**Annex 1**

**MECHANICAL VENTILATION DURING ROBOTIC SURGERY (AVATaR)**

Version 1.5

Assessment of ventilation management during general anesthesia for robotic surgery and its effects on postoperative pulmonary complications: a multicenter prospective observational study

<table>
<thead>
<tr>
<th>Patient Serial Number</th>
<th>__</th>
<th>__</th>
<th>__</th>
<th>__</th>
<th>__</th>
<th>__</th>
</tr>
</thead>
</table>

Investigator Site 1 _____________________________
Principal Investigator: Prof. Ary Serpa Neto, Intensive Care Department, Hospital Israelita Albert Einstein
Contact: Veronica Neves Fialho Queiroz, Anesthesiology, Hospital Israelita Albert Einstein, veronicanfialho@gmail.com

---

### 1. INCLUSION, EXCLUSION CRITERIA AND INFORMED CONSENT

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 18 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical ventilation for robotic surgery</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exclusion criteria</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure during pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procedure performed outside the operating room</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accessed patient included (all “yes” inclusion criteria and all “no” exclusion criteria)

Informed consent required
Date of signature of consent ___ / ___ / 20___

### 2. DETAILS OF PATIENT AND PROCEDURE

**Demographic data**

Age (years): ________
Gender: male □ female □

Height (cm): ________
Weight (kgs): ________

Race: Caucasian □ African □ Hispanic □ Asian □ other □
ASA: 1 □ 2 □ 3 □ 4 □ 5 □

Functional status:
Independent □ partially dependent □ totally dependent □
### 2. DETAILS OF PATIENT AND PROCEDURE

**Comorbidities**
- Hypertension: yes ☐ no ☐
- Coronary disease: yes ☐ no ☐
- Atrial fibrillation/flutter: yes ☐ no ☐ if yes acute ☐ paroxistic ☐ chronic ☐
- Heart failure: yes ☐ no ☐ if yes NYHA score (1-4):__________
- Diabetes mellitus: yes ☐ no ☐ if yes diet ☐ oral drug ☐ insulin ☐
- COPD: yes ☐ no ☐ if yes inhalation therapy ☐ corticoid ☐
- Asthma: yes ☐ no ☐
- Respiratory infection <30 days: yes ☐ no ☐ if yes upper ☐ lower ☐
- Smoker: yes ☐ no ☐ if yes current ☐ previous (stopped >3 months) ☐
- Obstructive sleep apnea: yes ☐ no ☐
- Active cancer: yes ☐ no ☐ if yes Type:__________
- Liver cirrhosis: yes ☐ no ☐
- Use of MV <30 days: yes ☐ no ☐
- Transfusion of packed RBC <30 days: yes ☐ no ☐
- Anemia (Hb <10 g/dL): yes ☐ no ☐
- Chronic kidney failure: yes ☐ no ☐ if yes hemodialysis ☐ conservative ☐

**Current organic function**
- Respiratory rate (/min) __________
- Heart rate (/min) __________
- Mean blood pressure (mmHg) __________
- SpO2 in room air and supine (%):__________
- Hemoglobin (if available) mmol/L g/dL ☐ __________
- Leucocytes (if available) x10⁹ cel/mm³ ☐ __________
- Creatinine (if available) mmol/L mg/dL ☐ __________

**Characteristics of procedure and anesthesia**
- Procedure: elective ☐ urgency ☐ emergency ☐
- Anticipated duration ≤2 hours ☐ 2 a 3 hours ☐ >3 hours ☐
- Surgical incision: peripheral ☐ low abdominal ☐ high abdominal ☐ thoracic ☐ other ☐:__________
- Surgical procedure: prostatectomy ☐ nephrectomy ☐ hysterectomy ☐ bariatric ☐ sacrococcygeal ☐ cholecystectomy ☐
- heart surgery ☐ colorectal resection ☐ hernia repair ☐ head and neck ☐ pulmonary resection ☐ other ☐:__________

### 3. DEFINITIONS

- Cm: centimeters
- Kgs: kilograms
- COPD: chronic obstructive pulmonary disease
- MV: mechanical ventilation
- RBC: red blood cells
- Hb: hemoglobin
- SpO2: pulse oximetry

