oxygenation, or if there is a progressive increase in the work of breathing
- Notify MRHP if a new change to Oxygen flow of 8 LMP or higher to maintain same level of oxygenation
- Positive Airway Pressure (PAP) therapy: Resume as per home settings
- Positive Airway Pressure (PAP) therapy: New initiation – Inspiratory Pressure _____ cmH₂O, Expiratory Pressure _____ cmH₂O, FiO₂ _____, Back up rate _____, Mask style _____, Mask size _____.

Consults / Referrals

- Respiratory Therapist referral for follow up once transferred to patient unit if patient receiving Positive Airway Pressure (PAP) therapy
- Consult Sleep Disorder Program

If PAP therapy newly required postoperatively. Consultation can occur after transfer from PACU if patient is transferred to a monitored setting.

- Consult Respiriology or appropriate Most Responsible Health Practitioner (MRHP)

If patient experiences hypoxemic or hypercarbic respiratory failure. Consultation can occur after transfer from PACU if patient is transferred to a monitored setting.

- Consult Respiriology

If BMI is greater than 40.

- Referral Bariatric Clinic – Assessment for bariatric surgery
- Consult _____

Disposition Planning

1. Outpatient follow-up

Referral for Sleep Assessment for patients that have a positive STOP-Bang Questionnaire Assessment greater than or equal to 5.

2. Patient and Family education/discharge instructions

Counsel patient to discuss referral from family physician to receive further sleep study assessments

Effective management for most people includes weight reduction. Patient's high risk for OSA should be counselled to consider weight management interventions including the option of bariatric surgery

Rural Considerations

High risk patients should have surgical procedures at centers that can provide [PAP therapy](#) if needed and have advanced airway equipment for the difficult airway risk.

Patient Referral Letter

Date (dd-Mon-yyyy): _____

To Whom It May Concern:

Patient: _____

Date of Birth (dd-Mon-yyyy): _____

Alberta Health Number: _____

Referral to _____:

Dear Doctor _____.

During preoperative surgical assessment, this patient received a STOP-Bang Score of _____ indicating risk of Obstructive Sleep Apnea.

We recommend this patient receive consultation from:

_____ Bariatric clinic due to BMI greater than 40

_____ Outpatient Sleep Assessment

_____ Respiriology

_____ Sleep Medicine/Sleep Clinic

_____ Snore Sat Assessment

Please consider this letter referral for further assessment.

Sincerely,

Physician Name

Contact Information

Analytics

Outcome Measure # 1

Name of Measure	Use STOP-Bang Scoring Model to predict post-operative complications.
Definition	To track STOP-Bang Scoring Model for patients perioperatively.
Rationale	Patients with obstructive sleep apnea are higher risk for postoperative complications. Using the STOP-Bang Scoring Model preoperatively supports clinical decision making to increase level of monitoring for patients who have a STOP-Bang score greater or equal to 3.
Notes for Interpretation	Use of the STOP-Bang Scoring Model for patients not yet diagnosed with obstructive sleep apnea as well as patients diagnosed with obstructive sleep apnea guides post-operative monitoring and disposition planning. Use of the STOP-Bang Scoring Model for patients diagnosed with obstructive sleep apnea aids in assessment of the severity of obstructive sleep apnea.
Cited References	<i>Anesth Analg.</i> 2016; 123(2): 452-473.

Outcome Measure # 2

Name of Measure	Respiratory events for patients with a STOP-Bang Scoring Model equal to or greater than 3.
Definition	Evaluation of the relationship of increasing STOP-Bang Scoring Model equal to or greater than 3, will be correlated to incidence of postoperative complications/postoperative respiratory events and PACU length of stay.
Rationale	Patients with obstructive sleep apnea (either diagnosed or not diagnosed prior to assessment with STOP-Bang Scoring Model) are higher risk for experiencing respiratory events postoperatively including oxygen desaturation, apnea greater than 10 seconds, bradyapnea less than 8 breaths/minute.
Notes for Interpretation	Calculation of the respiratory events occurring postoperatively for patients with a STOP-Bang score of 3 or greater aids development of baseline treatment plans for this population.
Cited References	<i>Anesthesiology.</i> 2014 Feb;120(2):268-86. <i>PLOS.</i> 2016; 11(5): 1-9. doi:10.1371/journal.pone.0153790.

Outcome Measure # 3

Name of Measure	Impact of the use of PAP therapy perioperatively for patients scoring with preoperative diagnosis of OSA on morbidity and mortality.
Definition	Measurement of the incidence of respiratory events perioperatively for patients who use PAP therapy prior to surgery.
Rationale	To determine use of PAP therapy in the perioperative period may reduce the incidence of postoperative respiratory events.
Notes for Interpretation	Calculation of the respiratory events occurring perioperatively for patients that use PAP therapy preoperatively aids development of baseline treatment plans for this population.
Cited References	<i>Anesthesiology.</i> 2014 Feb;120(2):268-86. <i>PLOS.</i> 2016; 11(5): 1-9. doi:10.1371/journal.pone.0153790.

