In collaboration with

INDICATIONS FOR RESPIRATORY PHYSIOTHERAPY IN PATIENTS WITH COVID-19 INFECTION [1]

updated on 16/03/2020

This document is intended to help physiotherapists involved in management of patients with COVID-19. Considering the complexity and fragility of the subjects who are affected, we recommend, where possible, to refer to physiotherapists with experience and / or specialist training in Physiotherapy Respiratory that will provide support in translating and adapting to specific clinical realities as described in our document and in the other official guidelines shown here.

PREMISE

Considering the continuous and rapid evolution of the epidemiological framework, the indications contained in this document are **NOT to** be considered as prescriptive and must ALWAYS be adapted to the directives of the "Crisis Units" and approved by the Directors of the structures in charge of managing subjects affected by Covid-19 in the specific area

work of each individual professional.

1 Adapted from "Care pathway for the patient with COVID-19 Section 2 - Recommendations for local management of critically ill patients - version 01 Published 14.03.2020 "by SIAARTI and from the document "Pneumological management of patients with respiratory infection with COVID-19" 08/03/2020 from AIPO - SIP.

1. INTRODUCTION

The person with coronavirus disease (COVID-19) can develop characterized pneumonia bilateral interstitial infiltrates with severe hypoxic respiratory failure (ARDS -Acute Respiratory Distress Syndrome) following a serious alteration of the ventilation ratio perfusion and possible shunt.
The **acute hypoxaemic patient** may experience **persistent wheezing** , **despite the administration of oxygen flows> 10-15 L / min, in mask with reservoir** . In these cases may be useful to other aids such as High-flow nasal oxygen (HFNO) or applying positive pressure non-invasively with CPAP or NIV to be used only in patients in appropriate hospital facilities.

IMPORTANT: CONSIDER THE HIGH RISK OF MANAGEMENT FAILURE INVISIVE AND THE NEED FOR **ATTENTIVE MONITORING** FOR THE POTENTIAL, ALSO RAPID, CLINICAL DETERIORATION.
There are no definitive guidelines on the use of CPAP / NIV in the hypoxemia patient .

However, where the need to adopt such techniques is imposed, the **POSSIBLE RAPID DETERIORATION OF HYPOXYSEIA and the need for intubation and invasive mechanical ventilation** . **In view of the risks of NIV failure it is NECESSARY to manage these patients with immediate availability staff capable of performing endotracheal intubation.**
If indicated, the administration of CPAP / NIV can be carried out with various types of interface depending on availability and indications (gold-nasal mask, total face or helmet). When choosing to use the CPAP / NIV, the level of potential environmental diffusion of aerosol particles.

In particular ARIR stresses:

"One of the critical issues of the 2019 nCoV patient in the intermediate phase - between disease onset and potential critical evolution, also in relation to copatologies - lies in the choice of oxygen therapy and invasiveness of respiratory support (Level of Care). Media not invasive (CPAP, BiPAP, NIV and HFNO) can correct hypoxemia by helping to manage respiratory failure (even in the absence of unique data in the literature) and to delay or avoid endotracheal intubation (and its potential complications and effects on the outcome), ***HOWEVER*** *there is evidence, from the SARS epidemic data, that these methods can increase the risk of aerogenic spread of the virus.*
Consideration to be evaluated: if the patient has prognostic factors leading to need for invasive ventilatory support, it is preferable to resort to intubation in election, rather than the "emergency" one (on expiring conditions), for minimize the complications of the intubation itself, as well as to reduce the risk of error - contamination of healthcare professionals. "

SIAARTI: "Care pathway for the patient with COVID-19 Section 2 - Recommendations for the local management of the critical patient - version 01
Posted on 3/14/2020 "

TAKE HOME MESSAGE

DO NOT INSERT WITH NON TREATMENTS INVASIVE, IF THE PATIENT DOES NOT RESPOND QUICKLY TO THE STRATEGIES PUT IN ACT. ALERT THE TEAM !!!

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REMEMBER: It is appropriate to adopt shared strategies, training in multidisciplinary teams, also taking into account the levels of care available, the equipment in endowment and feasibility of intensive assistance in dedicated environments.

