

TERNI, 28 Settembre 2019
SINDROME DELLE APNEE NOTTURNE

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Problematiche anestesiologicalhe nella gestione
dei pazienti con OSAS

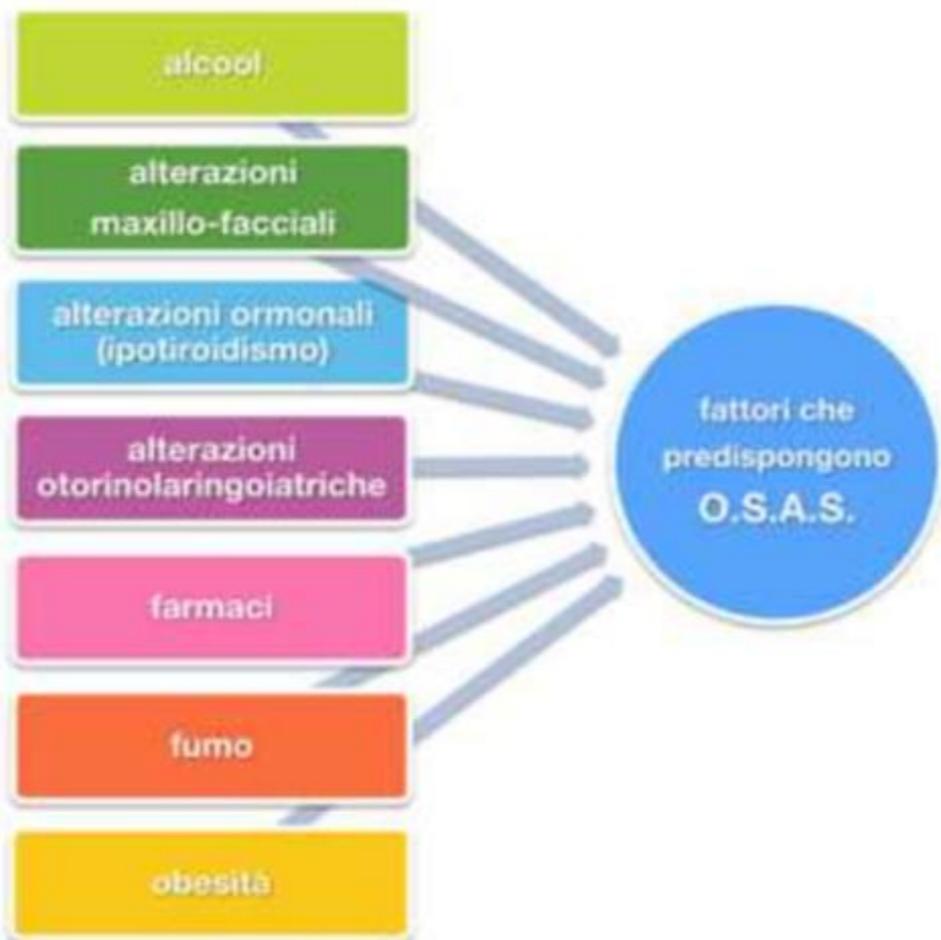
EPIDEMIOLOGIA

- ✓ **3-10% della popolazione adulta** ←
- ✓ **2-3% della popolazione pediatrica** ←
(ca. il 45 % dei bambini con S. di Down) ←
- ✓ **40% dei pazienti obesi**
- ✓ **20% dei pazienti con BPCO**
- ✓ **10% dei pazienti con ipert. art.**
- ✓ **10% dei pazienti con insuff. card.**
- ✓ **aritmie notturne**
(ca. 4% di tutte le OSA)
- ✓ **rapporto M : F = 2 : 1**



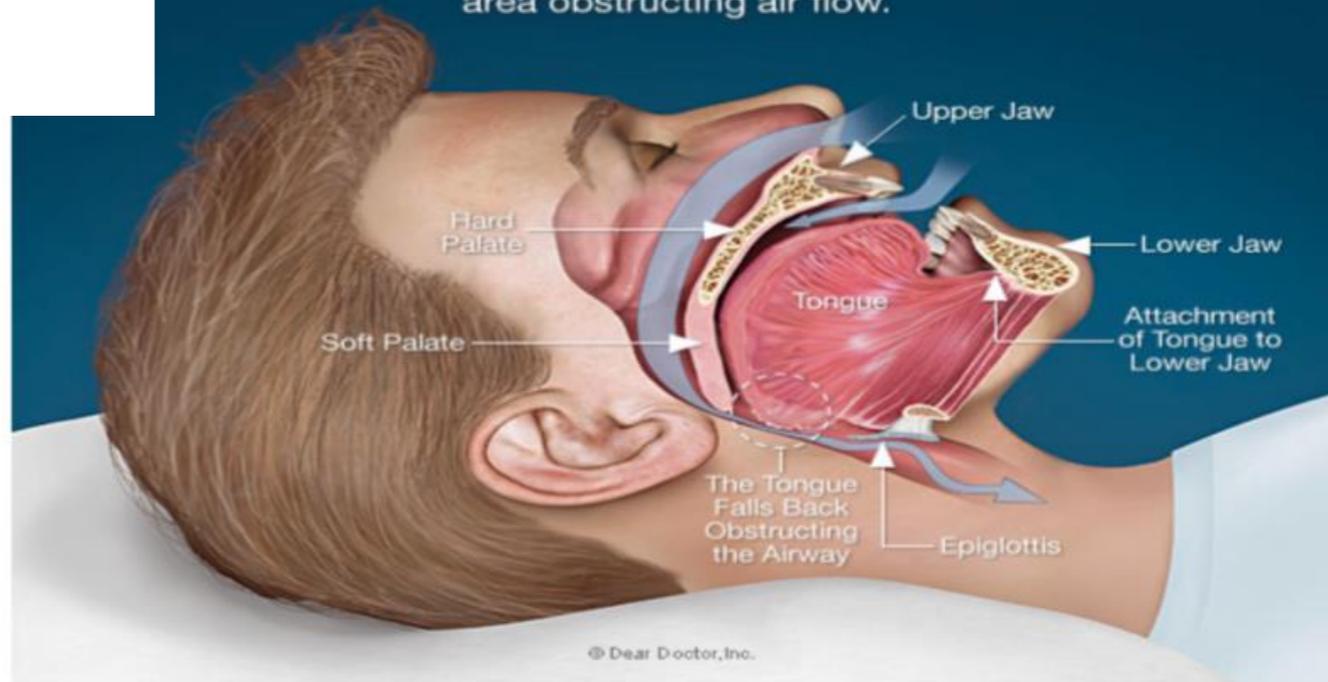
FATTORI GENERALI

- *Antropometrici*
 - sesso maschile
 - età
 - obesità
- *Farmacologici*
 - alcolici
 - ipnotici
- *Genetici*



Obstructive Sleep Apnea

During sleep, gravity and muscle relaxation allows the tongue and surrounding soft tissues to fall back into the throat area obstructing air flow.



EPIDEMIOLOGIA

- OSA is the most prevalent sleep disorder in the adult population.**
- **OSA is more common than bronchial asthma in adults ,affecting approximately 4% of men and 2% of women.**
- **The prevalence of OSA is higher in patients presenting for surgery than in the general population e.g. moderate or severe OSA is prevalent in at least 50% of patients subjected to bariatric surgery , and a significant proportion of OSA patients remain undiagnosed when they present for surgery.**
- **The presence of OSA is known to increase the occurrence of comorbid conditions (hypertension , ischemic heart disease , diabetes melitus and stroke) and postoperative complications .**
- **It is the opinion of the American Society of Anesthesiologists Task Force that the perioperative risk to patients increases in proportion to the severity of sleep apnea.**



Mortalità in pazienti con OSAS

- **In rapporto alla gravità delle apnee notturne:**
 - maggiore negli obesi e ipertesi
 - minore o assente negli anziani
- **Incidenti stradali**
- **Anestesia preoperatoria
o recupero postoperatorio**

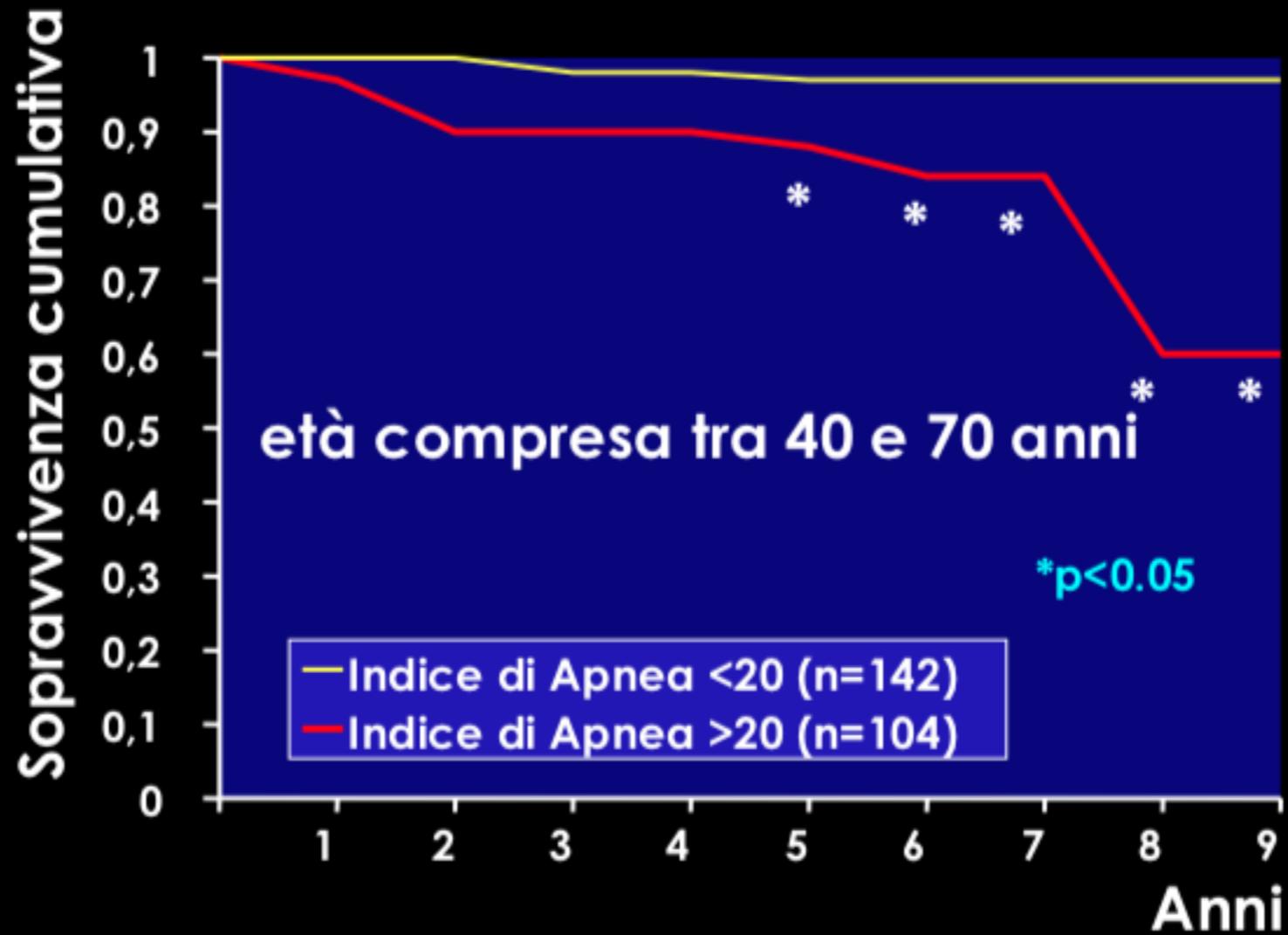


Mortalità e morbilità

- Minore qualità della vita (sonnolenza e comorbidità)
- Spese sanitarie elevate
- Alto rischio di ospedalizzazione e in ICU con ventilazione meccanica
- Alta mortalità (morte improvvisa)

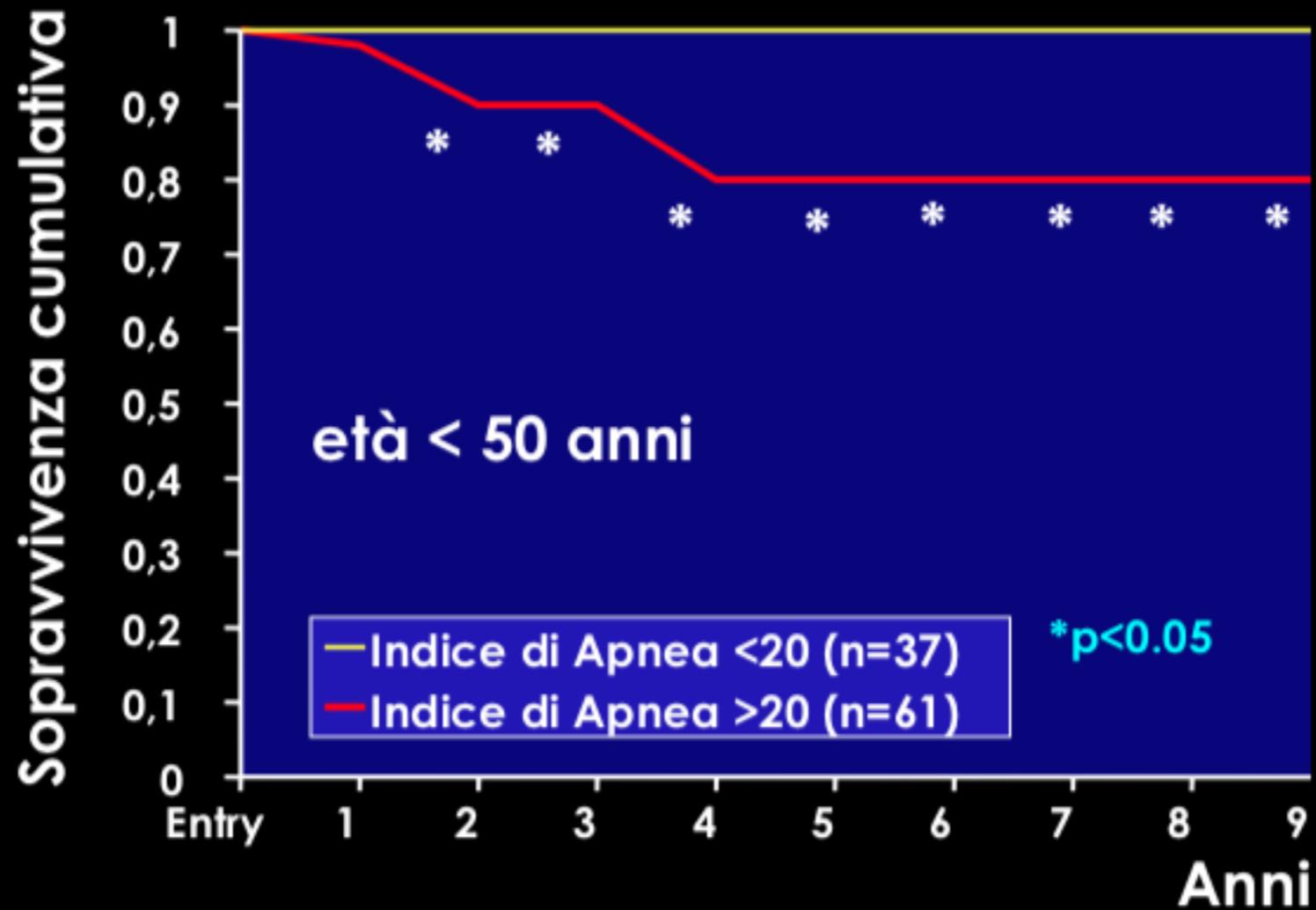
Conditions	Prevalence, %
Hypertension ^{12,17,28}	61–79
Heart failure ^{12,17,28}	21–32
Pulmonary hypertension (mean PAP \geq 20 mm Hg) ^{11,46}	59–88
Significant pulmonary hypertension (mean PAP \geq 40 mm Hg) ⁴⁶	31
Type 2 diabetes mellitus ^{11,17}	30–32
Asthma ^{12,17}	18–24
Erythrocytosis* ^{12,17,46}	8–15

