



An order-based approach to facilitate postoperative decision-making for patients with sleep apnea

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To the Editor,

The clinical practices pertaining to the perioperative management of patients with sleep apnea are inconsistent,^{1,2} and the introduction of a practical approach remains a challenge for a variety of reasons, including diagnostic challenges.³ In addition, the failure to provide the proper follow-up instructions for patients with suspected sleep apnea may have potential medico-legal ramifications, e.g., if accidents occur while driving or performing occupations wherein safety is critical.⁴

In July 2012, the Vancouver Acute Department of Anesthesia (VADA), serving both Vancouver General Hospital (VGH) and the University of British Columbia Hospital (UBCH), introduced a postanesthesia care unit (PACU) order-based sleep apnea protocol (henceforth referred to as “the protocol”) in an attempt to address the above-mentioned challenges. The protocol ([Figure Panel A](#)) was introduced as an alternative to the established standard three-hour minimum PACU stay for patients with sleep apnea.

The protocol is based on three components:

1. A validated screening tool for sleep apnea, i.e., the STOP-Bang questionnaire.³

2. The preoperative prediction of the risk of perioperative complications from sleep apnea based on the severity of sleep apnea, the invasiveness of the surgery, and the requirement for opioids.¹
3. The risk of postoperative respiratory complications based on observation in the PACU for the occurrence of recurrent respiratory events,⁵ and/or the requirement for opioids, and/or the need for supplemental oxygen to maintain the patient's baseline hemoglobin oxygen saturation above 90%.¹

The protocol prompts the PACU nursing staff to gather and convey the relevant information for appropriate postoperative decision-making for patients with sleep apnea. In addition, the anesthesiologists are prompted to:

- Consider all the relevant factors when estimating the postoperative risk from sleep apnea;
- Instruct all patients with suspected sleep apnea to obtain a sleep disorder consultation;
- Request a respirology consult for patients at high postoperative risk from sleep apnea;
- Identify the subset of patients with sleep apnea who would *not* require extended stay in the PACU¹; and
- Admit the patient to a monitored bed if at increased postoperative risk from sleep apnea.

The reverse side of the orders ([Figure Panel B](#)) features a table³ and a diagram⁴ to help facilitate decision-making.

In October 2012, a questionnaire was distributed to the 58 members of VADA to assess their initial impressions regarding the usefulness of the protocol, and the response rate was 77.6%. At that point, the responders had collectively completed 103 to 127 of the questionnaires (some of the responders selected a range of numbers). One question queried whether the new protocol would be helpful to

