

ANEXA 1.

Tabel 1.







Echipament individual de protectie (PPE)

PPE necesar	Contact apropiat (la distanta mai mica de 1m) cu pacient CAZ POSIBIL		Contact cu CAZ CONFIRMAT
	FARA PGA*	PGA*	
Igiena mainilor	DA	DA	DA
Manusi	DA	DA	DA
Sort impermeabil de unica folosinta	DA	NU	NU
Halat de unica folosinta cu maneca lunga	NU	DA	DA
Masca chirurgicala (b)	DA	NU	NU
Masca FFP3	NU	DA	DA
Protectie oculara	Evaluarea riscului (c)	DA	DA

*PGA - Proceduri care genereaza aerosoli

Tabelul 2.

PROCEDURĂ de ÎMBRĂCARE Echipament Protecție COVID-19

<p>Etapa 1 : boneta</p>	
<p>Etapa 2 : mască FFP2 (fit-check)</p>	 <p>Odată ce dezinfectarea a fost efectuată într-o cameră, aveți grijă să nu atingeți masca sau boneta (in caz de contact: dezinfectarea mâinilor cu o soluție hidro-alcoolică)</p>
<p>Etapa 3 : dezinfectarea mâinilor cu o soluție hidro-alcoolică</p>	
<p>Etapa 4 : Ochelari de protecție</p>	
<p>Etape 5 : halat plastic X2</p>	
<p>Etapa 6 : Mănuși nesterile X 2</p>	

PROCEDURĂ de DEZBRĂCARE Echipament Protecție COVID-19

Etapa 1 : scoatere halat plastic (se arunca la deseuri infectioase, ca fiecare element de protecție)



Etapa 2 inlaturare mănuși



Etapa 3 : dezinfectarea mâinilor cu o soluție hidro-alcoolică



Etapa 4 : inlaturare halat plastic N°2



Etapa 5 : dezinfectarea mâinilor cu o soluție hidro-alcoolică



Etape 6 : inlaturare ochelari de protecție



Etapa 7 : dezinfectarea mâinilor cu o soluție hidro-alcoolică



Etapa 8 : inlaturare mască si boneta



Etapa 9 : dezinfectarea mâinilor cu o soluție hidro-alcoolică



Tabelul 3.

Rezumatul recomandarilor privitoare la gestionarea COVID in reanimare

Pregatire	Masuri de igiena	Gestionarea pacientilor	Tratamente specifice
<ul style="list-style-type: none"> - Anticiparea circuitelor pacientilor - Estimarea nevoilor - Identificarea resurselor locale - Anticiparea unui aflux masiv de pacienti - Formarea echipelor - Antrenarea cu masurile de bariera/protectie 	<p>Masuri generale</p> <ul style="list-style-type: none"> - Dezinfectie hidro-alcoolica <p>Triaj:</p> <ul style="list-style-type: none"> - Masca chirurgicala cand exista contact cu pacientul la mai putin de 1m - Masca FFP2 pentru toti pacientii cu insuf respiratorie acuta <p>Spitalizarea cazului suspect/confirmat</p> <ul style="list-style-type: none"> - Ideal in camera individuala cu presiune negativa si aer tratat. - Minimum camera cu presiune nula si masuri de bariera si aerisirea incintelor <p>Masuri bariera in caz suspect/ confirmat</p> <ul style="list-style-type: none"> - Boneta - Masca FFP2 - Ochelari de protectie - Halat cu maneci lungi - Manusi - Procedeu de dezecupare riguros - https://www.mircochin.fr/videoplayer/3070# 	<ul style="list-style-type: none"> - Evitarea pe cat posibil a ventilatiei non-invazive si O2 cu debit inalt - Procedura specifica de ventilatie mecanica si a managementului cailor aeriene - https://mms.myomni.live/5e6126fdb44d66709afab1 - Limitarea transportului pacientului si evaluarea raportului risc-beneficiu privind deplasarea pacientului 	<ul style="list-style-type: none"> - Tratament specific indicat la pacientii cu insuf respiratorie acuta - Administrarea antibioterapiei la pacientii gravi - Molecula de electie : Remdesivir - Alternativa : Lopinavir/ritonavir - Alternativa : Hydroxy-chlorochina - A nu se utiliza steroizi - A nu se utiliza Ribavirine

Figura 1.