Mortalità in pazienti con OSAS



He J. et al: Chest 94: 9-14;1988

Mortalità in pazienti con OSAS



He J. et al: Chest 94: 9-14;1988

L'ipoventilazione durante il sonno è la causa principale dell'ipossiemia.

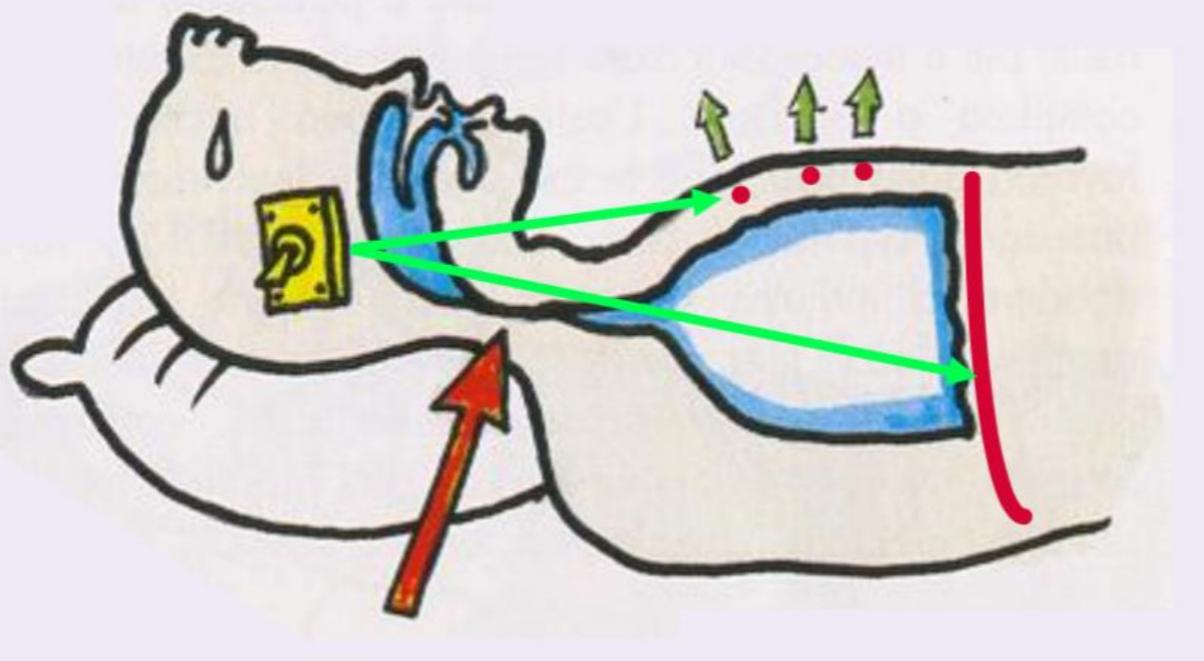


L'ipossiemia può essere imponente...

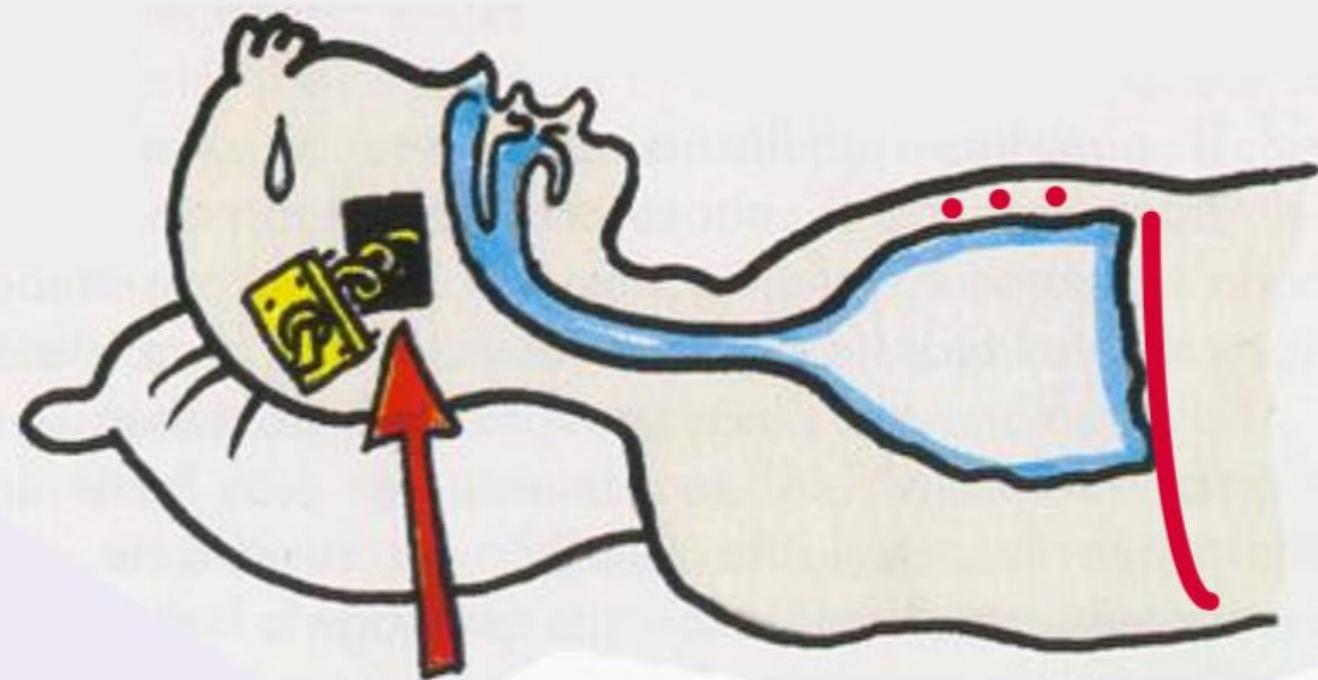
Types of Sleep disordered breathing includes :

- 1-Obstructive sleep apnea syndrome** in which inadequate ventilation occurs despite continued efforts to breath due to upper airway obstruction.
- 2- Central sleep apnea syndrome** in which inadequate ventilation occurs resulting from absent or diminished respiratory effort.
- 3-Sleep hypoventilation syndrome** in which > 10 mm Hg increase in PaCO₂ during sleep in comparison with an awake supine value.