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IF YOU RECEIVED THIS FACSIMILE IN ERROR, PLEASE CALL xxx-xxx-xxxx IMMEDIATELY							
 <p style="text-align: center; margin: 0;">VA: VGH / UBCH / GFS VC: BP / Purdy / GPC ORDERS</p>	<p style="text-align: center; margin: 0;">ADDRESSOGRAPH</p>						
COMPLETE OR REVIEW ALLERGY STATUS PRIOR TO WRITING ORDERS							
PACU ORDERS: PATIENTS WITH DIAGNOSED OR SUSPECTED SLEEP APNEA							
(items with check boxes must be selected to be ordered) (Page 1 of 1)							
Date: _____ Time: _____							
<u>Estimating postoperative risk of complications from sleep apnea:</u>							
<ul style="list-style-type: none"> • Consider collective risk from: severity of sleep apnea, invasiveness of surgery, impact of anesthesia & postoperative opioid requirement • Also ↑ risk of postoperative respiratory complications if: <ul style="list-style-type: none"> non-compliant with PAP therapy, &/or recurrent respiratory events in PACU 							
<input type="checkbox"/> Diagnosed sleep apnea	<table style="border: none;"> <tr> <td style="padding: 5px;"> <input type="checkbox"/> severe <input type="checkbox"/> moderate <input type="checkbox"/> mild <input type="checkbox"/> unknown severity </td> <td style="padding: 5px; vertical-align: middle;"> <input type="checkbox"/> on CPAP preoperatively <input type="checkbox"/> on BiPAP preoperatively <input type="checkbox"/> not on PAP preoperatively </td> <td style="padding: 5px; vertical-align: middle;"> } → apply device in PACU if drowsy/sleeping </td> </tr> </table>	<input type="checkbox"/> severe <input type="checkbox"/> moderate <input type="checkbox"/> mild <input type="checkbox"/> unknown severity	<input type="checkbox"/> on CPAP preoperatively <input type="checkbox"/> on BiPAP preoperatively <input type="checkbox"/> not on PAP preoperatively	} → apply device in PACU if drowsy/sleeping	<input type="checkbox"/> non-compliant, or <input type="checkbox"/> not recommended		
<input type="checkbox"/> severe <input type="checkbox"/> moderate <input type="checkbox"/> mild <input type="checkbox"/> unknown severity	<input type="checkbox"/> on CPAP preoperatively <input type="checkbox"/> on BiPAP preoperatively <input type="checkbox"/> not on PAP preoperatively	} → apply device in PACU if drowsy/sleeping					
<input type="checkbox"/> Suspected sleep apnea (e.g. STOP-Bang score ≥ 5)	→ <u>sleep apnea assessment required</u> → <table style="border: none;"> <tr> <td style="padding: 5px;"><input type="checkbox"/> instructed to see GP for further arrangements, or</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> referred to regional sleep disorders program</td> </tr> </table>		<input type="checkbox"/> instructed to see GP for further arrangements, or	<input type="checkbox"/> referred to regional sleep disorders program			
<input type="checkbox"/> instructed to see GP for further arrangements, or							
<input type="checkbox"/> referred to regional sleep disorders program							
<input type="checkbox"/> Respirology consult* if:	<table style="border: none;"> <tr> <td style="padding: 5px;"><input type="checkbox"/> PAP therapy newly required postoperatively, or</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> other indication of high postoperative risk of complications from sleep apnea: _____</td> </tr> </table>		<input type="checkbox"/> PAP therapy newly required postoperatively, or	<input type="checkbox"/> other indication of high postoperative risk of complications from sleep apnea: _____			
<input type="checkbox"/> PAP therapy newly required postoperatively, or							
<input type="checkbox"/> other indication of high postoperative risk of complications from sleep apnea: _____							
<small>*as long as the patient remains in a monitored bed, the Respirology consult does not necessarily have to occur in the PACU</small>							
PACU sleep apnea protocol:							
<ul style="list-style-type: none"> • semi-upright or lateral position, PAP application if ordered & monitor for respiratory events • extended PACU stay: <ul style="list-style-type: none"> → for at least 1 h after standard PACU discharge criteria met, and - this requirement elapses after 3 h of post-extubated stay - this requirement could be waived by anesthesiologist if all 3 of the following preconditions are met: 							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;"><input type="checkbox"/> low invasiveness of surgery [superficial or peripheral surgery (no airway, body cavity or major surgery)],</td> </tr> <tr> <td style="text-align: center; padding: 5px;">and</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> low OSA impact anesthesia [local or regional anesthesia (no neuraxial opioids), GA with appropriate ↓ or elimination of opioids/sedatives],</td> </tr> <tr> <td style="text-align: center; padding: 5px;">and</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> low-dose PO opioid analgesia required postop [maximum PO Q4H: codeine 60 mg, or oxycodone 10 mg, or hydromorphone 4 mg]</td> </tr> </table>			<input type="checkbox"/> low invasiveness of surgery [superficial or peripheral surgery (no airway, body cavity or major surgery)],	and	<input type="checkbox"/> low OSA impact anesthesia [local or regional anesthesia (no neuraxial opioids), GA with appropriate ↓ or elimination of opioids/sedatives],	and	<input type="checkbox"/> low-dose PO opioid analgesia required postop [maximum PO Q4H: codeine 60 mg, or oxycodone 10 mg, or hydromorphone 4 mg]
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and							
<input type="checkbox"/> low OSA impact anesthesia [local or regional anesthesia (no neuraxial opioids), GA with appropriate ↓ or elimination of opioids/sedatives],							
and							
<input type="checkbox"/> low-dose PO opioid analgesia required postop [maximum PO Q4H: codeine 60 mg, or oxycodone 10 mg, or hydromorphone 4 mg]							
<ul style="list-style-type: none"> → for at least 1 h after last respiratory event (unless transferred to a monitored bed), and → <input type="checkbox"/> until spinal anesthesia regressed below surgical incision (order if pain management challenge expected, unless transferred to a monitored bed) 							
<ul style="list-style-type: none"> • notify Anesthesiologist if: <table style="border: none;"> <tr> <td style="padding: 5px;">respiratory events (report number of apneas, bradypneas & desaturations, as well as time of first and last event)</td> </tr> <tr> <td style="padding: 5px;">significant opioid requirement &/or sedation</td> </tr> <tr> <td style="padding: 5px;">supplemental O₂ required to maintain baseline SpO₂ ≥ 90% by time of considered discharge (unstimulated, preferably asleep)</td> </tr> <tr> <td style="padding: 5px;"><small>↳ O₂ supplementation may prolong apneas & hinder detection of transient apnea & hypoventilation by SpO₂</small></td> </tr> </table> 			respiratory events (report number of apneas, bradypneas & desaturations, as well as time of first and last event)	significant opioid requirement &/or sedation	supplemental O ₂ required to maintain baseline SpO ₂ ≥ 90% by time of considered discharge (unstimulated, preferably asleep)	<small>↳ O₂ supplementation may prolong apneas & hinder detection of transient apnea & hypoventilation by SpO₂</small>	
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<small>↳ O₂ supplementation may prolong apneas & hinder detection of transient apnea & hypoventilation by SpO₂</small>							
<u>Safe transfer of care for patients at ↑ postoperative risk of complications from sleep apnea:</u>							
<ul style="list-style-type: none"> • Anesthesiologist to consider ongoing care in a monitored bed (e.g. PACU, SDU, other Critical Care Unit, or remote oximetry by telemetry on surgical ward) <ul style="list-style-type: none"> = continuous oximetry monitoring & possibility of early nursing intervention (also consider cardiac monitoring if at ↑ risk of cardiac ischemia or dysrhythmias) - e.g. monitored bed indicated if PAP therapy newly required postoperatively 							
_____ Anesthesiologist Signature	_____ Printed Name	_____ College ID					