Figure: First case of 2019 novel coronavirus in Canada
Chest x-ray shows bilateral, peribronchovascular, ill-defined opacities in all lung zones.

Figura 2. Pacient cu ARDS non-sever ziua 8 (A) și ziua 15 (B) post-admisie spital

Pacient cu ARDS sever ziua 1 (C) și ziua 4 (D) post-admisie

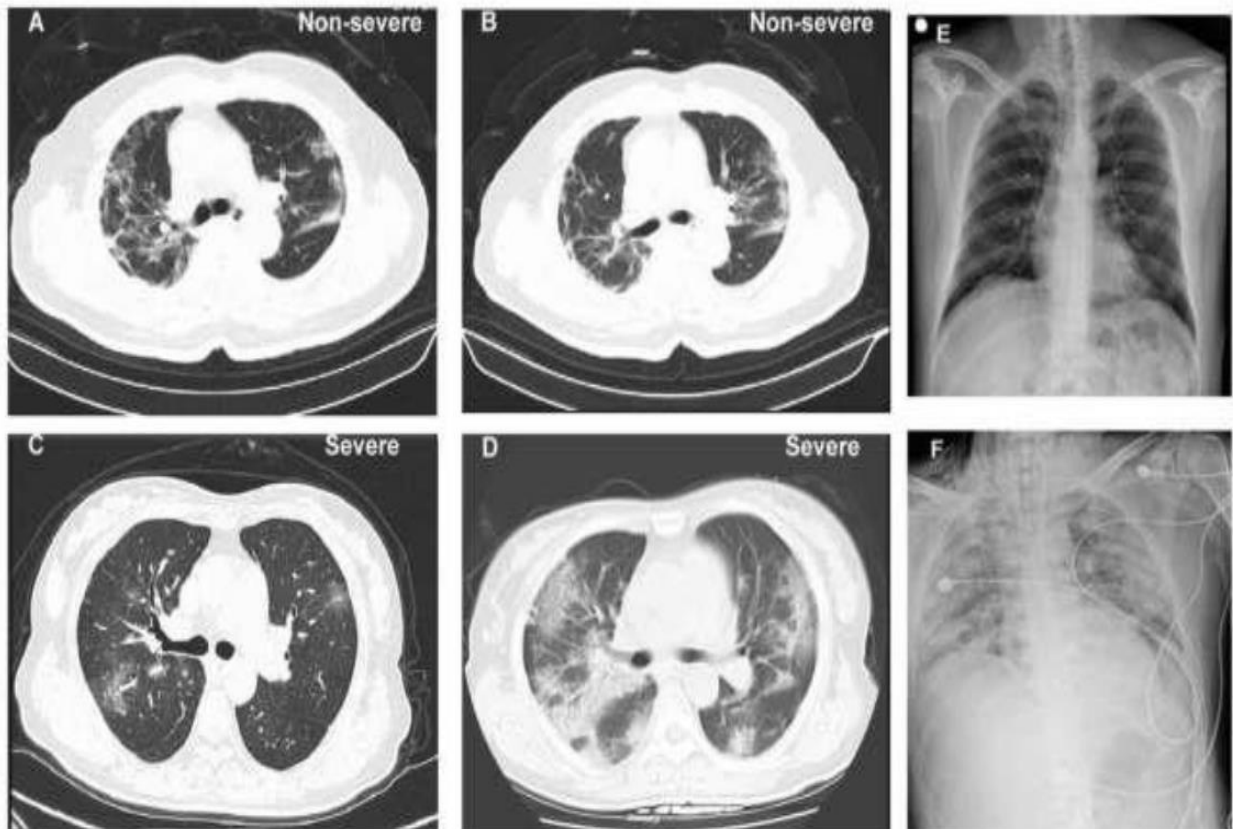


Figura 3. Echografie pulmonară la pacient cu ARDS datorat COVID-19

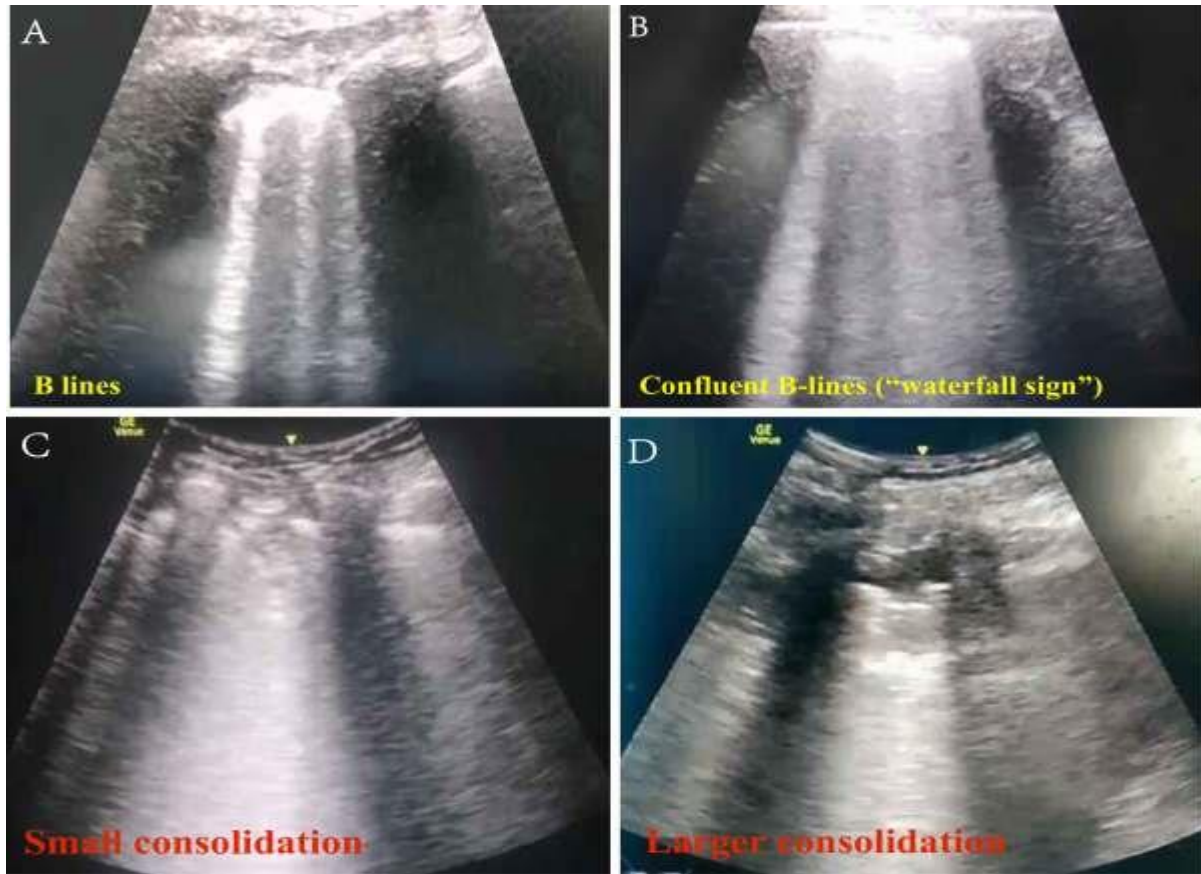
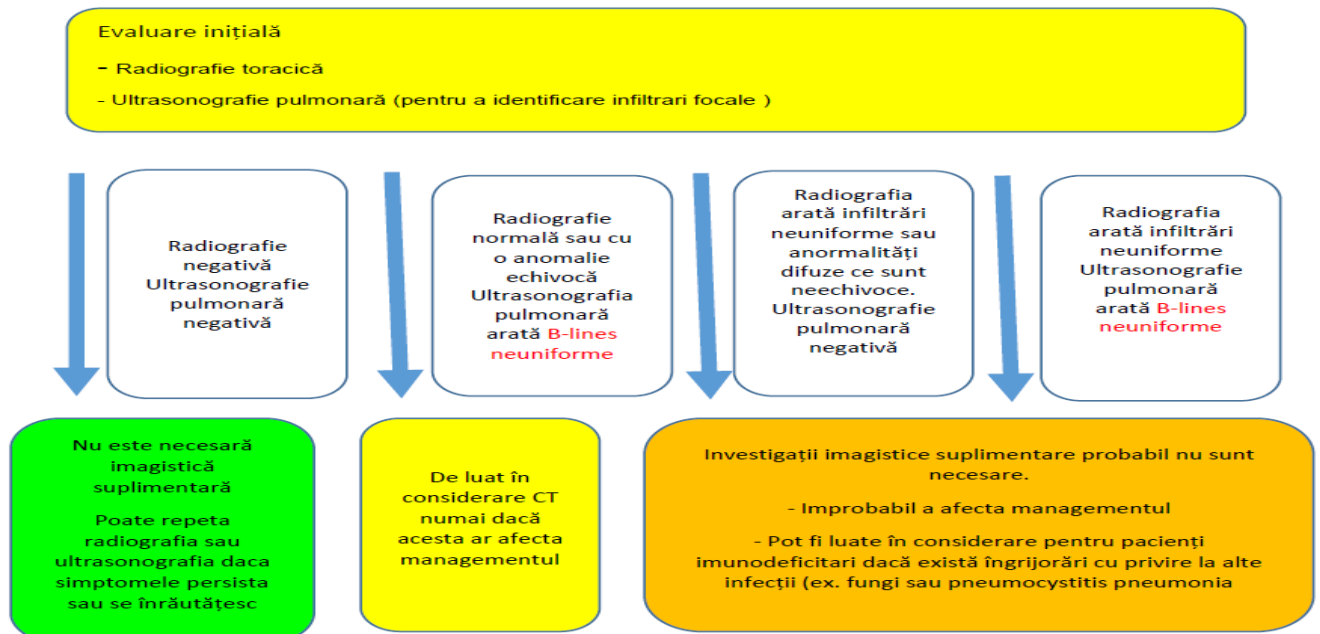