Outcome Measure # 4

Name of Measure	Frequency of patients provided new PAP therapy at time of surgery
Definition	Measurement of the frequency PAP therapy is provided for patients diagnosed with OSA with STOP-Bang Screening Tool
Rationale	The number of patients that are diagnosed with OSA at time of surgery is currently unknown.

Outcome Measure # 5

Name of Measure	Incidence of patients requiring anesthetic pre-operative OSA screening through Pre-Operative Assessment Clinics.
Definition	Measurement of the incidence patients requiring OSA screening by anesthesiologists prior to surgery.
Rationale	Determination of impact of screening on workload for surgical units and anesthesiologists.

Outcome Measure # 6

Name of Measure	Compliance to clinical standards in Perioperative OSA Order Set.
Definition	To determine compliance to clinical standards within the order set.
Notes for Interpretation	Health record to have coding for Perioperative OSA order set.

Clinical Questions & Recommendations

Clinical Questions help us to ask pertinent information about the knowledge topic in order to facilitate finding an evidence based answer that will guide decision making. Working groups have the option of identifying 2-3 key clinical questions. The questions chosen will then be prioritized using a Likert scale and evidence search strategy determined. Clinical questions may be formulated based on the PICO format as supported by Sackett¹ and Guyatt² in their User's Guide to the Medical Literature to define the clinical question. PICO-D format identifies the patient problem or population (P), intervention (I), comparison (C) and outcome(s) (O).

1. Sackett D, Richardson WS, Rosenberg W, Haynes RB. How to practice and teach evidence based medicine. 2nd ed. Churchill Livingstone; 1997.
2. Guyatt GH, Oxman AD, Vist GE, et al; for the GRADE Working Group. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008; 336(7650):924-926.

GRADE Methodology - Used to address quality of evidence and strength of recommendations of answers to the clinical questions. Whenever possible answers are identified from recent high quality guidelines or high quality systematic reviews and recommendations provided are based on GRADE definitions. Where guidelines or systematic reviews are not available to answer certain questions rapid reviews are undertaken and/or a consensus approach used to try to answer clinically relevant questions. **Only where the evidence is supportive and the benefits clearly outweigh the harm is a “we recommend” strength of recommendation applied.**

Table 1. GRADE Quality of Evidence¹

High GRADE A	We have high confidence that the true effect lies close to that of the estimate of the effect.
Moderate GRADE B	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low GRADE C	Our confidence in the effect estimate is low: The true effect may be substantially different from the estimate of the effect.
Very low GRADE D	We have very low confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

Table 2. GRADE Strength of Recommendations¹

Strong GRADE 1	Strong recommendation, with desirable effects clearly outweighing undesirable effects/burdens (or vice versa). Wording of Recommendation: We recommend in favor of / We recommend against.....
Weak GRADE 2	Weak recommendation, with desirable effects closely balanced with undesirable effects. Wording of Recommendation: We suggest in favor of / We suggest against
Insufficient evidence or no consensus	Wording of Recommendation: There is insufficient evidence or the confidence in the effect estimates is so low that the panel is unable to make a recommendation regarding....

1. Guyatt GH, Oxman AD, Vist GE, et al; for the GRADE Working Group. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008; 336(7650):924-926.

Clinical Question #1: In patients with obstructive sleep apnea (suspected or confirmed), what are the benefits of monitoring with capnography in the postoperative period?

Clinical Recommendation #1: No recommendation proposed.

Quality of Evidence: Insufficient

Strength of Recommendation: N/A

Clinical Question #2: In patients with obstructive sleep apnea (suspected or confirmed), what are the risks and benefits of perioperative complications for postoperative positive airway pressure?

Clinical Recommendation #2: In patients with obstructive sleep apnea, continuous positive airway pressure may have potential benefits (in terms of short length of stay trend and a lower apnea-hypopnea index). The number of adverse events (CPAP vs no CPAP) may not differ.

Quality of Evidence: Moderate, GRADE B

Strength of Recommendation: GRADE 2, Weak

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Chiu H, Chen P, Guilleminault C, et al. Clinical Review: Diagnostic accuracy of the Berlin questionnaire, STOP-BANG, STOP, and Epworth sleepiness scale in detecting obstructive sleep apnea: A bivariate meta-analysis. *Sleep Medicine Reviews*. 2017;36:57-70.
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Opperer M, Cozowicz C, Bugada D, et al. Does obstructive sleep apnea influence perioperative outcome? A qualitative systematic review for the Society of Anesthesia and Sleep Medicine Task Force on preoperative preparation of patients with sleep-disordered breathing. *Anesth Analg*. 2016. 122(5): 1321-1334.

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(*Anesthesiology*. 2008;108(5): 812-821)

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