**Functional status:**
- Independent: does not require any help for daily activities
- Partially dependent: requires some help for daily activities
- Totally dependent: requires help for all daily activities

**ASA (American Society of Anesthesiologist):**
1. Healthy patient without organic changes
2. Patient with mild or moderate systemic changes
3. Patient with severe systemic changes with functional limitation
4. Patient with severe systemic changes that are life-threatening
5. Moribund patient not expected to survive without surgery

**NYHA (New York Heart Association Functional Classification):**
1. Heart condition without symptoms or limitations for daily activities (no dyspnea)
2. Mild symptoms and minor limitation for daily activities (exertion dyspnea)
3. Moderate symptoms and limitations for daily activities (minimum exertion dyspnea)
4. Severe symptoms and limitations for daily activities (rest dyspnea)

**Procedure:**
- Emergency: surgery performed when a patient’s life is in danger
- Urgency: surgery required within 48 hours
- Elective: previously scheduled surgery, since it is not a medical emergency
### 1. CHARACTERISTICS OF INTRAOPERATIVE PERIOD

**Characteristics of anesthesia and procedure**

<table>
<thead>
<tr>
<th>Type of tracheal prosthesis</th>
<th>simple</th>
<th>double-lumen</th>
<th>nasotraqueal</th>
<th>bronchus blocker</th>
<th>endobronchial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of anesthesia</td>
<td>total intravenous</td>
<td>inhalational</td>
<td>balanced</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Antibiotic prophylaxis**
- yes ☐ no ☐

**One lung ventilation**
- yes ☐ no ☐ if yes Ventilated lung: R ☐ L ☐ duration (min): __________

**Neuroaxial block**
- yes ☐ no ☐ if yes epidural ☐ spinal ☐ combined epidural spinal anesthesia ☐

**Neuromuscular monitoring**
- yes ☐ no ☐ if yes EMG ☐ MMG ☐ AMG ☐

**Trendelenburg**
- yes ☐ no ☐ if yes normal ☐ extreme (≥40º) ☐

**Conversion to open technique**
- yes ☐ no ☐

**Conversion to laparoscopy**
- yes ☐ no ☐

**CO₂ Insufflation**
- yes ☐ no ☐ if yes abdominal ☐ thoracic ☐ mediastinum ☐

**Duration of anesthesia (min): __________ from intubation to extubation (or exit of operating room if on mechanical ventilation)**

**Duration of surgery (min): __________ from incision to closing**

**Drugs, fluids and transfusion**

<table>
<thead>
<tr>
<th>Crystalloid</th>
<th>yes ☐ no ☐ if yes Total volume (mL): __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthetic colloid</td>
<td>yes ☐ no ☐ if yes Total volume (mL): __________</td>
</tr>
<tr>
<td>Albumin</td>
<td>yes ☐ no ☐ if yes Total volume (mL): __________</td>
</tr>
<tr>
<td>Packed red blood cells</td>
<td>yes ☐ no ☐ if yes Total volume (un): __________</td>
</tr>
<tr>
<td>Opioids</td>
<td>yes ☐ no ☐ if yes short duration ☐ long duration ☐</td>
</tr>
<tr>
<td>Neuromuscular blocker</td>
<td>yes ☐ no ☐ if yes Rocuronium ☐ Vecuronium ☐ Atracurium ☐ Cisatracurium ☐ Pancuronium ☐</td>
</tr>
</tbody>
</table>

**Pharmacological reversal of neuromuscular block**
- yes ☐ no ☐ if yes Sugammadex ☐ Neostigmine ☐ Pyridostigmine ☐ Phystostigmine ☐

**End of anesthesia**

<table>
<thead>
<tr>
<th>Estimated blood loss</th>
<th>yes ☐ no ☐ if yes Total volume (mL): __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinary output</td>
<td>yes ☐ no ☐ if yes Total volume (mL): __________</td>
</tr>
<tr>
<td>Residual curarization</td>
<td>yes ☐ no ☐</td>
</tr>
<tr>
<td>Temperature</td>
<td>yes ☐ no ☐ if yes value (ºC): __________</td>
</tr>
<tr>
<td>Post-operative epidural</td>
<td>yes ☐ no ☐</td>
</tr>
</tbody>
</table>