Figura 4. Aloritm de utilizare CT în COVID-19



Tabel. 4

Admission laboratory pattern in patients with COVID-19

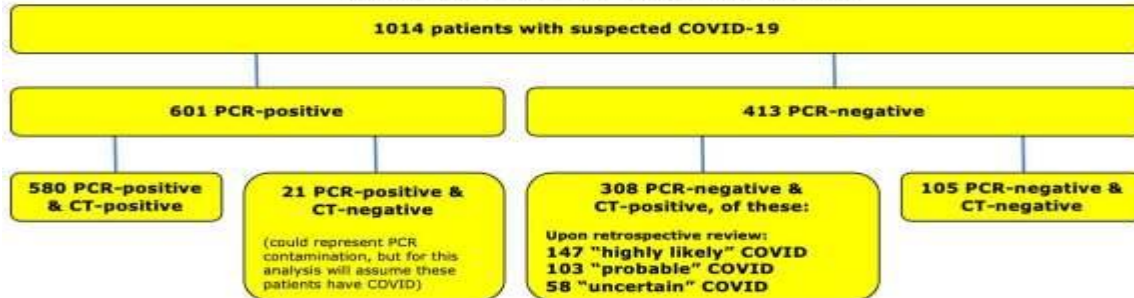
	Guan et al NEJM (largest cohort)	Shi et al Lancet	Chen et al Lancet	Huang et al. Lancet	Xu et al. BMJ
WBC count	4.7 (3.5-6)	7.8 (2.5)	7.5 (4)	6.2 (4-10.5)	4.7 (3.5-5.8)
Platelet count	168 (132-207)	213 (100)	214 (79)	164 (132-263)	176 (136-215)
Lymphocyte count (normally >1)	1 (0.7-1.3)	1 (0.3)	0.9 (0.5)	0.8 (0.6-1.1)	1 (0.8-1.5)
Hemoglobin	13.4 (12-15)	12.7 (1.3)	13 (1.5)	12.6 (11.8-14)	13.7 (12.9-15.2)
ALT (U/L)		51 (25)	39 (22-53)	32 (21-50)	22 (14-34)
AST (U/L)		48 (21)	34 (26-48)	34 (26-48)	26 (20-32)
Bilirubin uM/L (normal range 5-22 uM/L)		14 (4)	15 (7)	12 (10-14)	
Creatinine (normal range up to ~80-100 uM)		68 (15)	76 (25)	74 (58-86)	72 (61-84)
Prothrombin time (normal range ~12.7-15.4)		10.5 (0.4)	11 (2)	11 (10-12.4)	
APTT (normal range ~21-37 seconds)		34 (7)	27 (10)		
Thrombin time (normal range ~15-18.5)		32 (8)			
Fibrinogen mg/dL		192 (350)			
D-dimer (mg/L) – (NI range seems to vary?)		6.9 (1.1)	0.9 (0.5-2.8)	0.5 (0.3-1.3)	0.2 (0.2-0.5)
Creatinine kinase			85 (51-184)		
LDH (normal range up to 250 U/L)			336 (260-447)	286 (242-408)	205 (184-260)
C-Reactive Protein mg/L		61 (40)	51 (42)		
Procalcitonin	<0.5 in 95% patients		0.5 (1)	0.1 (0.1-0.1)	0.04 (0.03-0.06)
Erythrocyte sedimentation rate (ESR)			50 (23)		
Ferritin			808 (490)		

Laboratory findings are generally nonspecific. Substantial *deviation* from these values might argue *against* a diagnosis of COVID-19. However, in most cases, laboratory findings are unlikely to be tremendously helpful.