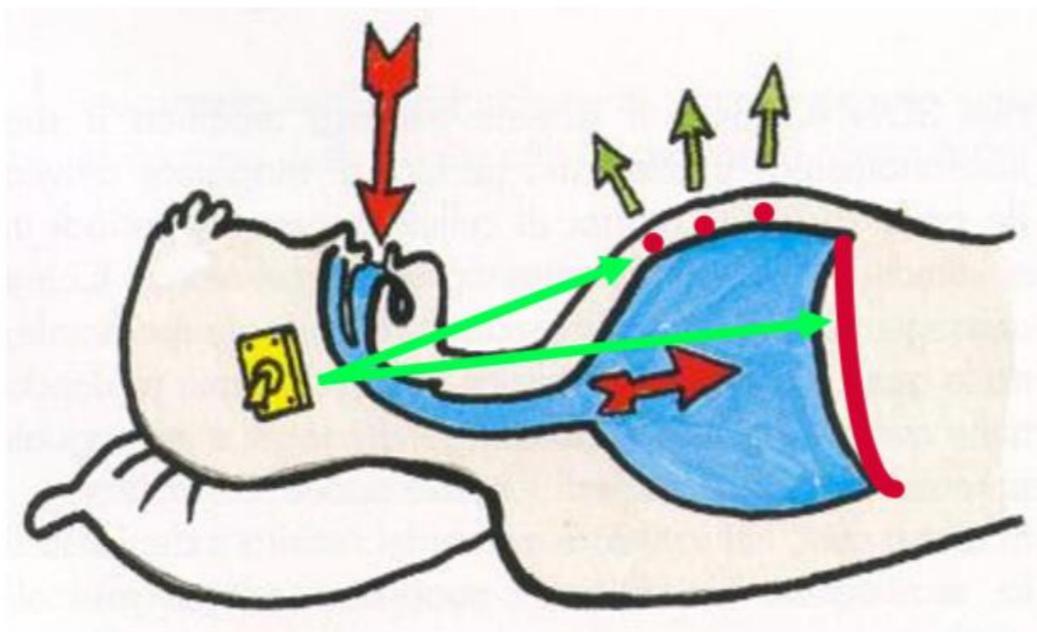
APNEE DI TIPO OSTRUTTIVO



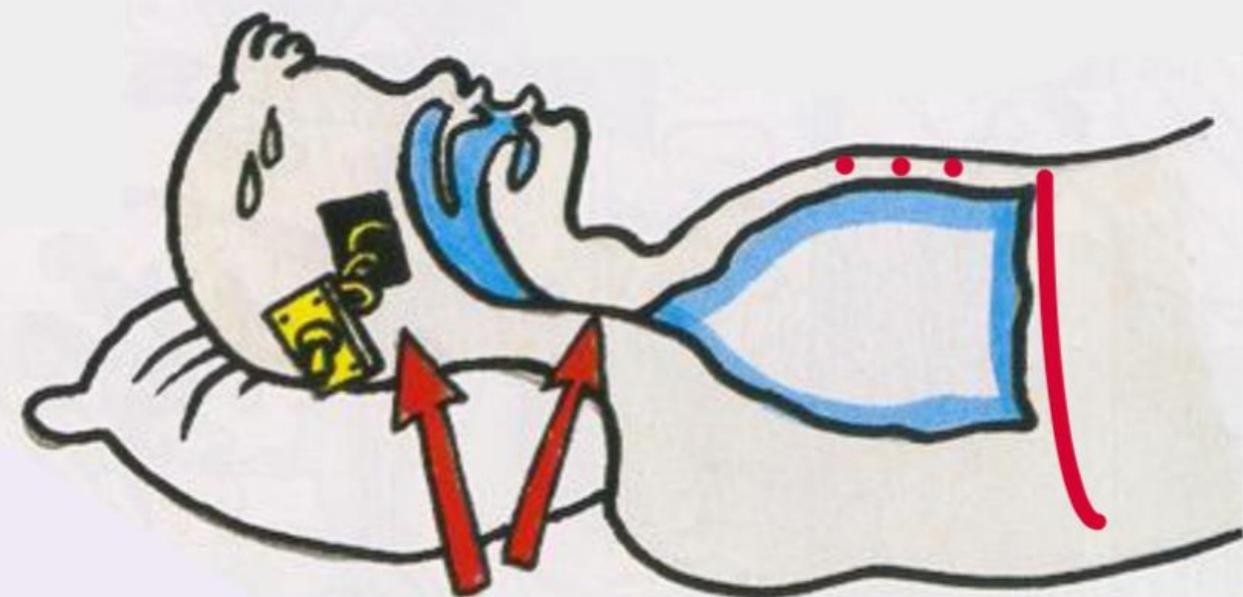
APNEE DI TIPO CENTRALE



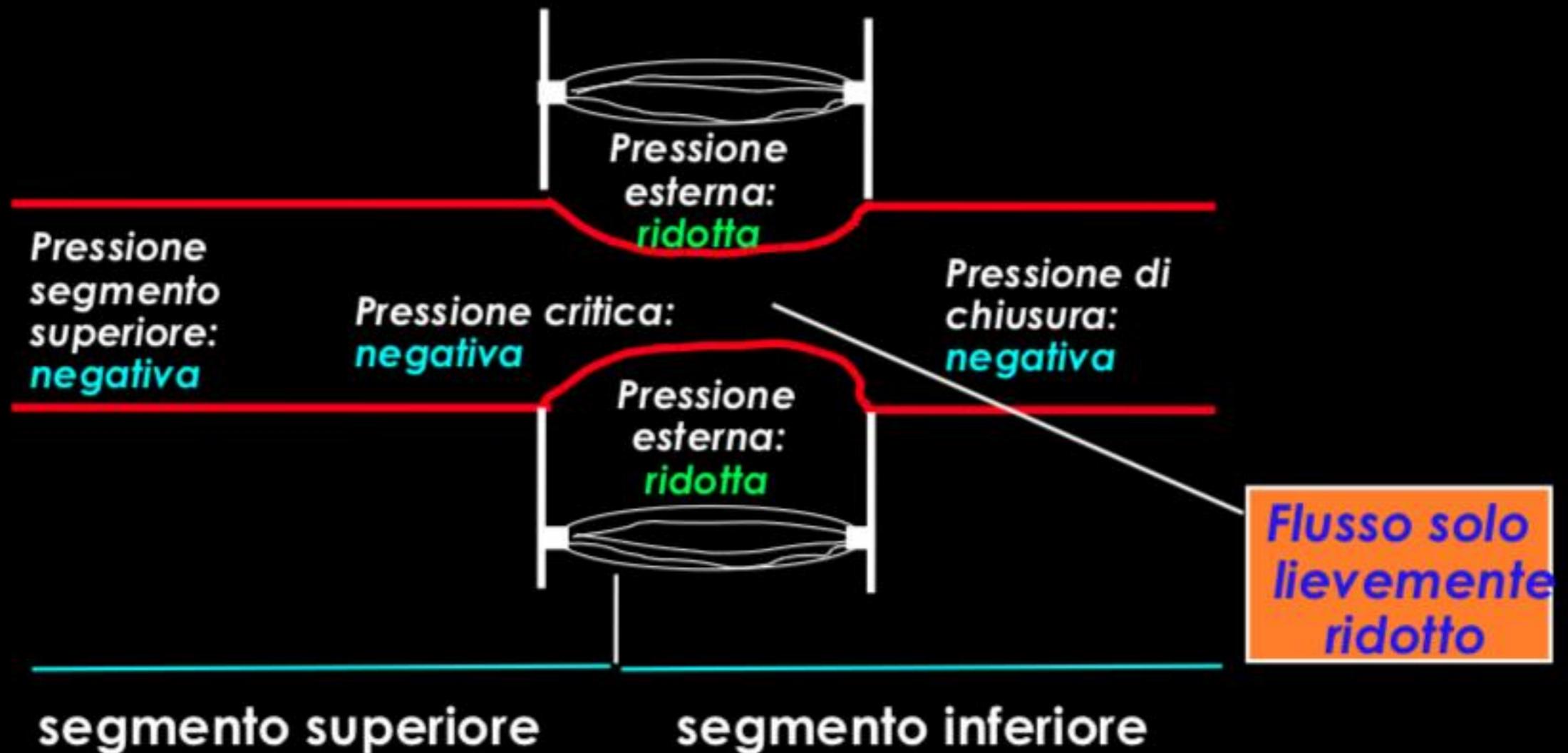
DINAMICA DELLA VENTILAZIONE



APNEE DI TIPO MISTO

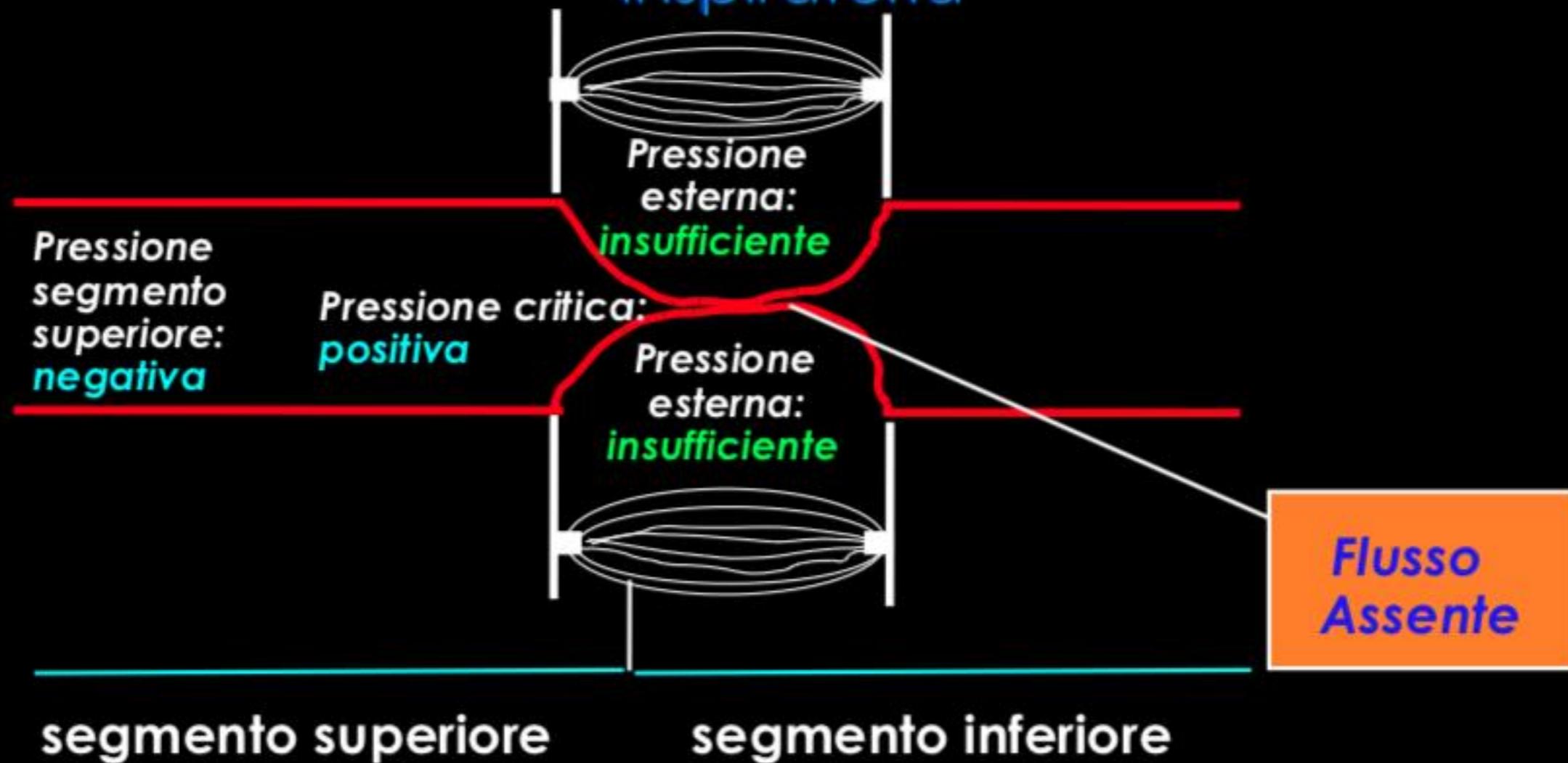


Soggetto normale durante il sonno in fase inspiratoria



$$\text{Flusso} = \frac{(\text{Pressione segmento superiore} - \text{Pressione critica})}{\text{Resistenza segmento superiore}}$$

Soggetto con OSAS durante il sonno in fase inspiratoria



$$\text{Flusso} = \frac{(\text{Pressione segmento superiore} - \text{Pressione critica})}{\text{Resistenza segmento superiore}}$$

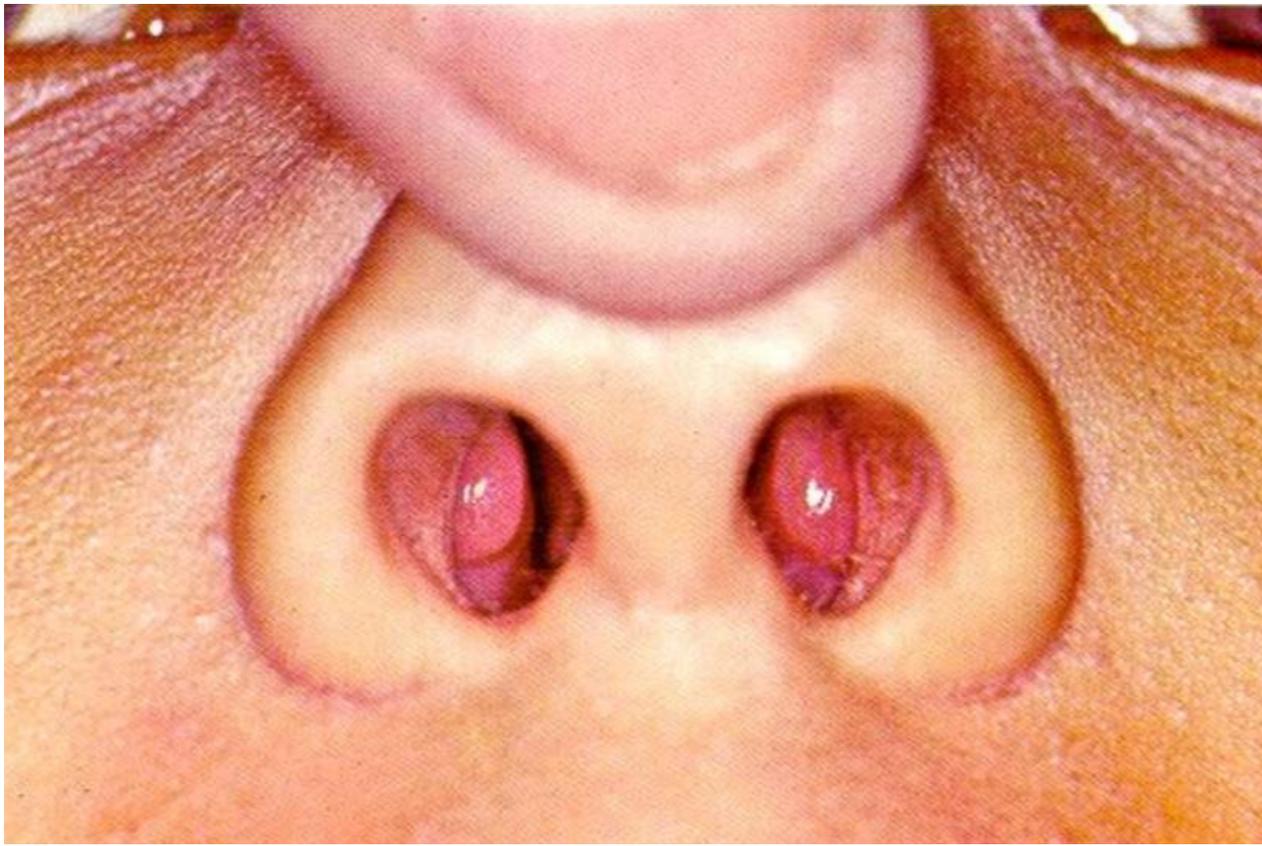
- **Specifici fattori anatomici**
 - ✓ collo corto e tozzo
 - ✓ ipertrofia adenoido-tonsillare
 - ✓ macroglossia
 - ✓ micrognazia
 - ✓ etc.
- **Iperflessione cervicale**
- **Ostruzione nasale**

Fattori di rischio congeniti per OSAS



MORFOLOGIA CRANIO-FACCIALE

La micrognazia è un fattore di rischio per OSAS in quanto predispone le vie aeree all'ostruzione: la mandibola, dislocata posteriormente, spinge la lingua ed i tessuti molli verso la parte posteriore dell'orofaringe.



3.2 Protocollo O.S.A.⁽¹⁷⁾

1

Obiettività e valutazione

(anamnesi, esame obiettivo,
STOP-Bang, ASA Scoring System,
pulsossimetria,
eventuale dosaggio
dei bicarbonati sierici)

2

Strategia intraoperatoria

3

Adozione di precauzioni adeguate nel postoperatorio

Screening for OSA prior to surgery

- It is estimated that **82% of men and 92% of women with moderate-to-severe sleep apnea have not been diagnosed.**
- **A substantial proportion of these patients present for surgery** and may have an increased risk of perioperative complications.
- The **screening tools** may assist in the diagnosis of OSA when **associated with a high index of clinical suspicion.**
- **Snoring is a prime symptom of OSA** and is almost **100% sensitive**, however it **lacks specificity** and has a low positive predictive value.

L'associazione di

- sintomi altamente predittivi
 - russamento
 - eccessiva sonnolenza diurna
- caratteristiche cliniche più specifiche
 - apnee testimoniate
 - tendenza ad appisolarsi durante la guida
 - obesità
 - circonferenza del collo
 - casi evidenti di ostruzione delle UA
 - etc.

PREOPERATIVE ASSESSMENT

- S** **SNORING:** Do you snore loudly (loud enough to be heard through closed doors or your bed-partner elbows you for snoring at night)?
- T** **TIRED:** Do you often feel tired, fatigued, or sleepy during the daytime (tired enough that you could fall asleep while driving)?
- O** **OBSERVED:** Has anyone observed you stop breathing or choking/gasping during your sleep?
- P** **PRESSURE:** Do you have or are you being treated for high blood pressure?
- B** **BMI:** body mass index more than 35 kg/m²?
- A** **AGE:** age older than 50 years old?
- N** **NECK:** Is it large? (measured around Adams apple)
For male, is your shirt collar 17 inches/43 cm or larger?
For female, is your shirt collar 16 inches/41 cm or larger?
- G** **GENDER:** male?

<5

≥5

NO

YES

IN CASE OF ONE OR MORE OF THE FOLLOWING:
(SIAARTI-ARIS Recommendations-2012)

IF NECESSARY CONSIDER:

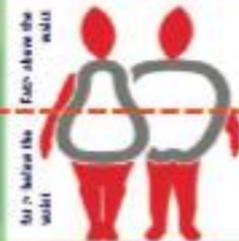
- METs ≤ 4
- PATHOLOGICAL ECG
- HYPERTENSIVE/ISCHEMIC CARDIOPATHY
- SpO₂ < 94% AMBIENT AIR
- ASTHMA – COPD (poorly controlled), WHEEZING
- PREVIOUS DVT
- PREVIOUS PE

- ✓ Pneumological and/or Cardiological referral (SIAARTI 2014)
- ✓ Echocardiogram
- ✓ ABG
- ✓ Polysomnography
- ✓ Preprocedural nCPAP

Anesthesiologist with specific competence – Expert Team
IF major surgery: provide ↑level of assistance

PERIPHERAL OBESITY (PEAR)

LOWER RISK
comorbidities



CENTRAL OBESITY (APPLE)

- INCREASED RISK:**
- cardiocirculatory complications / DVT-PE
 - Metabolic syndrome
 - Difficult ventilation
 - Difficult airway

AIRWAY SAFETY

STANDARD RISK INDICATORS:
National Health Ministry «Safety in OR recommendations»
SIAARTI airway management recommendations

+

SPECIFIC RISK INDICATORS:
neck circumference cm: W > 41 - M > 43
OSA (known or suspected) – OHS
WHR: W > 0.8 - M > 0.9

PLAN AIRWAY STRATEGY FOR

Difficult Ventilation or Oxygenation
DIFFICULT LARYNGOSCOPY+ SAFE EXTUBATION

CHECK EQUIPMENT AND SKILLS
PLAN CLINICAL ASSISTANCE PATHWAYS
IMPROVE MULTIDISCIPLINARY APPROACH

The STOP questionnaire

- | | | |
|--|-----|----|
| 1. Snoring: Do you snore loudly (loud enough to be heard through closed doors) ? | Yes | No |
| 2. Tired: Do you often feel tired, fatigued, or sleepy during daytime? | Yes | No |
| 3. Observed: Has anyone observed you stop breathing during your sleep? | Yes | No |
| 4. Blood Pressure: Do you have or are you being treated for high blood pressure? | Yes | No |

High risk of OSA: answering yes to 2 or more questions.