**Complications during intraoperative period**

- Desaturation (SpO₂ <92% for 3 minutes or more) yes ☐ no ☐
- Recruitment maneuver not previously planned yes ☐ no ☐
- Reduction in airway pressure yes ☐ no ☐
- Hypotension (SAP <90mmHg or MAP <65mmHg for 3 minutes or more) yes ☐ no ☐
- Acute arrythmia (AF, VT, SVT or VF) yes ☐ no ☐
- Not anticipated vasoactive drug and on continuous infusion required yes ☐ no ☐

**2. DEFINITIONS**

- Ventilated lung: R (right) or L (left)
- MMG: mechanomyography
- mL: milliliters
- SpO₂: pulse oximetry
- MAP: mean arterial pressure
- VT: ventricular tachycardia
- VF: ventricular fibrillation
- Min: minutes
- Residual curarization
  - Defined as train-of-four (TOF) stimulation rate <0.9 or diagnosed clinically
- Opioids
  - Short duration: alfentanil, fentanyl, sufentanil, remifentanil, morphine
  - Long duration: opioids as extended or prolonged release formulation
- Desaturation
  - Defined as SpO₂ <92% for 3 minutes or more
- Hypotension
  - Defined as systolic arterial pressure <90mmHg or mean arterial pressure <65mmHg for 3 minutes or more

...Continuation...
2. DEFINITIONS

Arythmia
Atrial fibrillation (AF): defined for absolute irregularity of R-R intervals and simultaneous loss of P waves identifiable on EKG recordings
Sustained ventricular tachycardia (V'T): characterized by ≥3 consecutive QRS complex with a wide QRS complex at a HR > 100 beats/min and duration >30 seconds
Supraventricular tachycardia (SVT): identified as a narrow QRS complex (<0.12 seconds) and a HR >180 beats/min
Ventricular fibrillation (VF): defined as a chaotic electrical ventricular activity, with pronounced variability in QRS morphology, amplitude and cycle

Vasoactive drug required
Any non-anticipated and of continuous infusion vasoactive drug required. Drugs considered: phenylephrine, vasopressin, dopamine, norepinephrine, epinephrine, dobutamine, ephedrine, atropine and/or milrinone

3. VENTILATION PARAMETERS

<table>
<thead>
<tr>
<th>Mode</th>
<th>T_1</th>
<th>T_2</th>
<th>T_3</th>
<th>T_4</th>
<th>T_4,1</th>
<th>T_4,2</th>
<th>T_4,3</th>
<th>T_4,4</th>
<th>T_4,5</th>
<th>T_4,6</th>
<th>T_4,7</th>
<th>T_4,8</th>
<th>T_4,9</th>
<th>T_4,10</th>
<th>T_4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ppeak (cmH_2O)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pplateau (cmH_2O)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEEP (cmH_2O)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V_tinspired (mL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR (/min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I:E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FiO_2 (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vital parameters
SpO_2 (%)  etCO_2 (mmHg)
MAP (mmHg)  HR (/min)
Others
Pneumo (mmHg)
Highest value at time

<table>
<thead>
<tr>
<th>Position</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
<th>S_0</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. DEFINITIONS

Ppeak: peak pressure
Pmean: mean pressure
V_t: tidal volume
I:E: inspirationexpiration ratio
etCO_2: end of expirationCO_2 exhaled
HR: Heart rate
Plateau: plateau pressure
Plateau pressure should be measured using an inspiratory pause of at least 5 seconds