AMONG THE SUGGESTED INTERVENTIONS, IN RESPECT OF THE ABOVE, WE REMEMBER:

1A. SPONTANEOUS OR IN NIV PATIENT

1) **CONVENTIONAL OXYGEN THERAPY** : **The use of goggles is not recommended (nasal cannulas) which cause a greater dispersion of droplets.** Yes recommended to use facial mask up to 5 L / min, mask with reservoir up 10 L / min or Venturi mask up to FiO 2 60% with the addition of the mask on the patient's face, correctly positioned and replaced every 6-8 hours.

2) **HIGH FLOW NASAL OXYGENATION (HFNO):** with a flow of at least 50 L / min and FiO 2 up to 60%. The nasal cannulas must be well positioned inside the nostrils and a well positioned surgical mask should also be worn above the nasal cannulas, in front of the patient's mouth and nose . Also in this case the mask must be replaced every 6/8 hours. For subjects who adopt an open-mouth breathing pattern in order to improve SpO 2 , it may be useful to use one **non-** vented NIV mask connected by T-fitting to the system (see photo on the right).

3) **NON INVASIVE VENTILATION (CPAP / NIV):** Perform a attempt only for a maximum duration of 1h. If not observe substantial improvements, do not insist e notify the team.

INTERFACE *: to minimize the risk of aerosolization of infected material, the safest interface is the helmet. In case of choice of mask facial is preferred combined with a double circuit with expiratory valve. If necessary combine the face mask with a single circuit, use the version equipped with integrated expiratory valve and not exhalation port, in addition that of antimicrobial filter installed.*

HUMIDIFICATION it *is advisable to use a dual circuit fan in mode non-invasive, with active heated humidifier (HH).*

ANTIMICROBIAL FILTERS: *Evaluate the positioning according to the ventilation setting and the PPE available to staff. Position the filters in order to protect the patient and ventilator (if necessary), as well as limit the dispersion of the exhaled air into the surrounding environment.*

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Suggested consultations:
SIAARTI WEBSITE: ASSISTANCE PATH FOR THE PATIENT WITH COVID-19
Link: http://www.siaarti.it/SiteAssets/News/COVID19%20-%% 20documenti 20SIAARTI / LINES% 20of% 20INDIRIZZO% 20ASSISTENZIALI% 20of% 20PAZIENTE% 20CRITICO 20AFFETTO%%% 20DA 20COVID-19.pdf

WEBINAR AIPO COVID 19 HOW TO MINIMIZE THE RISK OF AIR DISPERSION DURING SUPPORT RESPIRATORY
Link: https://www.youtube.com/watch?v=Qs0hrmTk_FQ

CORONVIRUS EMERGENCY - DUMENTATION OF VENETO REGION_ ZERO COMPANY
Link: https://www.azero.veneto.it/-/emergenza-coronavirus
Video gallery:

- High Flow Nasal Cannulas
- CPAP helmet with braces
- NIV helmet without straps

A relevant aspect is represented by the **posture** assumed by the patient. Avoid posture Slumped (sliding into bed), favoring correct positioning in a semi-sitting position or sitting. Whenever possible, and in close collaboration with the team, encourage the alternation of lateral decubitus and possibly consider the indication to the semi-prone position or prone.

ATTENTION : The position changes can modify the ventilation / perfusion ratio e lead to an improvement in gas exchange but also to a sudden change deterioration. A careful evaluation and a close is therefore necessary clinical and instrumental monitoring.

It is necessary to minimize the patient's effort even while maintaining the postures. It is therefore recommended to use cushions / aids that allow a position stable without effort (active work) by the patient.

IMPORTANT NOTE : To *date there is no clear recommendation to use NIV (in*

all its meanings) in the course of acute hypoxic respiratory failure de novo or specifically associated with viral pneumonia. Delay in the IOT, generated by an extension in the use of the NIV, it is associated with higher mortality, especially in severe forms.