Low risk of OSA: answering yes to less than 2 questions.

La gestione perioperatoria del paziente con Sindrome delle Apnee Ostruttive del Sonno (OSA)



SIAARTI
PRO VITA CONTRA DOLOREM SEMPER

Fig. 1 QUESTIONARIO STOP-Bang

S noring	Russa rumorosamente tanto da essere sentito attraverso una porta chiusa?	SI	NO
T iredness	Si sente spesso stanco, affaticato e assonnato durante il giorno?	SI	NO
O bserved apnea	Le sono mai stati osservati/segnalati episodi di apnea durante il sonno?	SI	NO
P ressure	Soffre di ipertensione arteriosa, anche trattata?	SI	NO
B ody mass index	BMI > 35 kg/m ²	SI	NO
A ge	Ha più di 50 anni?	SI	NO
N eck circumference	Circonferenza collo > 41 cm per le donne e > 43 cm per gli uomini	SI	NO
G ender	Genere maschile?	SI	NO

Una precisa misurazione della circonferenza del collo è raccomandata poiché valori sopra il cut-off consentono di stimare il rischio in modo più preciso (Tab. 1)⁽¹³⁾. In alcune categorie di pazienti (STOP-Bang ≥ 3 con BMI > 35kg/m² e obesità centrale, SpO₂ < 90% in posizione seduta e supina in aria ambiente, o BMI > 50kg/m²), l'aggiunta del dosaggio dei bicarbonati sierici aumenta la specificità di

Screening for OSA prior to surgery

- When combined with BMI, age, neck circumference, and gender, the STOP Questionnaire had a high sensitivity, especially for patients with moderate to severe OSA.
- This combined version is commonly referred to as the **STOP-Bang Questionnaire**.
- The use of the **STOP-Bang Questionnaire** improved the sensitivity to 93%, and 100% at AHI cut-offs of >15 and >30 respectively, making it an ideal screening tool with a high sensitivity level.
- The specificity of the **STOP-Bang Questionnaire** at similar AHI levels was 43% and 37% respectively.

-

Anaesthetic management of sleep-disordered breathing in adults

David R. Hillman , Frances Chung

First published: 17 December 2016

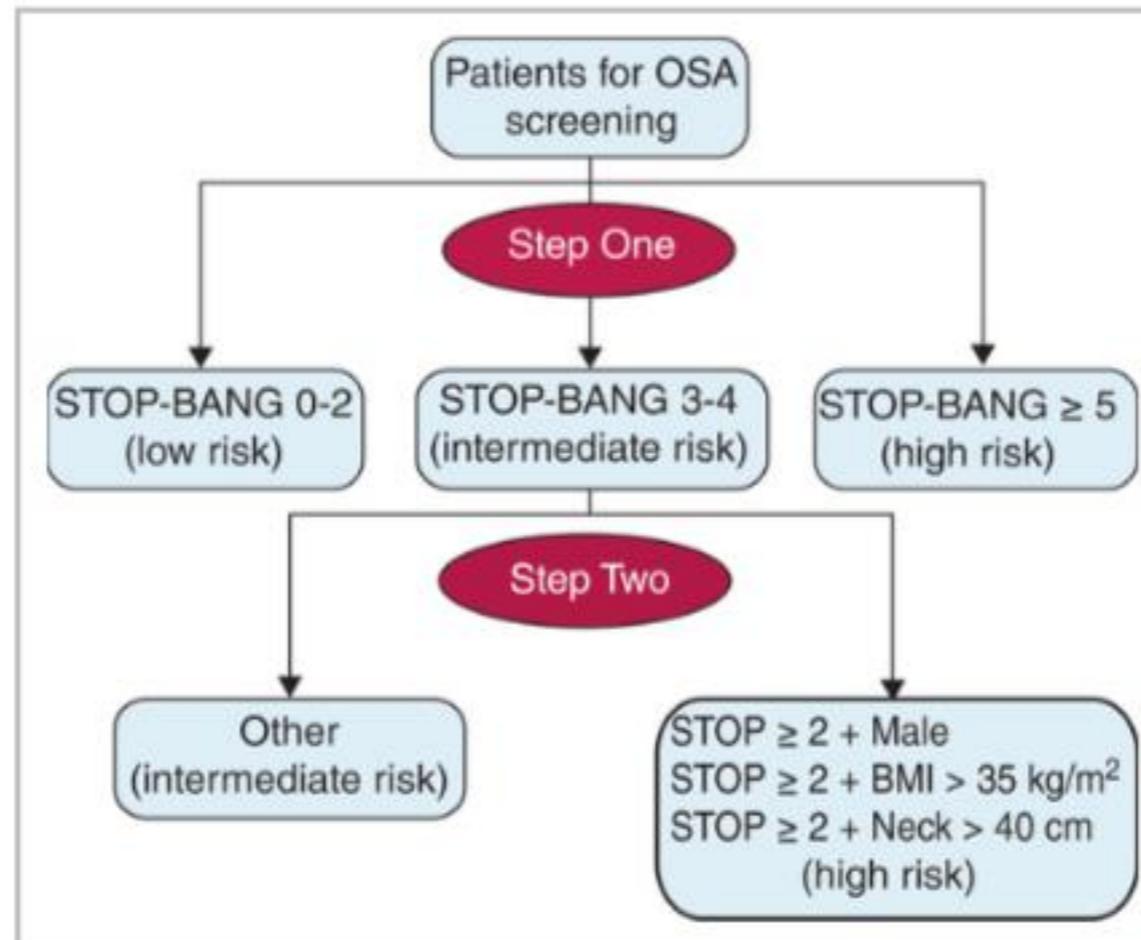
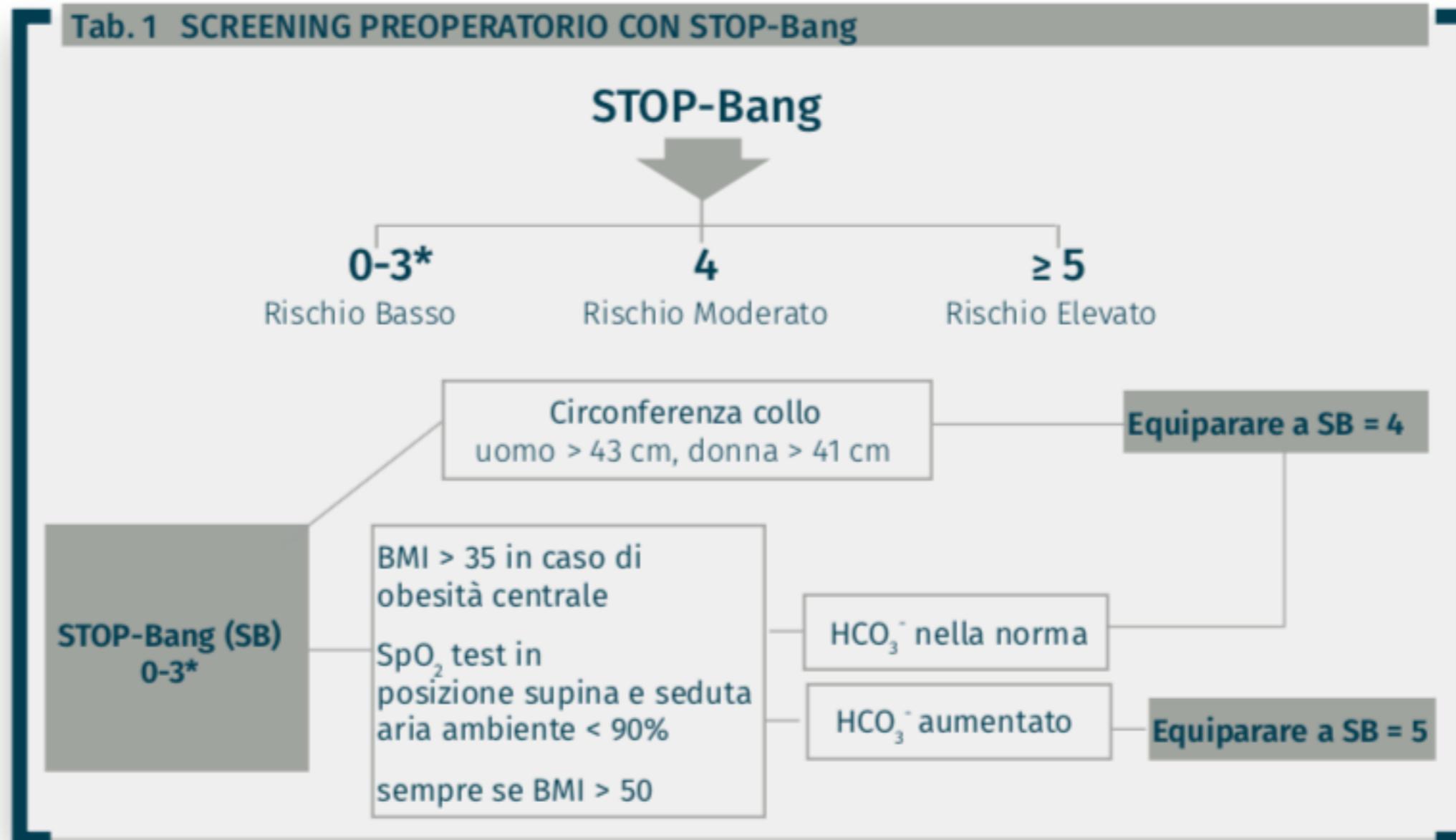


Figure 2

[Open in figure viewer](#) | [PowerPoint](#)

STOP-BANG (loud Snoring, daytime Tiredness, Observed obstructions during sleep, presence of high blood Pressure, BMI of >35 kg/m², Age over 50 years, Neck circumference >40 cm and Male gender) algorithm with a two-step scoring strategy (Adapted from Chung *et al.*,⁶⁴ with permission).

Tab. 1 SCREENING PREOPERATORIO CON STOP-Bang



1 Obiettività e valutazione

Per la stratificazione del rischio postoperatorio occorre considerare:

1. la severità dell'OSA (diagnosticata o sospetta);
2. la tipologia dell'intervento chirurgico;
3. il tipo di anestesia e la prevista richiesta di oppioidi postoperatori.

L'integrazione dei suddetti fattori determina tre differenti profili di rischio con conseguente gestione perioperatoria personalizzata, adeguata alla tipologia di paziente, alla gravità dell'OSA e alla gestione farmacologica per l'intervento programmato. Il profilo di rischio è ottenuto dalla somma dei punteggi attribuiti a singoli parametri (Tab 2) ⁽¹⁸⁾:

- Rischio postoperatorio **MOLTO AUMENTATO**→UTI
- Rischio postoperatorio **AUMENTATO**→RR/PACU (o altro ambiente similmente monitorizzato e presidiato)
- Rischio postoperatorio **NON AUMENTATO**→REPARTO di degenza con monitoraggio SpO₂ (preferibilmente associato a monitoraggio degli atti respiratori e/o della EtCO₂).

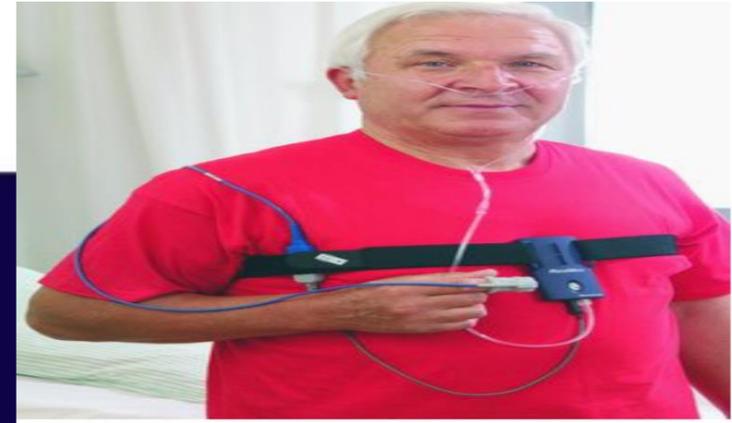
Perioperative Management Plan

- Anesthesiologists should work with surgeons to develop a protocol whereby patients in whom the possibility of OSA is suspected on clinical grounds are evaluated long enough before the day of surgery to allow preparation of a perioperative management plan.
- This evaluation may be initiated in a preanesthesia clinic (if available) or by direct consultation from the operating surgeon to the anesthesiologist.
- The perioperative management of patients with OSA begins with preoperative identification, after which plans are made to tailor specific preoperative, intraoperative and postoperative care.