Tabel 5.

Relative performance of PCR vs. CT scan?

(Retrospective study by Ai T et al. in Wuhan, China)



		If probable & uncertain pts DON'T have COVID	If probable & uncertain pts DO have COVID
PCR assay			
	Sensitivity	601/748 = 80%	601/909 = 66%
	Specificity	(Assumed 100% for this analysis)	
CT scan			
	Sensitivity	727/748 (97%)	888/909 (98%)
	Specificity	727/888 (82%)	888/888 (100%)

Attempts to sort out sensitivity & specificity in the largest radiographic series. Lack of a gold-standard diagnosis makes this ambiguous. Depending on what assumptions we make, performance of PCR & CT may vary somewhat.

-The Internet Book of Critical Care, by @PulmCrit

Figura 5. CHECK-LIST IOT

CHECK-LIST **Intubația pacienților cu COVID-19**

Echipament personal de protecție (EPP)

- EPP standard
 - Recomandat mască FFP 3 (în lipsă, mască N95/FFP2)
 - Protecție oculară (ochelari dedicați și eventual vizieră / scut)
 - Halat impermeabil, mănuși impermeabile, bonetă, botoși
- Suplimentar (în funcție de disponibilitate)
 - Glugă pentru acoperirea gâtului (dacă nu este disponibilă, utilizați o calotă pentru acoperirea părului)
 - Două perechi de mănuși (prima pereche în contact cu piele va fi de preferat o pereche de mănuși chirurgicale lungi)
 - Costum care acoperă complet corpul

Medicație utilizată și pregătirea sondei de intubație

- Doză mare de curară (cel puțin 1.2 mg/kg rocuronium)
- Calculați anterior nivelul la care veți fixa sonda IOT (utilizați MDCalc)

Materiale

- Videolaringoscop cu diferite lame
- Ventilator cu valvă PEEP și filtru cu proprietăți antivirale (HME)
- Filtru antiviral adițional pe portul de expir al ventilatorului

Procedură

- Limitați numărul de persoane prezente în cameră
- Intubația va fi realizată de cel mai experimentat membru al echipei
- Pre-oxigenarea: opțiunile pot include:
 - Doar administrarea de oxigen 100% pe mască facială
 - BiPAP plus filtru antiviral (HME)
 - Ventilație pe mască cu filtru antiviral (HME), valvă PEEP și mască de ventilație
- În momentul apneei
 - BiPAP: continuați
 - Ventilație pe mască: etanșeizați masca pe fața pacientului pentru a preveni derecrutare, dar NU ventilați activ pacientul
- Umflați balonașul sondei de intubație ÎNAINTE de a VENTILA
- Securizați sonde de intubația la nivelul stabilit anterior

Post-procedură de intubație

Îndepărtați EPP cofrom unei proceduri în care v-ați antrenat anterior (pentru mâini, utilizați soluția de dezinfecție de bază de alcool înainte și după îndepărtarea EPP).