PEEP: positive end expiration pressure
RR: respiratory rate
FiO_2: inspired oxygen fraction
SpO_2: pulse oximetry
MAP: mean arterial pressure
Ppneumo: pneumoperitoneum pressure
RA: alveolar recruitment maneuver
PEEP: gradual increase in PEEP with constant tidal volume
V_t: gradual increase in volume with constant PEEP
Double: PEEP and tidal volume are both gradually increased
Bag: manual hyperinflation with balloon/bag
CPAP: positive pressure on airways over 30cmH_2O applied during 10 to 30 seconds
continue...
### 4. DEFINITIONS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>ventilatory mode</td>
</tr>
<tr>
<td>CP</td>
<td>controlled pressure</td>
</tr>
<tr>
<td>VT</td>
<td>tidal volume</td>
</tr>
<tr>
<td>HDD</td>
<td>horizontal dorsal decubitus (supine)</td>
</tr>
<tr>
<td>HVD</td>
<td>horizontal ventral decubitus (prone)</td>
</tr>
<tr>
<td>LD</td>
<td>lateral decubitus</td>
</tr>
<tr>
<td>LIT</td>
<td>lithotomy</td>
</tr>
<tr>
<td>T</td>
<td>Trendelenburg</td>
</tr>
<tr>
<td>RT</td>
<td>Reverse Trendelenburg</td>
</tr>
<tr>
<td>S</td>
<td>seated</td>
</tr>
</tbody>
</table>

### T: surgical moments
1. 5 minutes after initiating mechanical ventilation
2. 5 minutes after performing pneumoperitoneum (do not fill out if not performed)
3. 5 minutes after definitive intraoperative positioning
   4.1 60 minutes after T3
   4.2-4.10 every 60 minutes
4. 5 minutes after pneumoperitoneum evacuation (if performed) and final positioning

### 1. POSTOPERATIVE VISIT ON DAY 0 (END OF SURGERY UNTIL 11:59 pm)

**Recovery**
- Loss to follow-up: yes □ no □
- Continuation of MV after surgery: yes □ no □
- If reintubation, cause:
  - ARF □
  - ALOC □
  - Hemodynamic instability □
- Admission to ICU after surgery: yes □ no □

**Postoperative pulmonary complications**
- Oxygen required: yes □ no □
- if yes FiO₂ (%) offered: ________
- Acute respiratory failure: yes □ no □
  - if yes NIV □
    - yes □
    - no □
    - if yes Interface: mask □
  - no □
- Pneumonia:
  - new/worsening infiltrated + 2: fever, leukocytosis/leucopenia, purulent discharge, antibiotic
  - yes □ no □
- ARDS:
  - yes □ no □
- According to Berlin criteria
  - yes □ no □
- Pneumothorax:
  - yes □ no □

### 2. DEFINITIONS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV</td>
<td>mechanical ventilation</td>
</tr>
<tr>
<td>FiO₂</td>
<td>inspired oxygen fraction</td>
</tr>
<tr>
<td>PaO₂</td>
<td>partial oxygen pressure</td>
</tr>
<tr>
<td>RA</td>
<td>room air</td>
</tr>
<tr>
<td>ARF</td>
<td>acute respiratory failure</td>
</tr>
</tbody>
</table>

**Oxygen required**
Defined as supplementary oxygen used due to PaO₂ <60mmHg or SpO₂ <92% in RA (in individuals without previous lung disease) or SpO₂ <88% (in individuals with previous lung disease)

**Acute respiratory failure**
Defined as PaO₂ <60mmHg or SpO₂ <92%, despite oxygen therapy, or non-invasive (NIV) mechanical ventilation required

**Pneumonia**
Defined by the presence of new or progressive radiographic infiltrate, in addition to at least two to four clinical characteristics: fever >38°C, leukocytosis or leucopenia (leucocyte count >12,000 cells/mm³ or <4,000 cells/mm³), purulent discharge or use of antibiotic

**Acute Respiratory Discomfort Syndrome (ARDS)**
- Time: within a week of a known clinical insult or worsening of respiratory symptoms
- Image: bilateral opacities not totally explained by pleural effusions, pulmonary or lobar collapse or nodules (chest x-ray or computerized tomography)
- Origin of edema: Respiratory failure not totally explained by heart failure or volume overload. Objective assessment required (example: echocardiography) to exclude hydrostatic edema if there is no risk factor present
- Oxygenation:
  - Mild: 200mmHg<PaO₂/FiO₂ <300mmHg with PEEP or CPAP ≥5cmH₂O (can be by NIV)
  - Moderate: 100mmHg<PaO₂/FiO₂ <200mmHg with PEEP
  - Severe: 100mmHg<PaO₂/FiO₂ with PEEP