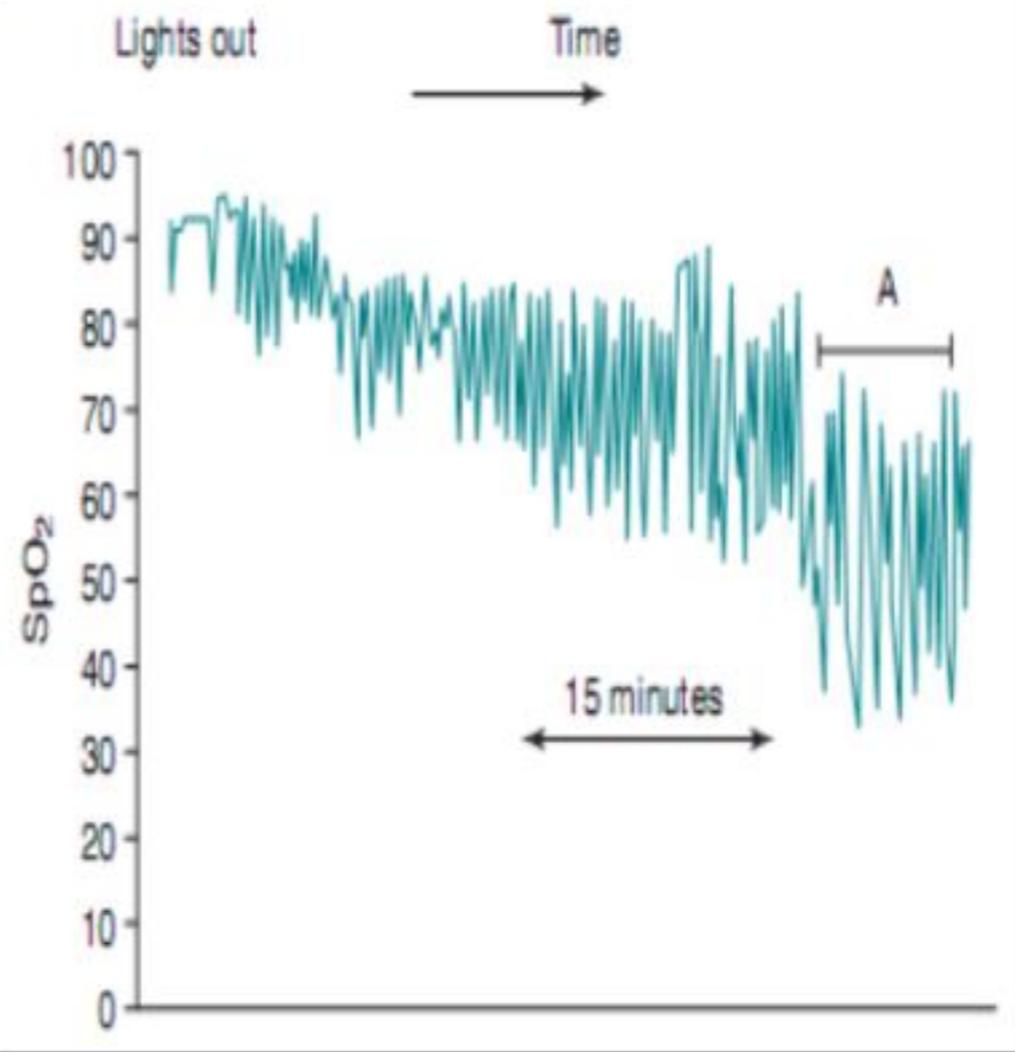
Screening for OSA prior to surgery

- Preoperative preparation can include the use of **home sleep tests e.g. Apnea Link** as a diagnostic tool for OSA.
- **The diagnostic gold standard remains polysomnography** carried out overnight in a sleep clinic, often times this is an **expensive, time-consuming option**.
- There frequently is **not enough time** from the date of scheduled surgery to obtain necessary authorizations and appointments for a PSG, resulting in **the need for alternative diagnostic methods**.
- For the anesthesiologist who first **suspects sleep apnea in a preoperative clinic for surgery scheduled several days in the future**, the patient's surgery would have to be cancelled and rescheduled **pending the PSG and appropriate treatment**

Nocturnal oximetry



3100
WristOx[™] 





Va inoltre valutato che:

la presenza di eventuali comorbidità mal controllate (obesità patologica, insufficienza respiratoria, cardiopatia ischemica, fibrillazione atriale o altre aritmie, ipertensione arteriosa refrattaria, ipertensione polmonare, stroke o TIA) va ad aumentare il rischio postoperatorio calcolato con la **Tabella 2**; la presenza di ipercapnia ≥ 50 mmHg peggiora il rischio perioperatorio potendo evidenziare una insufficienza respiratoria sottostante o Obesity Hypoventilation Syndrome (OHS) ⁽²⁵⁾; un adeguato approfondimento diagnostico e l'eventuale ottimizzazione preoperatoria sono condizionati dal grado di urgenza dell'intervento e il percorso andrebbe condiviso con il paziente e il chirurgo: quando lo studio e l'ottimizzazione preoperatori auspicabili non siano attuabili in tempi utili, il paziente va informato in modo esaustivo della valutazione rischi-benefici e della strategia terapeutica indicata e deve esprimere un chiaro consenso informato.

Preoperative optimization of patients with know or suspected OSA

- The current use of CPAP or BiPAP should be noted with **special care on compliance to therapy.**
- Patients should be **advised to bring their CPAP devices to the hospital on the day of surgery for postoperative use.**
- **A subset of patients may need reassessment preoperatively, especially patients with a known diagnosis of OSA but lost on follow-up, recent exacerbation of OSA symptoms, those who have undergone OSA-related airway surgery, or have been non-compliant with CPAP.**
- Experience suggests that **restarting preoperative CPAP may be beneficial on non-compliant patients.**
- **The American Society of Anesthesiologists task force on the management of OSA recommends that patients with moderate and severe OSA who have been on CPAP therapy should continue with CPAP in the postoperative period .**



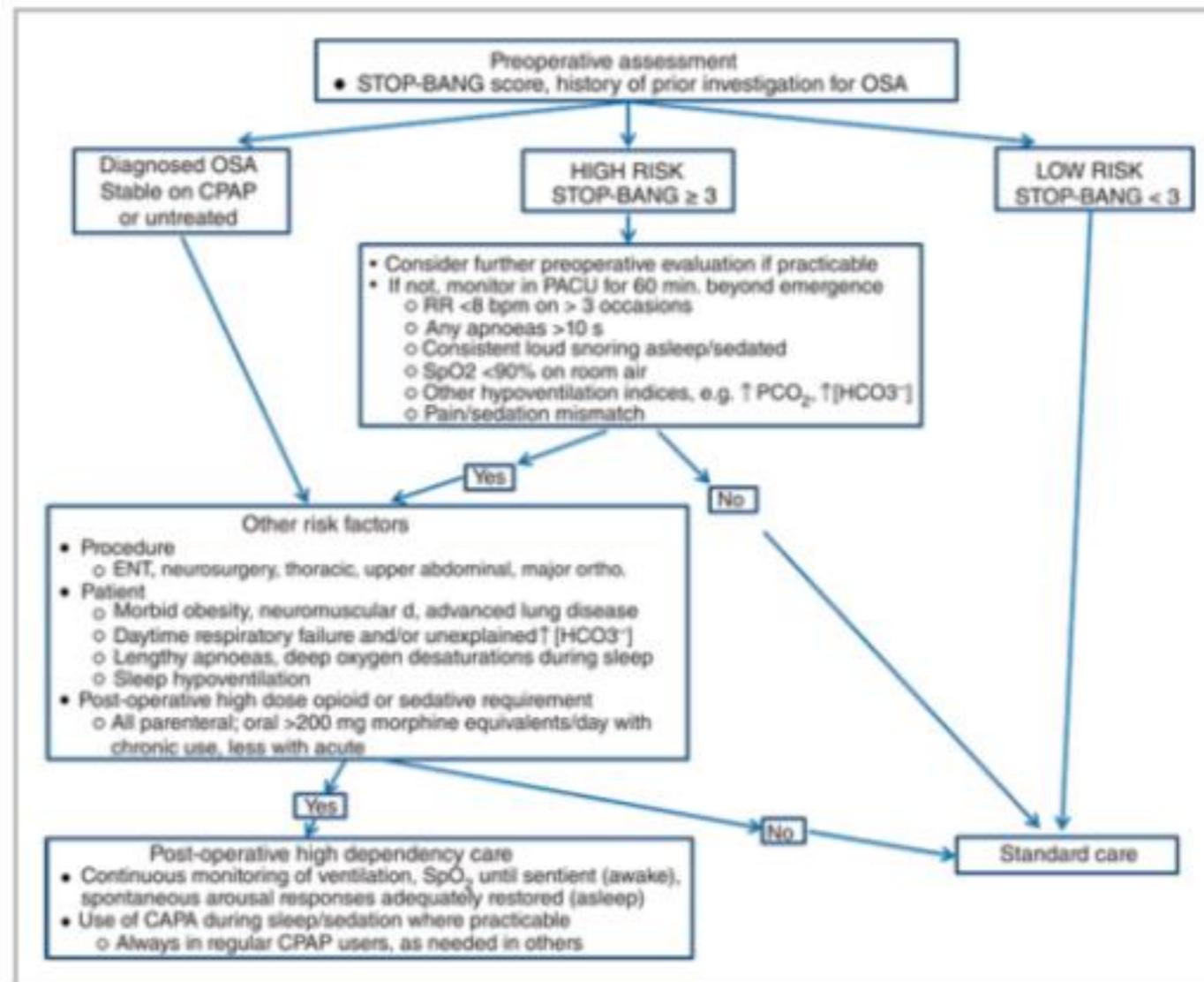
Preoperative optimization of patients with known or suspected OSA

- **Precautions should be taken in anticipating the possibility of having a difficult airway**
- **Most patients may be obese and appropriate care should be taken to prevent desaturation.**
- **It is useful to employ short-acting anesthetic drugs, less soluble inhalational agents, titrate opioids, and minimize sedation.**
- **In patients with anticipated difficult airways, awake extubation may have to be performed preferably in a 30° to 45° head-up position.**
- **The routine perioperative care may be adequate for patients with mild OSA. If patients have any co-morbidities, they should be optimized.**
- **Patients may benefit by the modifications of anesthetic technique such as avoidance of general anesthesia in favor of a central neuraxial or a peripheral nerve block.**

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INTRAOPERATIVE CARE

ADDITIONAL EQUIPMENT (to be added to the standard)

- Suitable bed, chairs, trolley and operating table with specific support (for size and weight) – step for the Anaesthetist
- Moving devices – ADEQUATE staff NUMBER for patient placement and transport
- APPROPRIATE antiseptics /artificial devices – ADEQUATE sized gowns for patients dignity respect
- Large NBP cuff, long needles for vascular access and/or LBA
- Ramped Position device – difficult airway devices (2nd generation SAs – VDL – FOB – bougie – tube exchanger – intubation kit)
- Monitoring: NIBP – ETCO₂ (ALSO FOR NORA) – consider depth of anaesthesia monitoring (awakeness)
- Ventilator allowing controlled, assisted and spontaneous techniques with PEEP/CPAP
- Intermittent compression device for DVT prophylaxis
- ULTRASOUNDS AVAILABILITY

RAMPED POSITION

(Incor level with otomax)
for induction/intubation/etubation



ANESTHETIC MANAGEMENT

- Evaluate airway prophylaxis, anticholinergics, antihemetics and antibiotics
- Monitoring: glycemia - temperature - vitals
- Prevention of positional injuries: if possible patient self-placement on the operating table
- Evaluate alternatives to endotracheal tube
- Plan strategy in case of difficult airway management
- Evaluate risk of oxygen desaturation in spontaneous breathing
- Ramped position for preoxygenation ± THREE/CPAP/BPPV in mask and for intubation
- Minimize apnea time during induction to avoid desaturation
- Pass quickly to the maintenance phase (awareness)
- Set up protective ventilation
- Provide short-acting drugs- multimodal analgesia
- Consider deep analgesia – NIBP monitoring
- Apply safe extubation plan (including sitting position 25-30°)

Prefer MINI-INVASIVE surgical technique

CONSIDER SPECIAL CAUTIONS IN OBESE PREGNANT PATIENT

- EARLY ANESTHESIOLOGICAL EVALUATION
- Early epidural analgesia (ultrasound support)
- Consider the risk of "difficult lumbar access"
- LRA is not an alternative to manage a predicted difficult airway (> VENTILATION)
- Consider AFOI

Discharge Criteria OR – ED – PACU – NORA

JAMAED criteria	APCC criteria
Stable NIBP	SpO ₂ as close as possible to the preoperative value with minimal oxygen supplementation
Low (depth)	
+	
Absence of hypoventilation (hypoxemia/apnea for at least 1 hour)	
ALERT in case of difficult airway management	





Intra-operative optimization of patients with known or suspected OSA

- Several issues can arise intraoperatively in the OSA patient, including **difficult intubation**, **opioid-related respiratory depression**, and **excessive sedation**; provides an overview of **potential anesthetic concerns with the OSA patient** .
- Two important **correlates of difficult intubation** are a **higher Mallampati score ≥ 3** , **neck circumference > 40 cm**, or **waist circumference > 105 cm** ; same for both genders).

2 Strategia intraoperatoria ⁽¹⁴⁾

- > NO alla premedicazione con sedativi;
- > preferire quando possibile anestesia locale, locoregionale o neuroassiale evitando la sedazione profonda e valutando il rapporto rischio-beneficio dell'aggiunta di oppioidi agli anestetici locali; se il paziente è già adattato a domicilio alla CPAP valutarne l'utilizzo in SO;
- > posizionare il paziente in posizione *ramped* e *anti Trendelenburg*;
- > pre-ossigenare il paziente possibilmente a pressione positiva;
- > prepararsi a una potenziale via aerea difficile, il cui rischio è aumentato nel paziente con OSA; l'incidenza di ventilazione difficile in maschera facciale è più alta, quindi la pronta disponibilità di un PEG può risultare determinante ⁽²²⁾;
- > evitare oppioidi e sedativi a lunga durata d'azione, preferire *opioid sparing anesthesia*;
- > monitorizzare il blocco neuromuscolare e garantire il completo recupero (TOF-R \geq 0.9);
- > verificare la disponibilità di CPAP/NPPV postoperatoria, o riprendere CPAP nel caso di utilizzo a domicilio ^(23, 24).