Panel A Postanesthesia care unit (PACU) orders: patients with diagnosed or suspected sleep apnea

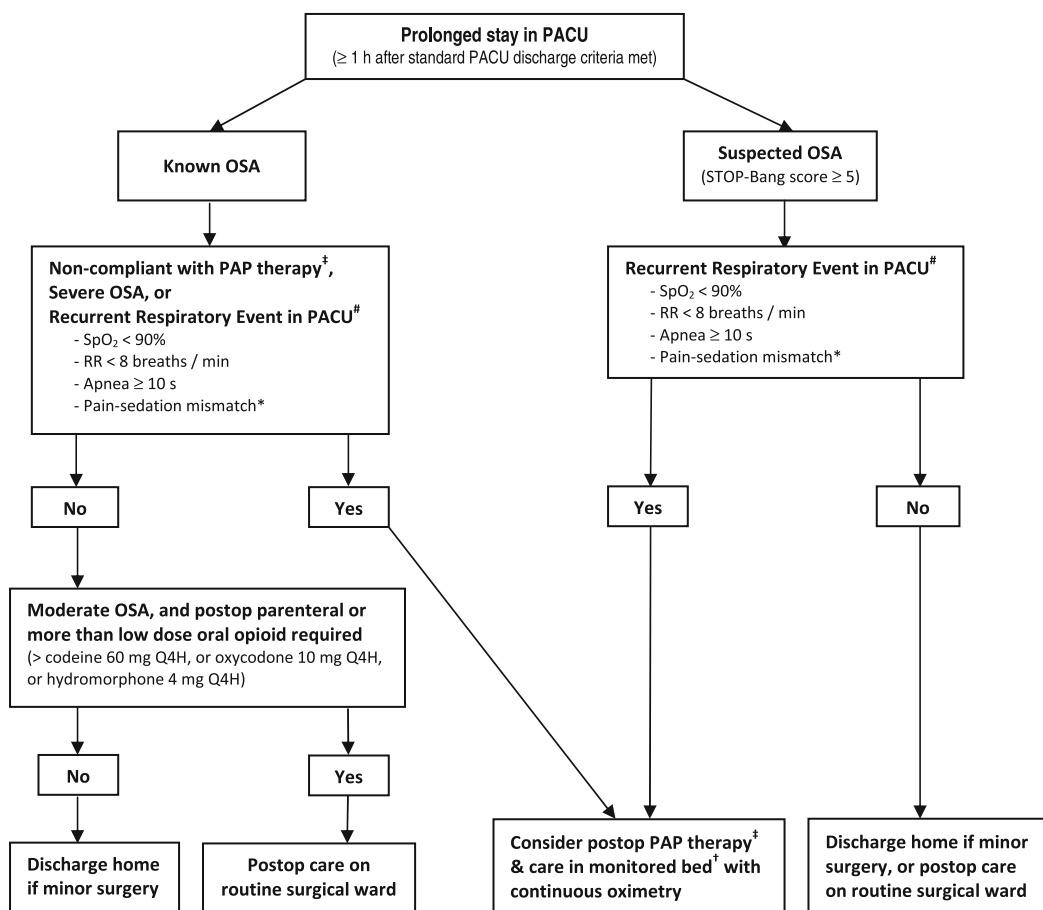
STOP-Bang Questionnaire: Screening Tool for OSA