Other links: http://www.siaarti.it/SiteAssets/News/COVID19%20-%20documenti%20SIAARTI/SIAARTI%20-%20Covid-19%20-20vie 20Full%%%% 20aeree 20rev.1.1.pdf

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1B. INVASIVE MECHANICAL VENTILATION PATIENT

The **pronation** is recommended: at least 12-16h / day, preferably within 72 hours intubation endotracheal. If effective, repeat until P / F ≥ 150 with PEEP ≤ 10 cmH 2 O and FiO 2 ≤ 60% for at least 4 hours after supination. The pronation procedure must be interrupted in case of worsening of oxygenation (20% decrease in P / F compared to the supine position) or in case of serious complications.

Suggested consultation on PRONATION
Link: https://www.youtube.com/watch?v=bE4mmGdjA5I&list=PLpClorbJ0-261TRyh3nH9r7xdP3ri8wCz

In the table below some suggestions regarding the measures to be implemented in the subject subject to PRONATION to avoid undesirable effects:

COMPLICATIONS	SOLUTIONS
Bedsores	Change of head and arm posture every 4-6 hours. Check that the endotracheal tube is not pressed against mouth / lips and the SNG do not exert excessive pressure against the nostril. Use suitable anti-decubitus devices and protect the affected areas at higher pressure, for example using high density foams or resilience.
Facial edema / pear trees orbital	Keep the bed in anti-trendelemburg at 30 °
Corneal damage and / or conjunctiva	Cleaning and closing of eyelids and eye protection by applying ophthalmic ointment and protective patch
Plexus injury brachial	Correct positioning and modification of upper limb postures

Poor positioning of the auricle	Check that the ear below is not bent.
Access stability venous and problems of CRRT line	Make sure they are well secured and do not exert excessive pressure on the skin.
Injury of staff	Correctly instruct operators, identify the appropriate number based on the size of the patient and the devices / aids present by manage and optimize the coordination during the execution of the maneuver.

The **recruitment maneuver** may be indicated but are to be considered risky and should be shared with the team.

The **bronchoscopy** : USE VACUUM SYSTEMS CLOSED CIRCUIT FOR AVOID DECONNECTIONS from the ventilator, loss of PEEP, de-recruitment and atelectasis. Proceed with bronchoaspiration maneuvers only on request.

Suggested consultation
CORONVIRUS EMERGENCY - DUMENTATION OF VENETO REGION - ZERO COMPANY.
Video gallery: Tracheobronchial Aspiration Closed Circuit
https://www.azero.veneto.it/-/emergenza-coronavirus

To **contain the droplet dispersion** we also recommend:

- The controlled check of the tightness of the endotracheal cuff (25-30 cmH 2 O);
- To avoid delivering inhalation therapy using an ampoule: prefer dry or inhalers ultrasonic nebulizers connected in closed circuit to the mechanical fan, without remove the antimicrobial filter on the expiratory branch of the circuit;
- Administer bronchial unblocking procedures only if evaluated in team e deemed strictly indispensable for the improvement of the clinical picture.
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2. PREVENTION OF COMPLICATIONS

Reduction of days of mechanical ventilation:

- Use the weaning protocols that provide for the daily evaluation of the spontaneous breathing capacity.

Reduction in the incidence of ventilator-associated pneumonia

- Keep the patient in a semi-sitting position (30-45 °);
- Use a closed tracheo-aspiration system;
- Use a new ventilation circuit for each patient once the patient is ventilated change the circuit only if it is damaged;

Reduction of the incidence of venous thromboembolism
Reduction of the incidence of pressure ulcers
Reduction of the incidence of intensive care-related myopathy

- Early mobilize the patient as soon as the conditions of the course of the disease allow it.