Dopo induzione dell'anestesia
nel paziente obeso è necessario un
rapido controllo delle vie aeree



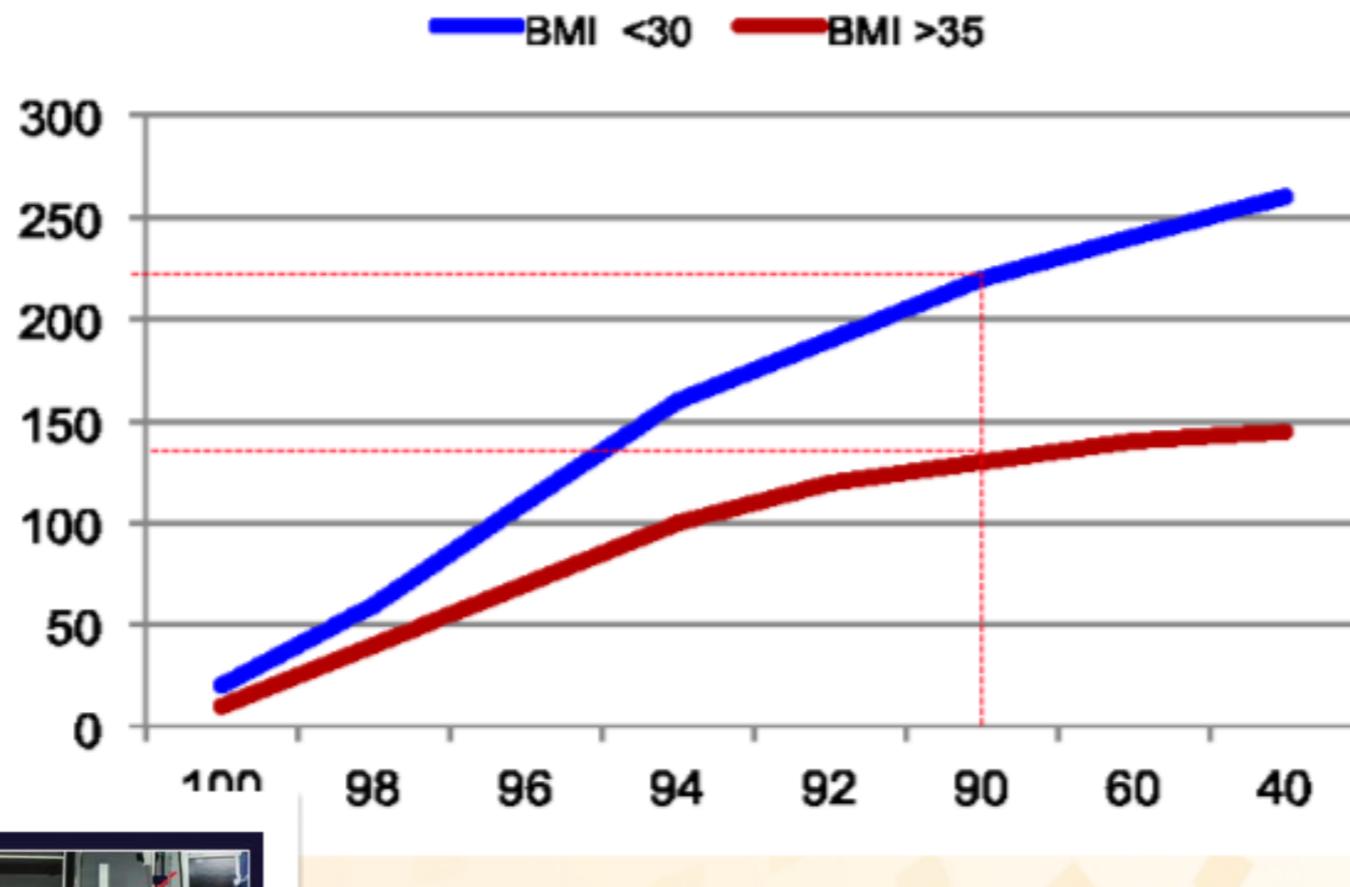
RSI

(Rapid Sequence Induction)



Tolleranza all'apnea nel paziente obeso

(Sec)



(SpO₂)

(BMI >35), il tempo di desaturazione a 90% risulta





Effetto della posizione sulla tolleranza all'apnea



Tempo di "safe apnea" (s)	178 ± 55*	123 ± 24	153 ± 63
Tempo di recupero (s)	80 ± 30 [§]	206 ± 64	97 ± 41 [¶]
SaO ₂ più bassa	83 ± 4	82 ± 5	83 ± 4

Tempo dalla disconnessione a SpO₂ 92% e recupero a SpO₂ 100%

* = p<0.05 vs. 2 e 3; § = p<0.05 vs. 2; ¶ = p<0.05 vs. 2





Rocuronio vs. succinilcolina per la RSI

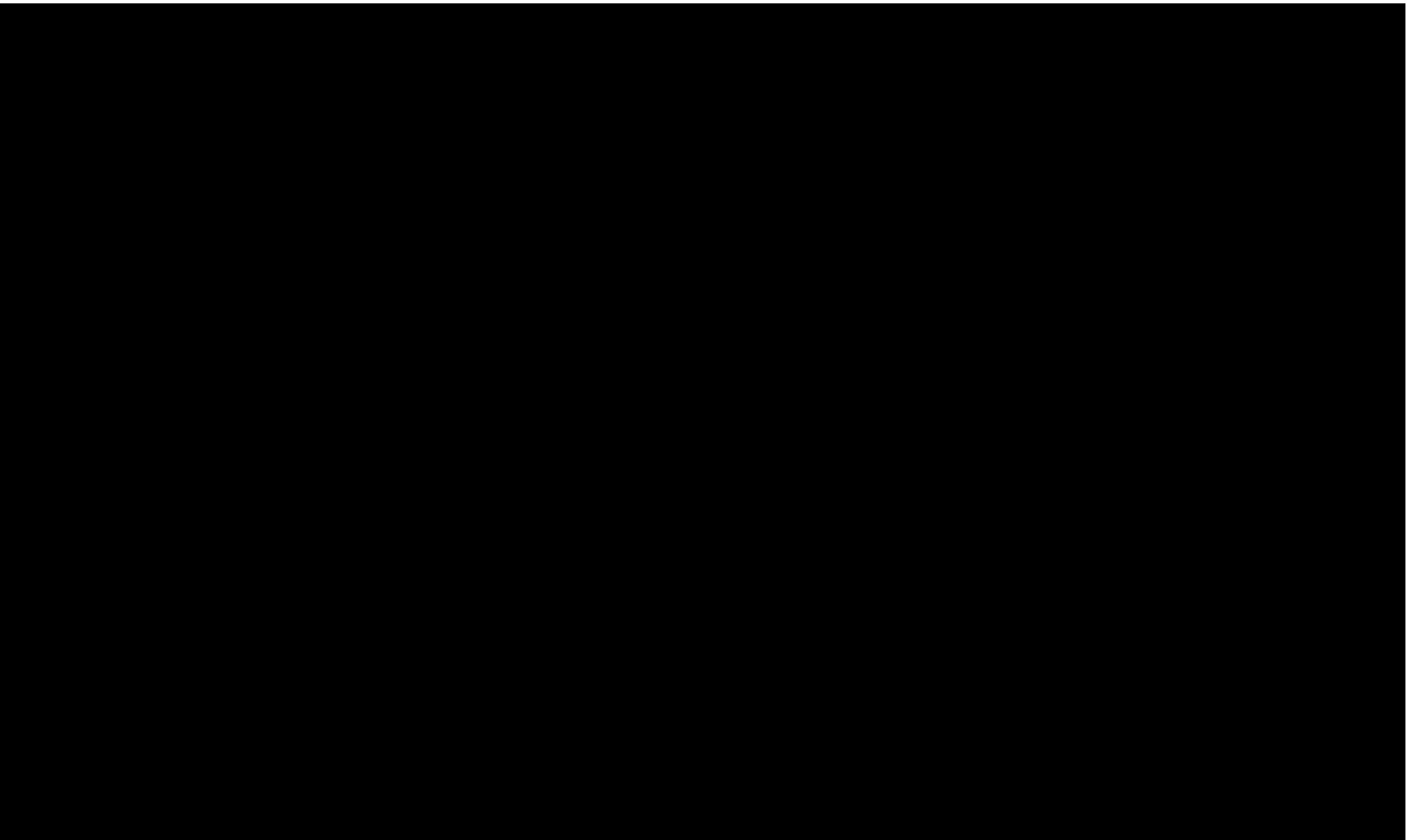
succinilcolina 1 mg/kg vs.
rocuronio 0.6 mg/kg

succinilcolina > rocuronio

succinilcolina 1 mg/kg vs.
rocuronio 0.9 - 1.2 mg/kg

succinilcolina = rocuronio





Intra-operative optimization of patients with known or suspected OSA

- **The obese patient has a reduced FRC, and tidal volume often falls below the closing capacity of the small airways, leading to atelectasis, increased intrapulmonary shunting, and impaired oxygenation.**
- **FRC is further reduced after induction of anesthesia, when the weight of the anterior chest compresses the thorax.**
- **At least three minutes of breathing 100% oxygen or five vital capacity breaths of 100% oxygen are essential.**
- **For superficial procedures, one should consider the use of local anesthesia or peripheral nerve blocks, with or without moderate sedation.**
- **If moderate sedation is used, ventilation should be continuously monitored by capnography or another automated method if feasible because of the increased risk of undetected airway obstruction in these patients.**

Intra-operative optimization of patients with known or suspected OSA

- **One should consider administering CPAP during sedation to patients previously treated with these modalities.**
- **General anesthesia with a secure airway is preferable to deep sedation without a secure airway, particularly for procedures that may mechanically compromise the airway.**
- **Spinal/epidural anaesthesia should be considered for peripheral procedures.**
- **Full reversal of neuromuscular block should be verified before extubation. When possible, extubation and recovery should be carried out in the lateral, semi-upright, or other non-supine position.**

Extubation of airway

Complete reversal of neuromuscular blockade – checked with a nerve stimulator.

Awake extubation.

Semi-upright posture for recovery.

3 Adozione di adeguate precauzioni nel postoperatorio

Per ridurre il rischio di complicanze postoperatorie, appare centrale il ruolo della RR/PACU o altro ambiente comunque adeguatamente monitorizzato e presidiato dove sia possibile una stretta sorveglianza che rilevi prontamente il verificarsi di eventi respiratori in grado di predire una maggiore probabilità di complicanze nel postoperato (Tab. 3).

Esiste infatti evidenza che l'osservazione di alcuni anomali episodi respiratori in RR/PACU possa essere usata come indicatore dell'opportunità di adeguare il livello del monitoraggio postoperatorio. Per evento respiratorio in RR/PACU si intende il verificarsi, in un intervallo di 30 minuti, (escludendo però i primi 30' dall'inizio del monitoraggio) di:

- a) apnea $\geq 10''$ (anche un solo episodio);
- b) bradipnea FR ≤ 8 atti/min (almeno tre episodi);
- c) desaturazione $< 90\%$ (almeno tre episodi);
- d) *pain sedation mismatch* definito come discordanza tra dolore (misurato tramite Numerical Rating Scale, NRS) e sedazione per la presenza contemporanea di un elevato score dolore accompagnato ad un elevato livello di sedazione.

Per eventi respiratori **ricorrenti** in RR si intende la rilevazione di uno qualunque degli eventi respiratori sopracitati in almeno due differenti intervalli di tempo di 30 minuti.

Il paziente andrebbe posizionato semiseduto o sul fianco (se consentito dall'intervento), connesso alla CPAP domiciliare se presente, con la minima somministrazione di O₂ che consenta il raggiungimento dei valori di SpO₂ preoperatori.

Se durante 3 ore di monitoraggio si verifica la presenza di almeno un evento respiratorio, il monitoraggio viene esteso a 4 ore, se gli eventi persistono il paziente potrebbe necessitare di ricovero in UTI.

Fig. 2 SCHEDA DI VALUTAZIONE POSTOPERATORIA PER PAZIENTE AFFETTO DA APNEE OSTRUTTIVE: MONITORAGGIO DEGLI EVENTI RESPIRATORI RICORRENTI

Sig./Sig.ra _____ Data: ___/___/_____

Tipo di intervento/procedura _____

Ore: _____	Ore: _____	Ore: _____	Ore: _____	Ore: _____	Ore: _____	Ore: _____						
← 30' →		← 30' →		← 30' →		← 30' →						
Almeno una apnea $\geq 10''$	sì	no	sì	no	sì	no	sì	no	sì	no	sì	no
Almeno 3 episodi FR ≤ 8 /min												
Almeno 3 episodi SpO ₂ $\leq 90\%$												
Paziente sedato ma elevato NRS	sì	no	sì	no	sì	no	sì	no	sì	no	sì	no
	Almeno un evento respiratorio?		Almeno un evento respiratorio?		Almeno un evento respiratorio?		Almeno un evento respiratorio?		Almeno un evento respiratorio?		Almeno un evento respiratorio?	
	sì	no	sì	no	sì	no	sì	no	sì	no	sì	no
se $\geq 2 \Rightarrow$ Eventi Respiratori Ricorrenti \Rightarrow valutare necessità di monitoraggio della Saturazione in continuo nelle ore successive												

POSTOPERATIVE SAFETY

LEVEL OF CARE

Adjust LEVEL OF CARE (I, II, III level) to:

- Preexisting comorbidity
- Procedure complexity
- Hypo/dys/ventilation risk

ward assistance includes handover for:

- Multimodal analgesia
- Sitting position 25-30°
- Early mobilization and physiotherapy
- Appropriately extended DVT prophylaxis
- Increase attention and monitoring in case of long-acting sedatives and opioids use
- Alert criteria (NEWS model)
- Prevention and treatment of rhabdomyolysis
- Prophylaxis and control of infection



Precaution in case of OSA/OHS

- Keep sitting position 25-30°
- Avoid sedative and opioid
- Discontinue nasal cannula (oxygen?) – restart nCPAP if yet in preoperative state
- Monitor SpO₂: untreated / not tolerating nCPAP patients using opioids
- IF critical situation, adapt assistance : ↑ at level II (with bed availability at level III)

AFTER DIFFICULT AIRWAY MANAGEMENT

- Supply information in clinical and anaesthesiological documentation
- HANDOVER - ALERT to ward team and to patient



SPECIFIC ALERTS IN INTENSIVE CARE (Level III – ICU)

- Adequate team approach for difficult airway management in critically ill patient and in emergency
- Tracheotomy: timing / difficulty (percutaneous – surgical techniques) / adequate cannula choice
- Protective ventilation
- Suitable resources for frequent mobilization and delirium prevention
- Early rehabilitation
- Appropriate organization in case of secondary transport