**Pneumothorax**
Defined as presence of air between visceral and parietal pleura, the diagnosis can be made by physical examination and chest x-ray
Annex 1

1. POSTOPERATIVE VISIT DAY 1 (FROM 0:00 am TO 11:59 pm)

<table>
<thead>
<tr>
<th>Recovery</th>
<th>Loss to follow-up</th>
<th>yes □ no □ if yes discharge □ death □ transfer □ other □: ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>New MV required</td>
<td>yes □ no □</td>
<td></td>
</tr>
<tr>
<td>Admission to ICU required</td>
<td>yes □ no □</td>
<td></td>
</tr>
</tbody>
</table>

Postoperative pulmonary complications

<table>
<thead>
<tr>
<th>Oxygen required</th>
<th>yes □ no □ if yes FiO2 (%) offered: ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>PaO2 &lt;60mmHg or SpO2 &lt;90% in RA</td>
<td>yes □ no □</td>
</tr>
</tbody>
</table>

Acute respiratory failure

<table>
<thead>
<tr>
<th>PaO2 &lt;60mmHg or SpO2 &lt;90% with oxygen or NIV required</th>
<th>yes □ no □ if yes NIV: yes □ no □ if yes, Interface: mask □ helmet □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>yes □ no □</td>
</tr>
</tbody>
</table>

ARDS

<table>
<thead>
<tr>
<th>new/worsening infiltrate + 2: fever, leukocytosis/leucopenia, purulent discharge, antibiotic</th>
<th>yes □ no □ if yes mild □ moderate □ severe □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumothorax</td>
<td>yes □ no □</td>
</tr>
</tbody>
</table>

2. DEFINITION

MV: mechanical ventilation

FiO2: inspired oxygen fraction

PaO2: partial oxygen pressure

RA: room air

SpO2: pulse oximetry

MV: mechanical ventilation

Oxygen required defined as supplementary oxygen used due to PaO2 <60mmHg or SpO2 <90% in room air (in individuals without previous pulmonary disease) or SpO2 <88% (in individuals with previous pulmonary disease)

Acute respiratory failure defined as PaO2 <60mmHg or SpO2 <92%, despite oxygen therapy, or required non-invasive mechanical ventilation (NIV)

Pneumonia defined by the presence of new or progressive radiographic infiltrate, in addition to at least two of four clinical characteristics: fever >38°C, leukocytosis or leucopenia (leucocyte count >12,000 cells/mm³ or <4,000 cells/mm³), purulent discharge or use of antibiotic

Acute Respiratory Discomfort Syndrome (ARDS) Time: within one week of known clinical insult or worsening of respiratory symptoms

Image: bilateral opacities not totally explained by pleural effusions, pulmonary or lobar collapse or nodules (chest x-ray or computerized tomography)

Origin of edema: respiratory failure not totally explained by heart failure or volume overload. Needs objective assessment (example: echocardiography) to exclude hydrostatic edema, if there is no risk factor present

Oxygenation:

Mild: 200mmHg <PaO2/FiO2 ≤300mmHg with PEEP or CPAP ≥5cmH2O (can be via NIV)

Moderate: 100mmHg <PaO2/FiO2 ≤200mmHg with PEEP

Severe: 100mmHg ≤PaO2/FiO2 with PEEP

Pneumothorax defined as the presence of air between visceral and parietal pleura, the diagnosis can be made by physical examination and chest x-ray

1. POSTOPERATIVE VISIT ON DAY 2 (FROM 0:00 am TO 11:59 pm)

<table>
<thead>
<tr>
<th>Recovery</th>
<th>Loss to follow-up</th>
<th>yes □ no □ if yes discharge □ death □ transfer □ other □: ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>New MV required</td>
<td>yes □ no □</td>
<td></td>
</tr>
<tr>
<td>Admission to ICU required</td>
<td>yes □ no □</td>
<td></td>
</tr>
</tbody>
</table>

Postoperative pulmonary complications

<table>
<thead>
<tr>
<th>Oxygen required</th>
<th>yes □ no □ if yes FiO2 (%) offered: ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>PaO2 &lt;60mmHg or SpO2 &lt;90% in RA</td>
<td>yes □ no □</td>
</tr>
</tbody>
</table>