		Yes	No	
S	Do you snore loudly (loud enough to be heard through closed doors)?	<input type="checkbox"/>	<input type="checkbox"/>	} Total "yes" ≥ 5: high probability of OSA
T	Do you often feel tired , fatigued, or sleepy during daytime?	<input type="checkbox"/>	<input type="checkbox"/>	
O	Has anyone observed you stop breathing during your sleep?	<input type="checkbox"/>	<input type="checkbox"/>	
P	Do you have or are you being treated for high blood pressure ?	<input type="checkbox"/>	<input type="checkbox"/>	
B	BMI > 35 kg/m ² ?	<input type="checkbox"/>	<input type="checkbox"/>	
A	Age > 50 years old?	<input type="checkbox"/>	<input type="checkbox"/>	
N	Neck circumference > 40 cm?	<input type="checkbox"/>	<input type="checkbox"/>	
G	Male gender ?	<input type="checkbox"/>	<input type="checkbox"/>	

Chung F, et al. STOP Questionnaire. A Tool to Screen Patients for Obstructive Sleep Apnea. *Anesthesiology* 2008; 108: 812–21
 Chung F, et al. High STOP-Bang score indicates a high probability of obstructive sleep apnoea. *Br J Anaesth* 2012; 108: 768–75

Postoperative Management of the Known or Suspected OSA Patient after General Anesthesia:

Adapted from: Seet E & Chung F. Management of sleep apnea in adults - functional algorithms for the perioperative period. *CJA*.2010; 57: 849-65.



Recurrent Respiratory Events - consider the number, frequency and severity of events, as well as the time interval between the first and last event
 † Positive airway pressure (PAP) therapy - including CPAP, BiPAP, or autotitrating PAP (APAP)
 * Pain-sedation mismatch - high pain & sedation scores concurrently
 † Monitored bed:
 - environment with continuous oximetry & possibility of early nursing intervention (e.g., PACU, ICU, SDU, or remote pulse oximetry with telemetry on surgical ward)
 - also consider cardiac monitoring if at increased risk of cardiac ischemia or dysrhythmias

Panel B STOP-Bang Questionnaire, and flow diagram for the postoperative management of the OSA patient after general anesthesia

facilitate appropriate postoperative care for patients with sleep apnea: 47% of respondents indicated “definitely”, 36% indicated “probably”, 16% “possibly”, and 2% indicated “no”.

Over the last fiscal year, 17,433 patients had surgical procedures in the operating rooms at VGH, and 8,443 patients had surgical procedures at UBCH. At this point, no data are available regarding the percentage of diagnosed sleep apnea in our perioperative population at VGH or UBCH.

A practical way to implement the increasing body of literature on the perioperative management of patients with sleep apnea remains a challenge. This example of a PACU order-based protocol may be useful for other institutions trying to formulate a practical approach to the postoperative management of sleep apnea.

Disclosures None.

Competing interests None declared.

References

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2. Seet E, Chung F. Management of sleep apnea in adults - functional algorithms for the perioperative period. *Can J Anesth* 2010; 57: 849-64.
3. Chung F, Yegneswaran B, Liao P, et al. STOP questionnaire: a tool to screen patients for obstructive sleep apnea. *Anesthesiology* 2008; 108: 812-21.
4. Fleetham J, Ayas N, Bradley D, et al. Canadian Thoracic Society 2011 guideline update: diagnosis and treatment of sleep disordered breathing. *Can Respir J* 2011; 18: 25-47.
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