3. PROCEDURES AT RISK OF CONTAMINATION

Particular attention should be paid during those interventions that expose you to greater risk of contamination of health personnel by aerial dispersion of droplets. Among the procedures a greater risk we remember:

- aerosol nebulization (if necessary administer aerosol drugs use MDI pre-dosed inhalers)
- bronchial unclogging (cough and other maneuvers that favor expectoration)
- NIV (in particular with systems that use masks with holes or other systems "a lost")
- bronchoscopy
- tracheal intubation
- manual ventilation before intubation
- tracheotomy
- endotracheal aspiration
- cardiopulmonary resuscitation
- extubation

4. PROCEDURES NOT TO BE APPLIED IN THE ACUTE PHASE

In the presence of IRA clinical pictures that result in reduced lung compliance, increased respiratory work and altered blood oxygenation, the pattern rapid and superficial respiratory spontaneously adopted by the subject represents one strategy in an attempt to minimize inspiratory effort and maximize efficiency. Furthermore, in such clinical conditions also the strength of the respiratory muscles can result severely reduced. It therefore becomes extremely important that requests and procedures put in place by the physiotherapist do not lead to a further burden on the job respiratory system that the subject must support and do not expose him to an increased risk of respiratory distress.

We list below some of the most commonly used **practices** in physiotherapy Respiratory **not recommended** with acute Covid-19 patients:

– diaphragmatic breathing;
– breath with parted lips;
– bronchial unclogging / lung re-expansion (PEP Bottle, EzPAP®, machines cough, etc.);
– use of incentive spirometry;
– manual mobilization / stretching of the rib cage;
– nasal washings;
– training of the respiratory muscles;
– exercise training;
– mobilization in the clinical instability phase (multidisciplinary assessment required)

NB . It is necessary, always in order not to increase respiratory work, to **limit the bronchial debulking strategies** to only those cases in which it is **indispensable** taking always in high consideration the risk of contamination of the surrounding environment e

equipping health workers with adequate PPE.

5. PPE AND IMMEDIATE IMPLEMENTATION OF THE MEASURES APPROPRIATE FOR THE PREVENTION AND CONTROL OF INFECTIONS

We suggest to **follow the indications** reported in the document produced by the *Group of work ISS Infection Prevention and Control. Interim indications for use rationale of protections for SARS-COV-2 infection in sanitary and socio-sanitary activities (assistance to subjects affected by covid-19) in the current SARS-COV-2 emergency scenario. Version of March 1 Rome Istituto Superiore di Sanit; 2020 (ISS COVID-19 Report, n.2 / 2020)*

Link: https://www.epicentro.iss.it/coronavirus/pdf/rapporto-covid-19-2-2020.pdf

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REMEMBER

Suggested consultations:

CORONVIRUS EMERGENCY - DUMENTATION OF VENETO REGION - ZERO COMPANY

Link: https://www.azero.veneto.it/-/emergenza-coronavirus .

WEAR PPE

Link: https://www.epicentro.iss.it/coronavirus/pdf/rapporto-covid-19-2-2020.pdf

6. REFERENCES

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- https://www.ficm.ac.uk/sites/default/files/prone_position_in_adult_critical_care_2019.pdf
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7. ACRONYMS

2019nCoV (2019 new Corona Virus)
AIPO (Italian Association of Hospital Pulmonologists)
ARDS (Acute Respiratory Distress Syndrome)
BiPAP (Biphasic Positive Airway Pressure)
CoVID-19 (Corona Virus Disease 2019)
CPAP (Continuous Positive Airway Pressure)
CRRT (Continuous Renal Replacement Therapies)
PPE (Personal Protective Equipment)
EzPAP® (Positive Airway Pressure System)
FFP2 (Filtering Face Piece 2)
FFP3 (Filtering Face Piece 3)
FiO_2 (Fraction Inspired Oxygen)
HFNO (High Flow Nasal Oxygen)
HH (Heated Humidification)
IRA (Acute Respiratory Failure)
IOT (Oro-Tracheal Intubation)
MDI (Metered Dose Inhaler)
NIV (Non Invasive Ventilation)
P / F (PaO_2 / FiO_2 ratio)

PEP (Positive Expiratory Pressure)
PEEP (Positive End-Expiratory Pressure)
SARS (Severe Acute Respiratory Syndrome)
SARS-CoV2 (Severe Acute Respiratory Syndrome Coronavirus 2)
SIAARTI (Italian Society of Anesthesia Analgesia Resuscitation and Intensive Care)
SIP (Italian Society of Pulmonology)
SNG (nasogastric tube)
SpO_2 (Saturation
Peripheral Oxygen)