Acute respiratory failure

<table>
<thead>
<tr>
<th>PaO2 &lt;60mmHg or SpO2 &lt;90% with oxygen or NIV required</th>
<th>yes □ no □ if yes NIV: yes □ no □ if yes, Interface: mask □ helmet □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>yes □ no □</td>
</tr>
</tbody>
</table>

ARDS

<table>
<thead>
<tr>
<th>new/worsening infiltrate + 2: fever, leukocytosis/leucopenia, purulent discharge, antibiotic</th>
<th>yes □ no □ if yes mild □ moderate □ severe □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumothorax</td>
<td>yes □ no □</td>
</tr>
</tbody>
</table>
### 2. DEFINITIONS

| MV: mechanical ventilation | ICU: intensive care unit |
| FiO₂: inspired oxygen fraction | NIV: non-invasive ventilation |
| PaO₂: partial oxygen pressure | SpO₂: pulse oximetry |
| RA: room air | ARDS: acute respiratory discomfort syndrome |

**Oxygen required**
- defined as supplementary oxygen used due to PaO₂ <60mmHg or SpO₂ <92% in room air (in individuals without previous pulmonary disease) or SpO₂ <88% (in individuals with previous pulmonary disease)

**Acute respiratory failure**
- defined as PaO₂ <60mmHg or SpO₂ <92%, despite oxygen therapy, or non-invasive mechanical ventilation required (NIV)

**Pneumonia**
- defined by the presence of new or progressive radiographic infiltrate, in addition to at least two of four clinical characteristics: fever >38°C, leukocytosis or leucopenia (leucocyte count >12,000 cells/mm³ or <4,000 cells/mm³), purulent discharge or use of antibiotic

**Acute Respiratory Discomfort Syndrome (ARDS)**
- Time: within one week of known clinical insult or worsening of respiratory symptoms
- Image: bilateral opacities not totally explained by pleural effusions, pulmonary or lobar collapse or nodules (chest x-ray or computerized tomography)
- Origin of edema: respiratory failure not totally explained by heart failure or volume overload. Needs objective assessment (example: echocardiography) to exclude hydrostatic edema, if there is no risk factor present

**Oxygenation:**
- Mild: 200mmHg < PaO₂/FiO₂ ≤300mmHg with PEEP or CPAP ≥5cmH₂O (can be via NIV)
- Moderate: 100mmHg < PaO₂/FiO₂ ≤200mmHg with PEEP
- Severe: 100mmHg ≤ PaO₂/FiO₂

**Pneumothorax**
- defined as the presence of air between visceral and parietal pleura, the diagnosis can be made by physical examination and chest x-ray

---

### 1. POSTOPERATIVE VISIT ON DAY 3 (FROM 0:00 am TO 11:59 pm)

<table>
<thead>
<tr>
<th>Recovery</th>
<th></th>
</tr>
</thead>
</table>
| Loss to follow-up | yes □ no □ if yes discharge □ death □ transfer □ other □: _______
| New MV required | yes □ no □ |
| Admission to ICU required | yes □ no □ |

**Postoperative pulmonary complications**

| Oxygen required | yes □ no □ if yes FiO₂ (%) offered: _______
| PaO₂ <60mmHg or SpO₂ <90% in RA | |
| Acute respiratory failure | yes □ no □ if yes Use of NIV: yes □ no □ if yes Interface: mask □ helmet □ |
| PaO₂ <60mmHg or SpO₂ <90% with oxygen or NIV required | |

**Pneumonia**
- new/worsening infiltrate + 2: fever, leukocytosis/leucopenia, purulent discharge, antibiotic
- ARDS according to Berlin criteria
- Pneumothorax
  - air between visceral and parietal pleura

### 2. DEFINITIONS

| MV: mechanical ventilation | ICU: intensive care unit |
| FiO₂: inspired oxygen fraction | NIV: non-invasive ventilation |
| PaO₂: partial oxygen pressure | SpO₂: pulse oximetry |
| RA: room air | ARDS: acute respiratory discomfort syndrome |