SPECIAL ALERTS AND WARNINGS

ERAS PROTOCOLS Specific attention to surgical elderly patient

PREGNANT (CESAREAN SECTION)

"Safe birth pathways" – anaesthetic ALERT and precautions in post caesarean section

RAPID RESPONSE SYSTEM TO INTRA-HOSPITAL EMERGENCY

Early alert criteria – organize to act
Adequate equipment & emergency team skills

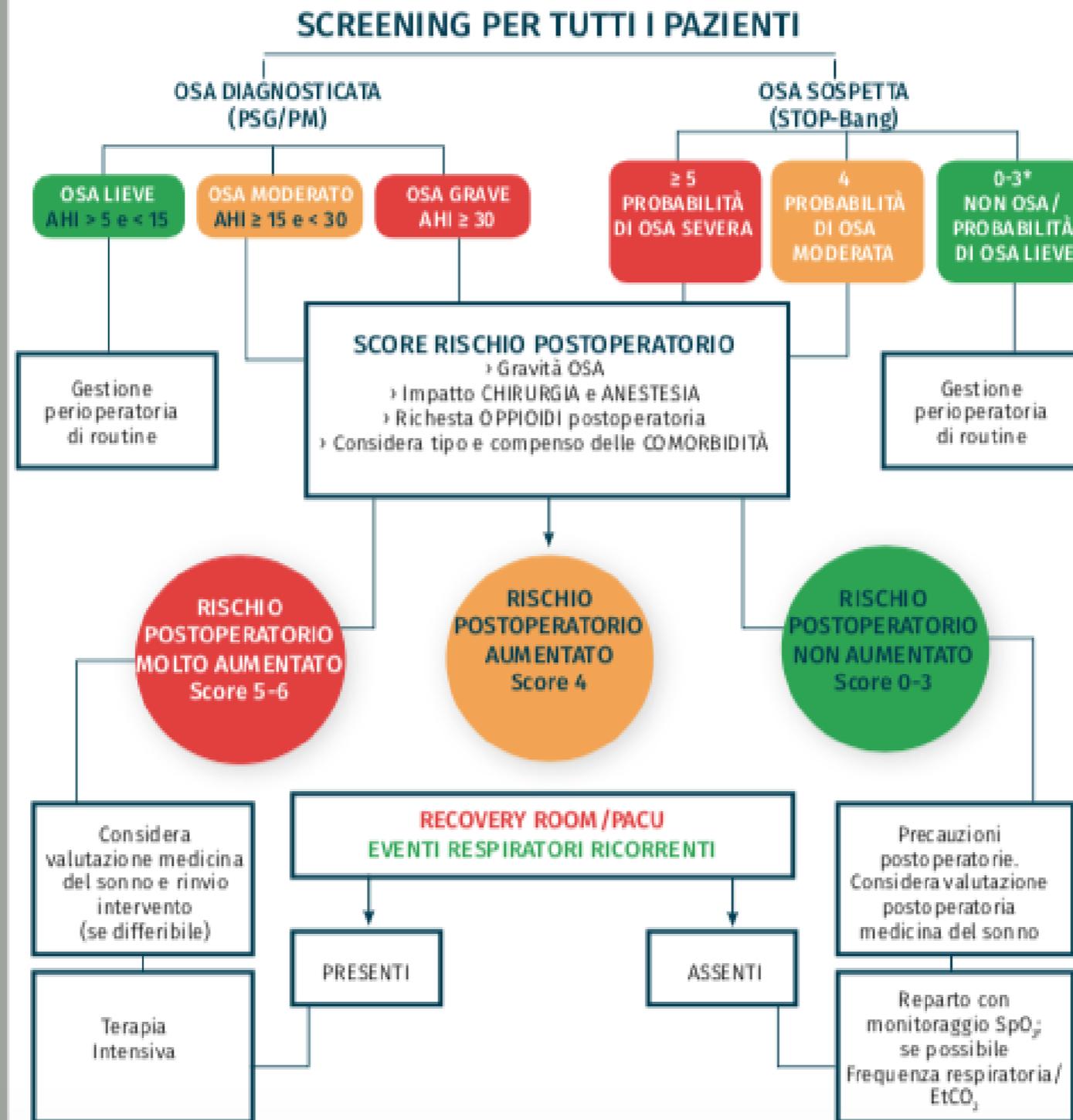


ALERT in ED

- Provide for supports, moving devices, equipment – suitable for patients size/weight
- Early MET ALERT for difficult airways risk: CHECK skills & devices – emergency techniques
- Specific attention for assistance during secondary transport (Ambulance/Helicopter)



Tab. 3 GESTIONE POSTOPERATORIA NEL PAZIENTE OSA





OSA and postoperative complications

- **In a recent retrospective study of elective non-cardiac procedures, the occurrence of postoperative complications was observed in 44% of patients with OSA versus 28% in patients with no OSA.**
- **Patients with OSA undergoing hip or knee replacement were at an increased risk of developing perioperative complications (24% versus 9%, respectively).**
- **An increased risk of postoperative complications was also observed in OSA patients undergoing upper airway and cardiac procedures .**
- **The most commonly observed complication was oxygen desaturation (17% in patients with OSA versus 8% with no OSA).**

OSA and postoperative complications

- Proposed guidelines from the Adult OSA Task Force of the **American Academy of Sleep Medicine** suggest that :
 - 1- **Questions regarding OSA should be included in routine health screenings.**
 - 2- **If OSA is suspected, a comprehensive sleep evaluation should be conducted.**
- Interestingly, it was observed that **OSA patients undergoing surgery had higher AHI and oxygen-desaturation index scores on the third postoperative night** compared to the first postoperative night or preoperatively .

Post-operative optimization of patients with known or suspected OSA

- **Postoperative concerns in the management of patients with OSA include:**
 - (1) **analgesia,**
 - (2) **oxygenation**
 - (3) **patient positioning**
 - (4) **monitoring.**
- **Risk factors for respiratory depression include the systemic and neuraxial administration of opioids, administration of sedatives, site and invasiveness of surgical procedure, and severity of the sleep apnea.**
- **Postoperative residual curarization is common after administration of neuromuscular blocking agents.**
- **Suggested practices include verification of full neuromuscular blockade recovery, ensuring the patient is fully conscious prior to extubation, and placing the patient in a semi-upright recovery position. Anticipating possible difficult airways, use of short-acting anesthetic agents, opioid minimization, reversal prior to extubation, and extubation in a non-supine position.**

Post-operative optimization of patients with known or suspected OSA

- **Supplemental oxygen should be administered continuously to all patients who are at increased perioperative risk from OSA until they are able to maintain their baseline oxygen saturation while breathing room air.**
- **The Task Force cautions that supplemental oxygen may increase the duration of apneic episodes and may hinder detection of atelectasis, transient apnea, and hypoventilation by pulse oximetry.**
- **CPAP or BiPAP, with or without supplemental oxygen, should be continuously administered when feasible to patients who were using these modalities preoperatively, unless contraindicated by the surgical procedure.**

Post-operative optimization of patients with known or suspected OSA

- **Compliance with CPAP or BiPAP may be improved if patients bring their own equipment to the hospital.**
- **Intermittent pulse oximetry or continuous bedside oximetry without continuous observation does not provide the same level of safety.**
- **If frequent or severe airway obstruction or hypoxemia occurs during postoperative monitoring, initiation of nasal CPAP or BiPAP should be considered.**

Special considerations for postoperative management

Postoperative analgesia

- OSA is one of the major risk factors contributing to the occurrence of respiratory depression .
- The use of opioids can be a special concern in patients with OSA, as **most opiates** including morphine, meperidine, hydromorphone, and fentanyl **cause a dose-dependent reduction of respiratory drive, respiratory rate, and tidal volume** that in turn can lead to hypoventilation, **hypoxemia, and hypercarbia** .
- **Sedatives , anesthetics and analgesics** may selectively compromise respiratory function in OSA patients.
- The general recommendation is **that opioids and other drugs with central respiratory and sedating effects should be avoided, if possible**. It is imperative to **minimize the use of opioids** in diagnosed or suspected OSA patients.

Alternative to opioid therapy

- The use of multimodal analgesia may be more beneficial in patients with OSA in minimizing the opioid-related side effects and providing effective analgesia as well.
- There are a plethora of medications that can be used, such as nonsteroidal anti-inflammatory drugs, acetaminophen, tramadol, ketamine, gabapentin, and pregabalin .
- Caution should be advocated while using some of these drugs like gabapentin with the side effect of sedation. Dexmedetomidine has been particularly beneficial because of the opioid sparing effect and the lack of respiratory depression.

Alternative to opioid therapy

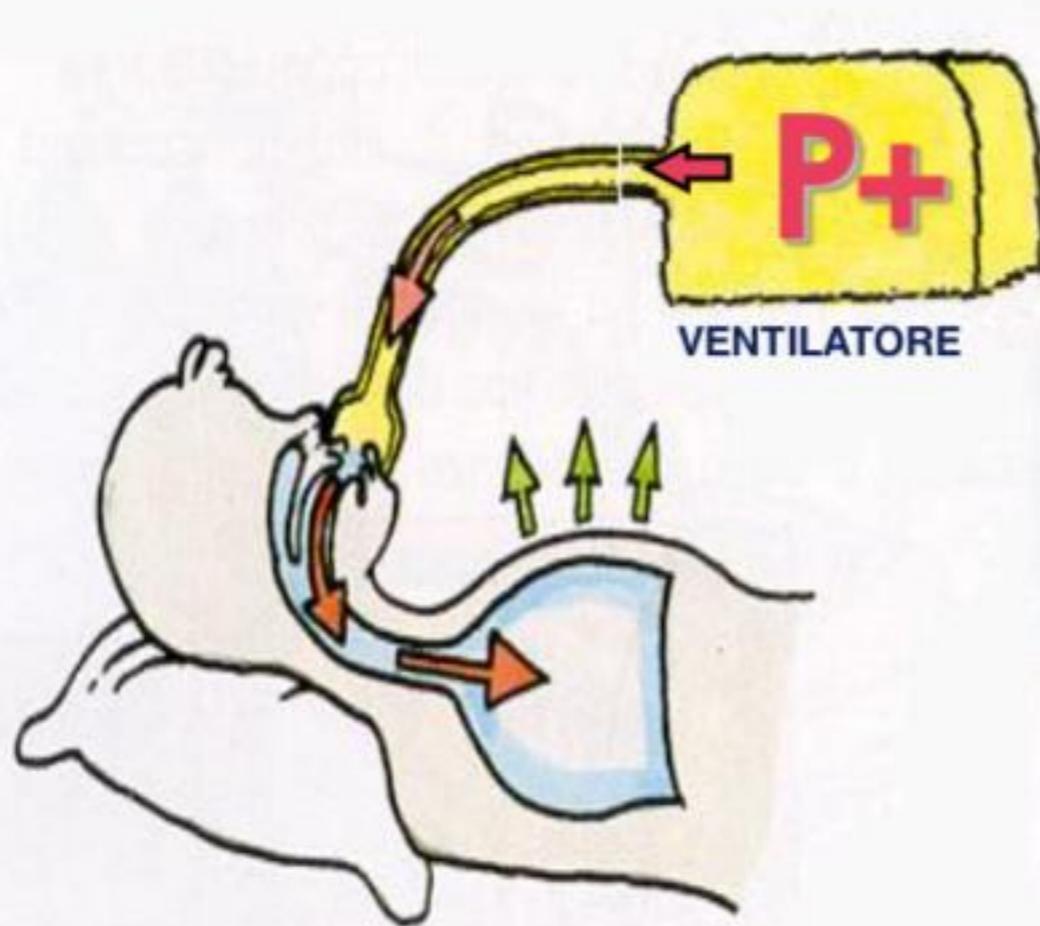
- The American Society of Anesthesiologists guidelines recommend regional anesthesia to reduce the possibility of negative adverse events associated with systemic opioids.
- The use of nonsteroidal anti-inflammatory analgesics is strongly recommended .
- The use of nerve blocks with or without catheters with local anesthetics obviates the need for systemic opioid analgesics.
- Caution should be exercised in using neuraxial opioids in patients with OSA as there are reports of postoperative respiratory arrest in a case series of three patients .
- Patients with OSA may be at an increased risk of perioperative complications with the use of strong opioids even after a regional anesthetic.