Figura 6. Management Căi Aeriene COVID-19 Poster ESA

European Society of Anaesthesiology




COVID-19

Reference
Wang C, Horby PW, Hayden FG, Gao GF (2020). A novel coronavirus outbreak of global health concern. *The Lancet* 395(1023): 474-475.
Centers for Disease Control and Prevention. Coronavirus. <https://www.cdc.gov/coronavirus/about/index.html>. Accessed February 2020.
Livingston E, Bucher K, Rakito A. Coronavirus Disease 2019 and Influenza. *JAMA*. Published online February 26, 2020. doi:10.1001/jama.2020.2930
WHO - Clinical management of severe acute respiratory infection when Novel coronavirus (2019-nCoV) infection is suspected: Interim Guidance.
Janson M, Liao X, Rele J. Strengthening ICU health security for a coronavirus epidemic. *Intensive Crit Care Nurs*. 2020;Feb 7:102812. doi: 10.1016/j.iccn.2019.102812
Phelan AL, Katz R, Sood DD. The novel coronavirus outbreak in Wuhan, China: challenges for global health governance. *JAMA*. Published online January 30, 2020. doi:10.1001/jama.2020.1897
Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. *Crit Care J*. 2020;Feb 12. doi:10.1097/CCO.0000000000000551
Hingolo Zhang, Wenting Yao, Li Xia, Xiaohui Chi, Wei Mei. Current Protocol for Emergency Tracheal Intubation in Patients with 2019 novel coronavirus (2019-nCoV) Pneumonia Department of Anesthesiology, Tongji Hospital, Tongji Medical College, Huashong University of Science and Technology, Wuhan, Hubei, China
Yui T, Uchiyama TW, et al. Evidence of airborne transmission of the severe acute respiratory syndrome virus. *N Engl J Med*. 2004;350(17):1731-1739
Peng, Philip WA, et al. Outbreak of a new coronavirus: what anesthesiologists should know. *British Journal of Anaesthesia*. In press. doi: <https://doi.org/10.1016/j.bja.2020.02.008>

AIRWAY MANAGEMENT

HIGHLIGHTS

- ▶ INTEGRATED COMPETENCIES FOR EVERY PHASE/STEP
- ▶ AIRBORNE PROTECTION FOR EVERY PHASE/STEP
- ▶ ANTICIPATE NEEDS, MAXIMIZE FIRST-PASS SUCCESS

DOUBLE-CHECK INDICATIONS FOR ENDOTRACHEAL INTUBATION

- ▶ Adopt Early Warning Scores for intubation/quod vitam prognosis (consider DNR cases)
- ▶ Identify negative pressure environment
- ▶ Balance benefits of CPAP/BIPAP/NIV/HFNO versus risks of airborne diffusion
- ▶ IF INTUBATION is required, prefer ELECTIVE procedure (in emergency >> patient risk)

TEAM PREPARATION

- ▶ Minimize the number of team members:

 - 1 The most expert team member should perform the intubation and advanced airway control/ventilation (with donned PPE) [INSIDE the chamber]
 - 2 EXPERT assistant on protocols and devices (doctor/nurse with donned PPE) [INSIDE the chamber]
 - 3 Second doctor with donned PPE if complex maneuver/difficult airway is expected/planned [INSIDE the chamber]
 - 4 Doctor available with donned PPE [OUTSIDE the chamber]
 - 5 PPE donning/doffing Observer [OUTSIDE]

CARRY OUT PRELIMINARY BRIEFING FOR ROLE DEFINITION, STRATEGY DEFINITION, IDENTIFICATION OF DONNING/DOFFING OBSERVER

PPE DONNING

- ▶ Second level PPE (airway management) FFP3, facial shield, long sleeve fluid-resistant scrubs, double gloves, overshoes
- ▶ Third level PPE (aerosol generating procedures - bronchoscopy, awake endotracheal intubation, etc.) helmet in place of FFP3, facial shield, long sleeve fluid-resistant scrubs, double gloves, overshoes

DONNING/DOFFING OBSERVER EXTERNALLY CHECKING, INDIVIDUAL DONNING

One of the most critical issues regarding 2019 nCoV patients is the transitory phase between initial symptoms and potentially severe evolution requiring critical care, while taking into account the comorbidities. The choice of supplementary oxygen delivery interface and the decision to provide invasive ventilatory support is crucial. These decisions have the potential of impacting outcome and may lead to consequences on saturation of critical care beds. Non-invasive support methods (CPAP, BIPAP, NIV, HFNO) might correct hypoxemia and counterbalance respiratory failure (though univocal data are missing) and may either delay or avoid endotracheal intubation (with potential complications and effects on outcome). Nevertheless, data from the SARS epidemic provide evidence showing that these ventilatory techniques might favor the risk of airborne viral spreading. Given the nature of nCoV 19 in terms of contagiousness, should the patient require, or be expected to necessitate

invasive ventilator support, an elective endotracheal intubation should be preferred, or even anticipated, rather than waiting for an emergency procedure (in the precipitating patient) as to minimize complications of intubation itself and also to reduce both the risks of procedural errors and the contamination of healthcare providers. Adoption of early warning scores (EWS), shared and predefined strategies, multidisciplinary team training and simulation of possible scenarios are highly recommended, taking also into account the available levels of care and feasibility of critical care levels of assistance in a non-ICU environment. The decisional elements for airway management, oxygenation and invasive ventilator support thus include competencies and organization and available human and environmental resources. Vigilance in prevention, strict adherence of donning/doffing of PPE, preparedness for the care of infected patients remain priority and of utmost importance.