**Oxygen required**
- defined as supplementary oxygen used due to PaO₂ <60mmHg or SpO₂ <92% in room air (in individuals without previous pulmonary disease) or SpO₂ <88% (in individuals with previous pulmonary disease)

**Acute respiratory failure**
- defined as PaO₂ <60mmHg or SpO₂ <92%, despite oxygen therapy, or non-invasive mechanical ventilation required (NIV)

**Pneumonia**
- defined by the presence of new or progressive radiographic infiltrate, in addition to at least two of four clinical characteristics: fever >38°C, leukocytosis or leucopenia (leucocyte count >12,000 cells/mm³ or <4,000 cells/mm³), purulent discharge or use of antibiotic

---
Annex 1

2. DEFINITIONS

Acute Respiratory Discomfort Syndrome (ARDS)
Time: within one week of known clinical insult or worsening of respiratory symptoms
Image: bilateral opacities not totally explained by pleural effusions, pulmonary or lobar collapse or nodules (chest x-ray or computerized tomography)
Origin of edema: respiratory failure not totally explained by heart failure or volume overload. Needs objective assessment (example: echocardiography) to exclude hydrostatic edema, if there is no risk factor present
Oxygenation:
Mild: 200mmHg <PaO₂/FiO₂ ≤300mmHg with PEEP or CPAP ≥5cmH₂O (can be via NIV)
Moderate: 100mmHg <PaO₂/FiO₂ ≤200mmHg with PEEP
Severe: 100mmHg ≤PaO₂/FiO₂ with PEEP
Pneumothorax
defined as the presence of air between visceral and parietal pleura, the diagnosis can be made by physical examination and chest x-ray

1. POSTOPERATIVE VISIT ON DAY 4 (FROM 0:00 am TO 11:59 pm)

<table>
<thead>
<tr>
<th>Recovery</th>
<th>yes</th>
<th>no</th>
<th>if yes</th>
<th>discharge</th>
<th>death</th>
<th>transfer</th>
<th>other: __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss to follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New MV required</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission to ICU required</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postoperative pulmonary complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen required</td>
<td>yes</td>
<td>no</td>
<td>if yes</td>
<td>FiO₂ (%) offered: __________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PaO₂ &lt;60mmHg or SpO₂ &lt;90% in RA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute respiratory failure</td>
<td></td>
<td></td>
<td></td>
<td>Use of NIV: yes</td>
<td>no</td>
<td>if yes</td>
<td></td>
</tr>
<tr>
<td>PaO₂ &lt;60mmHg or SpO₂ &lt;90% with oxygen or NIV required</td>
<td>yes</td>
<td>no</td>
<td>if yes</td>
<td>Interface: mask</td>
<td>helmet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>new/worsening infiltrate + 2: fever, leukocytosis/leucopenia, purulent discharge, antibiotic</td>
<td>yes</td>
<td>no</td>
<td>if yes</td>
<td>mild</td>
<td>moderate</td>
<td>severe</td>
<td></td>
</tr>
<tr>
<td>ARDS according to Berlin criteria</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. DEFINITIONS

MV: mechanical ventilation
FiO₂: inspired oxygen fraction
PaO₂: partial oxygen pressure
RA: room air
SpO₂: pulse oximetry
PaO₂/FiO₂: partial oxygen pressure/ inspired oxygen fraction
Oxygen required
defined as supplementary oxygen used due to PaO₂ <60mmHg or SpO₂ <92% in room air (in individuals without previous pulmonary disease) or SpO₂ <88% (in individuals with previous pulmonary disease)
Acute respiratory failure
defined as PaO₂ <60mmHg or SpO₂ <92%, despite oxygen therapy, or non-invasive mechanical ventilation required (NIV)
Pneumonia
defined by the presence of new or progressive radiographic infiltrate, in addition to at least two of four clinical characteristics: fever >38°C, leukocytosis or leucopenia (leucocyte count >12,000 cells/mm³ or <4,000 cells/mm³), purulent discharge or use of antibiotic
Acute Respiratory Discomfort Syndrome (ARDS)
Time: within one week of known clinical insult or worsening of respiratory symptoms
Image: bilateral opacities not totally explained by pleural effusions, pulmonary or lobar collapse or nodules (chest x-ray or computerized tomography)
Origin of edema: respiratory failure not totally explained by heart failure or volume overload. Needs objective assessment (example: echocardiography) to exclude hydrostatic edema, if there is no risk factor present
Oxygenation:
Mild: 200mmHg <PaO₂/FiO₂ ≤300mmHg with PEEP or CPAP ≥5cmH₂O (can be via NIV)
Moderate: 100mmHg <PaO₂/FiO₂ ≤200mmHg with PEEP
Severe: 100mmHg ≤PaO₂/FiO₂ with PEEP
Pneumothorax
defined as the presence of air between visceral and parietal pleura, the diagnosis can be made by physical examination and chest x-ray