Evidence for using perioperative CPAP

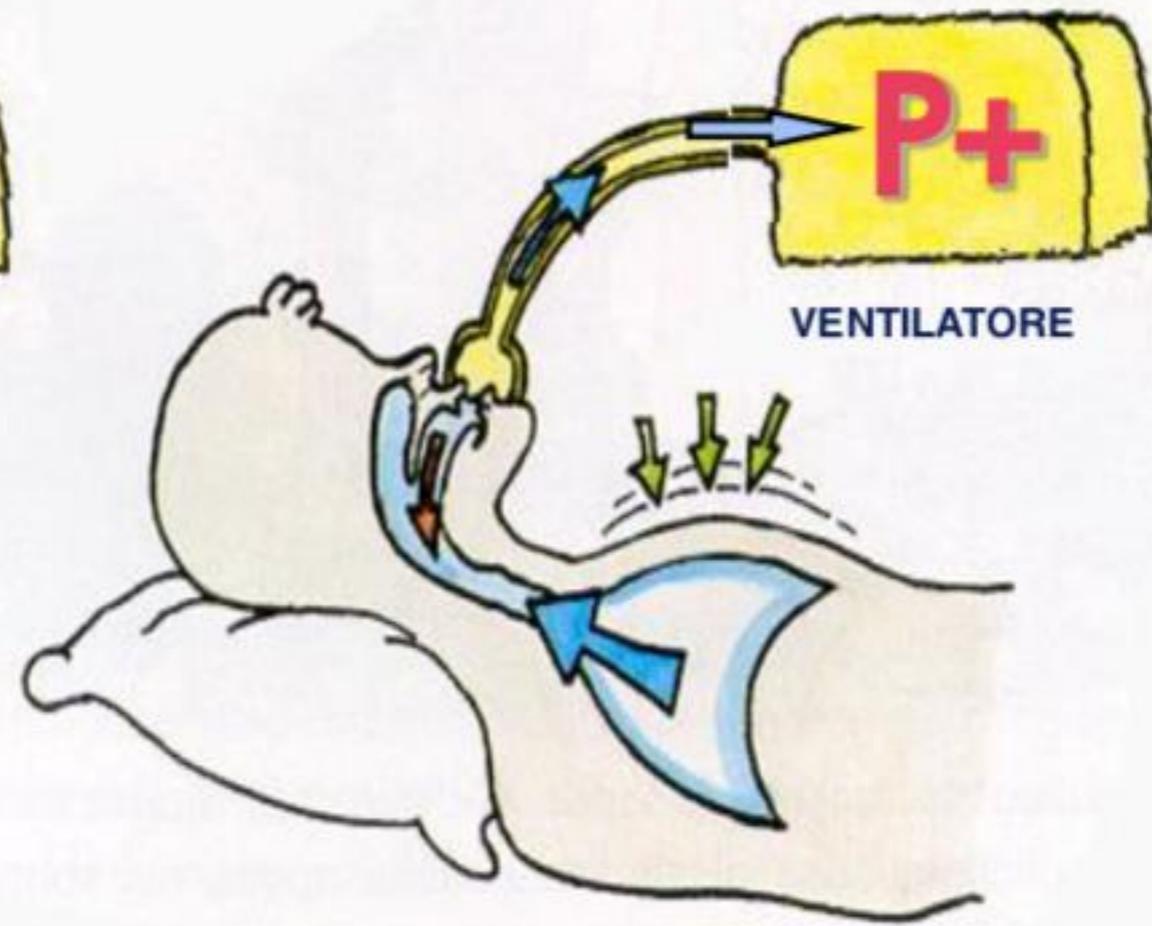
- **CPAP** exerts its beneficial effects by acting as a **pneumatic splint** and prevents the obstruction to airflow during sleep.
- **Postoperative CPAP** reduces airway obstruction, reduces major postoperative complications and shortens the hospital stay.
- The **American Society of Anesthesiologists** task force recommends that patients continue with their routine **CPAP** through the perioperative period.
- The patients are better advised to get their own **CPAP** device to the hospital on the day of surgery.

PRINCIPIO DEI VENTILATORI A "C-PAP"

(Continuous Positive Airways Pressure)



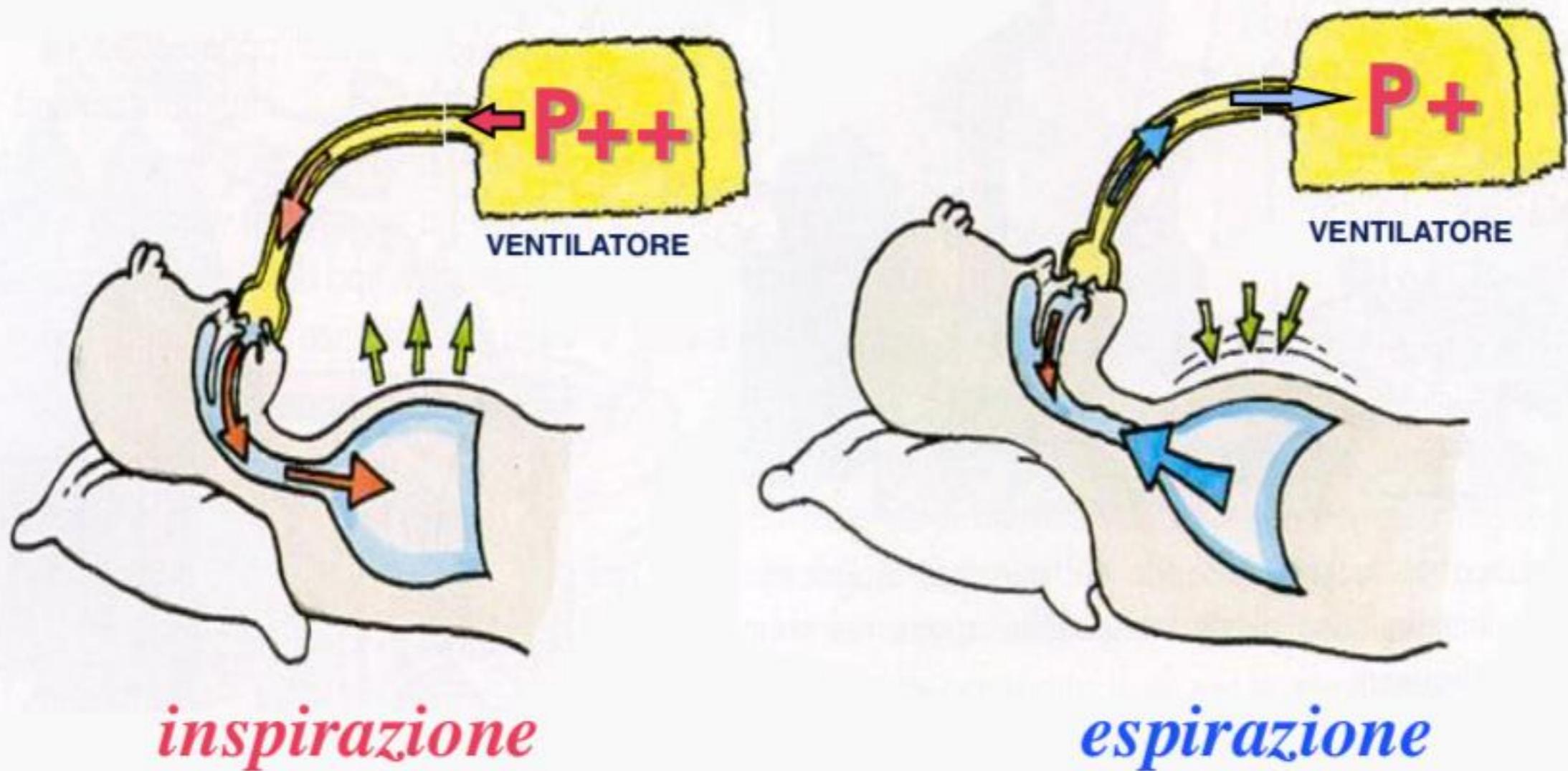
inspirazione

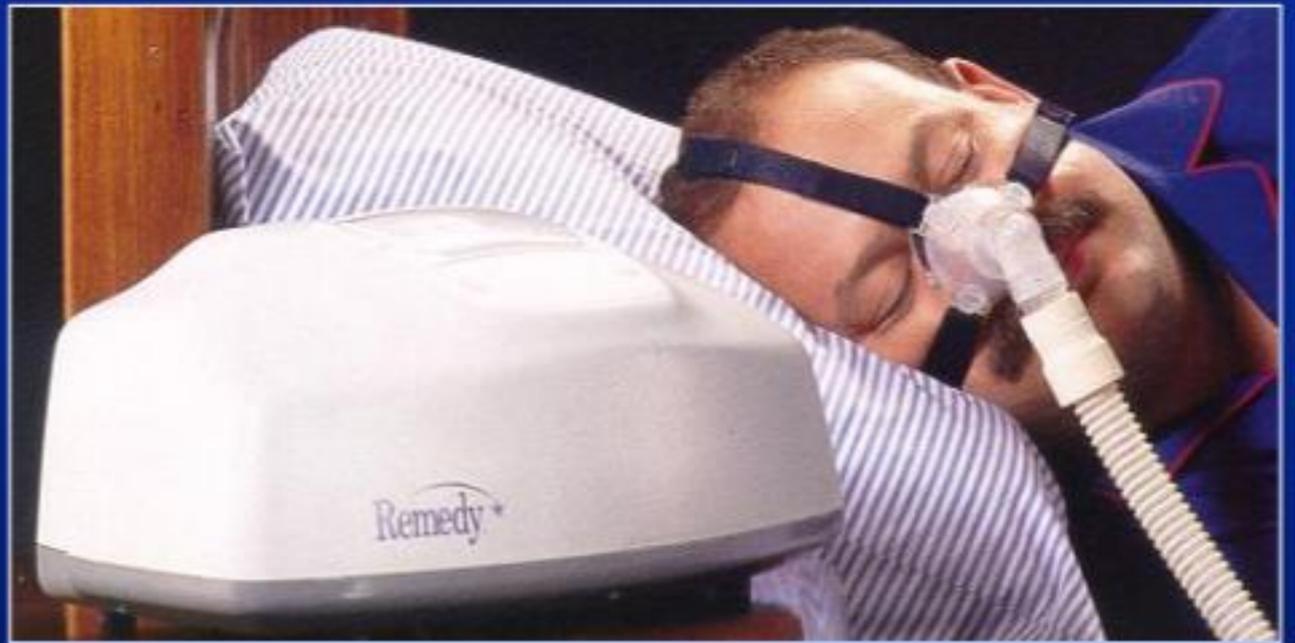


espirazione

PRINCIPIO DEI VENTILATORI "Bi-PAP"

(somministrazione della pressione positiva continua a due livelli)



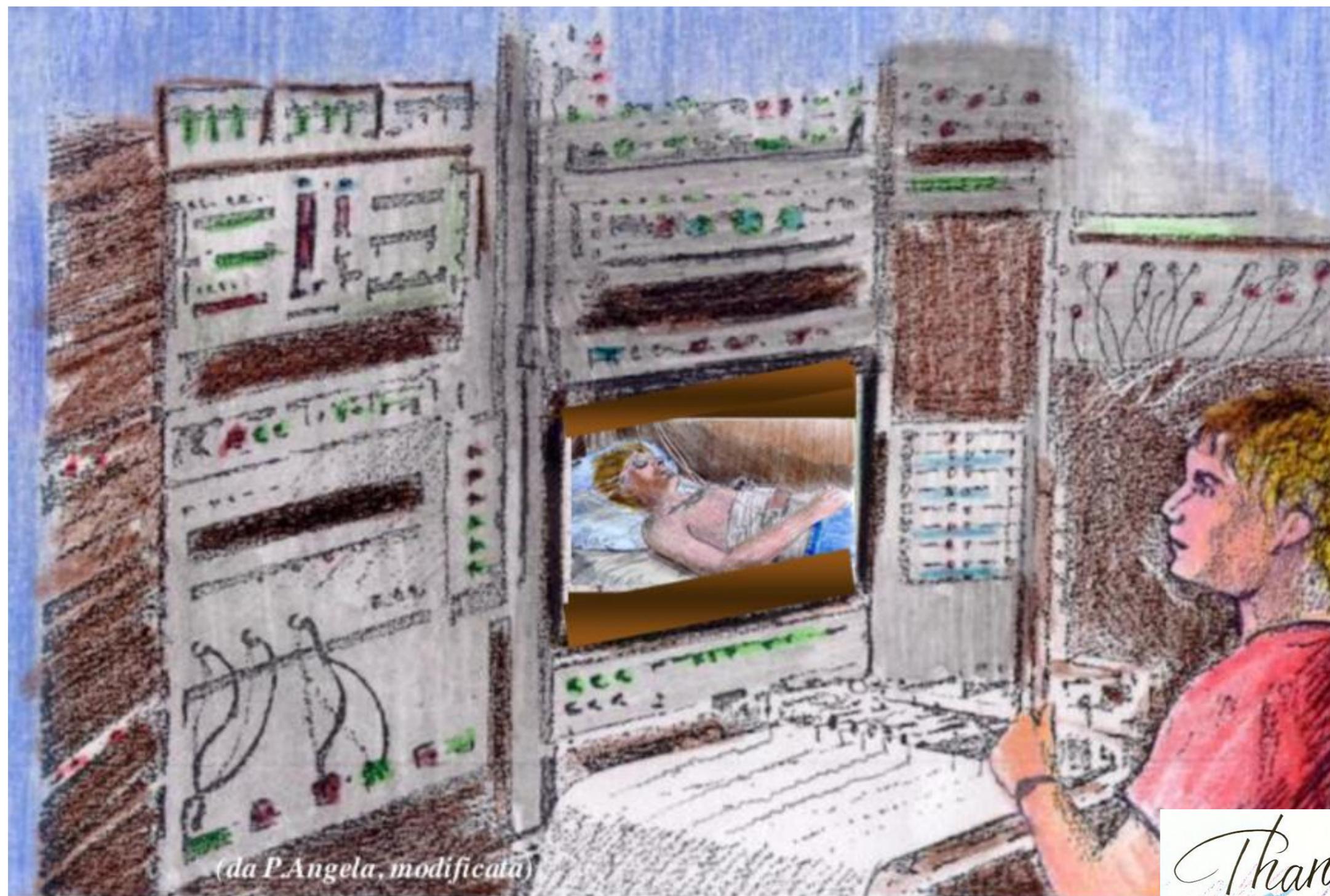


OSA and Malpractice

- **Adverse outcomes** can occur due to **intubation difficulties** (due to increased oropharyngeal classification, decreased atlanto-occipital extension, thick neck and occasionally micrognathia and retrognathia) and **extubation difficulties** (due to loss of optimal airway management position, monitors off the patient, patients not fully awake, no oropharyngeal airway), and **together constitute approximately 30% of the malpractice OSA cases.**
- **The prototypical OSA malpractice case, constituting approximately 70% of the cases, is finding a postoperative patient dead in bed.**
- **The clinical components of the prototypical OSA malpractice “dead in bed” case are:**
 - (1) **Severe OSA**
 - (2) **Morbid obesity**
 - (3) **Patient in an isolated ward room,**
 - (4) **Has no monitoring**
 - (5) **Is receiving narcotics**
 - (6) **Has a painful incision**
 - (7) **Is off oxygen and**
 - (8) **Is off his or her CPAP device.**

Conclusion

- **Simplified questionnaires and a myriad of inexpensive, quick at home sleep tests have provided a necessary first step in arriving at a solid, evidence-based system for identifying patients with OSA prior to the operating room setting, which can only serve to diminish the potentially negative outcomes associated with surgery and OSA.**
- **Postoperative management of patients with OSA should include close monitoring postoperatively.**
- **Adequacy of postoperative respiratory function may be documented by observing patients in an unstimulated environment, preferably while they seem to be asleep, to establish that they are able to maintain their baseline oxygen saturation while breathing room air.**



(da P. Angela, modificata)

Thank You!