CLINICAL CHECKLIST (wearing PPE)

- ▶ COMPLETE EVALUATION OF AIRWAYS AND OXYGENATION (accept difficult airway management risk overestimation)
- ▶ HEMODYNAMIC EVALUATION ▶ PRE-EMPTIVE HEMODYNAMIC OPTIMIZATION

AIRWAY INSTRUMENTATION

- ▶ HME FILTER ON EVERY OXYGENATION INTERFACE (face mask, circuit, endotracheal tube, supraglottic airway devices, introducer, airway exchange catheters)
- ▶ AIRWAY CART READY (DISPOSABLE devices preferable)
- ▶ SUCTION: CLOSED SYSTEM
- ▶ ANTI-FOGGING
- ▶ MEDICATIONS: PREPARED AND DOUBLE-CHECKED
- ▶ EMERGENCY CART READY (DISPOSABLE devices preferable)

AWAKE INTUBATION NOT INDICATED:

- ▶ PREOXYGENATION (according to respiratory and hemodynamic status)
 - 3min' at TV FiO₂=100%
 - or 1min' at FVC 8 breaths FiO₂=100%
 - or CPAP/PSV 10 cm H₂O + PEEP 5 cm H₂O FiO₂=100%
- ▶ RSI in all patients (limit BMV **unless** unavoidable and **apply** Cricoid Pressure only in case of ongoing regurgitation)
- ▶ NASAL PRONGS 3 LT/MIN FIO₂=100% FOR APNOIC PHASE (NODESAT)
- ▶ FULL DOSE NEUROMUSCULAR BLOCK RESPECT onset time for laryngoscopy
 - > 1st LARYNGOSCOPY: prefer VIDEOLARYNGOSCOPE with separate screen + endotracheal tube pre-loaded on introducer
 - Re-oxygenate with low TV/pressure between attempts -Early switch (after failed second attempt) to supraglottic airway devices (prefer second generation - intubable SADs)
 - > INTUBATION THROUGH SUPRAGLOTTIC AIRWAY DEVICES: flexible endoscope with separate screen (prefer DISPOSABLE)
- ▶ EARLY CRICOTHYROTOMY IF CI-CO

AWAKE INTUBATION INDICATED (only if really mandatory):

- ▶ AIRWAY TOPICALIZATION: no aerosol/vaporization
- ▶ TITRATED SEDATION (INFUSION PUMP) - sedation depth monitoring
- ▶ FLEXIBLE ENDOSCOPE WITH SEPARATE SCREEN (PREFER DISPOSABLE)
- ▶ RESCUE: INTUBATION THROUGH SUPRAGLOTTIC AIRWAY DEVICES (see above)
- ▶ EARLY CRICOTHYROTOMY IF CI-CO

TUBE POSITION CONTROL - PROTECTIVE VENTILATION

- ▶ CAPNOGRAPHIC CURVES repeated and with standard morphology (if in doubt take it out)
- ▶ AVOID useless circuit disconnections (if needed: ventilator on stand-by/clamp endotracheal tube)
- ▶ CONSIDER indications for advanced techniques: ECMO - experts advise

PPE DOFFING

- ▶ During and after PPE doffing, hands hygiene mandatory
- ▶ Donning/doffing observer externally checking, individual doffing
- ▶ Waste disposal

TRANSPORT

- ▶ Follow bio-containment regulations

- S** - Secure airway: anticipated intubation
- T** - Team briefing
- O** - Organize (competencies - team - pathways)
- P** - Prepare (devices)
- C** - Checklist - controls- crisis management
- O** - Optimize (hemodynamics - oxygenation)
- V** - Vigilated donning/doffing
- I** - Invasive airways - evaluation and integrated airway management
- D** - Debriefing



Massimiliano Sorbello, Ida Di Giacinto, Filippo Bressan, Flavia Petri
on behalf SIARTI Airway Management Research Group