continue...
Annex 1

1. POSTOPERATIVE VISIT ON DAY 5 (FROM 0:00 am TO 11:59 pm)

<table>
<thead>
<tr>
<th>Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss to follow-up</td>
</tr>
<tr>
<td>New MV required</td>
</tr>
<tr>
<td>Admission to ICU required</td>
</tr>
</tbody>
</table>

Postoperative pulmonary complications

| Oxygen required | yes □ | no □ |
| PaO₂ < 60mmHg or SpO₂ <90% in RA | if yes |
| Acute respiratory failure | yes □ | no □ |
| PaO₂ < 60mmHg or SpO₂ <90% with oxygen or NIV required | if yes |
| Pneumonia | yes □ | no □ |
| new/worsening infiltrate + 2: fever, leukocytosis/leucopenia, purulent discharge, antibiotic | if yes |
| ARDS | yes □ | no □ |
| according to Berlin criteria | if yes |

| Pneumothorax | yes □ | no □ |
| air between visceral and parietal pleura | |

2. DEFINITIONS

MV: mechanical ventilation
FiO₂: inspired oxygen fraction
PaO₂: partial oxygen pressure
RA: room air

Oxygen required defined as supplementary oxygen used due to PaO₂ < 60mmHg or SpO₂ < 92% in room air (in individuals without previous pulmonary disease) or SpO₂ < 88% (in individuals with previous pulmonary disease).

Acute respiratory failure defined as PaO₂ < 60mmHg or SpO₂ < 92%, despite oxygen therapy, or non-invasive mechanical ventilation required (NIV).

Pneumonia defined by the presence of new or progressive radiographic infiltrate, in addition to at least two of four clinical characteristics: fever > 38°C, leukocytosis or leucopenia (leucocyte count > 12,000 cells/mm³ or < 4,000 cells/mm³), purulent discharge or use of antibiotic.

Acute Respiratory Discomfort Syndrome (ARDS) Time: within one week of known clinical insult or worsening of respiratory symptoms
Image: bilateral opacities not totally explained by pleural effusions, pulmonary or lobar collapse or nodules (chest x-ray or computerized tomography)
Origin of edema: respiratory failure not totally explained by heart failure or volume overload. Needs objective assessment (example: echocardiography) to exclude hydrostatic edema, if there is no risk factor present.

Oxygenation:
Mild: 200mmHg < PaO₂/FiO₂ < 300mmHg with PEEP or CPAP ≥ 5cmH₂O (can be via NIV)
Moderate: 100mmHg < PaO₂/FiO₂ ≤ 200mmHg with PEEP
Severe: 100mmHg ≤ PaO₂/FiO₂ with PEEP

Pneumothorax defined as the presence of air between visceral and parietal pleura, the diagnosis can be made by physical examination and chest x-ray.

1. DISCHARGE VISIT (DAY OF DISCHARGE)

<table>
<thead>
<tr>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of admission: ___ / ___ / ______</td>
</tr>
<tr>
<td>Date of discharge: ___ / ___ / ______</td>
</tr>
<tr>
<td>Length of hospital stay: _______ days</td>
</tr>
<tr>
<td>Death during hospital stay</td>
</tr>
<tr>
<td>if yes Date of death: ___ / ___ / ______</td>
</tr>
<tr>
<td>Comments:</td>
</tr>
</tbody>
</table>