

First Line Covid-19

Emergency Department Organizational Management within Epidemic or Pre-Epidemic Outbreak Areas

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CLINICAL AND EPIDEMIOLOGICAL DATA

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- Increase of cases with respiratory infection in the days preceding the first peak of accesses of positive Covid-19 cases
- Trend characterized, in contexts with higher concentration of cases, by inflow peaks every 12-24 hours during which significant numbers of patients show up within a few hours with respiratory symptoms
- Prevalence of males among the most serious cases
- False negatives to Covid-19 swab in the first 2-3 days after the onset of symptoms are not uncommon
- Significant clinical picture even before swab confirmation (type 1 respiratory failure with severe hypoxemia and positive x-ray for infiltrates - the presence of hypercapnia is unusual)

In this context, given the way of transmission from close contacts and "droplets" (not by air), the extended temporary closure of ERs/Admissions and Emergency Departments is of very doubtful value.

SUSPECTED CASES AND INITIAL GUIDANCE FOR ERs/ADMISSIONS AND EMERGENCY DEPTS

- **Local and/or hospital pre-triage** (pre-ER or intra-ER) to identify suspected cases based on the following criteria
 - o The presence of fever or flu-like symptoms (including gastro-intestinal symptoms)
 - o To come from areas with a high incidence of contagions (red areas) or to have been in contact with high risk subjects
- **Triage OUT:** all patients who come to the ER/Admissions and Emergency Department claiming to have had contact with infected subjects should be assessed and recorded only if they have a fever or flu symptoms; all other patients should not be recorded and should be requested to follow the indications for contact screening. Therefore potential counseling services should be activated in another area
- **Separation of intra-ER (and intra-hospital) pathways**
 - o infected path - suspected cases
 - o clean path - other patients



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The criteria for identifying suspected cases cannot be 100% sensitive and specific: focusing on sensitivity will cause many more patients and above all many non-infected patients to be directed along the infected path; focusing on specificity could lead to an increase in the number of infected patients directed along the clean path. The criteria should be modulated on the basis of regional/local epidemiological data, and also consider sentinel cases; the regional Crisis Unit should be checked daily and notice of any changes to the criteria currently in force be sent to Medical Administrators and ER/Admissions and Emergency Department Directors. Continuous updating of local epidemiology is of great value for identifying geographic areas and social situations that are at risk.

Pre-triage areas should be areas that allow for rapid patient flow, avoiding prolonged stays that increase the risk of infection.

PROPHYLACTIC MEASURES AND IDENTIFICATION OF "EPICENTER" ERs/ADMISSIONS AND EMERGENCY DEPARTMENTS

All ERs/ADMISSIONS AND EMERGENCY DEPARTMENTS

- Self-protection for all patients and relatives from the entrance to the ER/Admissions and Emergency Department with a 24-hour manned position by security personnel (adequately protected by PPEs)
- Separation of accompanying relatives (which should be prevented from entering the Emergency Room), with adequate explanations provided by means of informative signs or videos
- PPE worn properly by all staff, differentiating between those working in the pre-triage and the infected path and those working in the clean path
- Filter zones for access to restrooms and refreshment areas
- Surgical masks and hand hygiene for all patients who access the ER/Admissions and Emergency Department (infected path and clean path)

EPICENTER ER/ADMISSIONS AND EMERGENCY DEPARTMENT

- An ER/ADMISSIONS AND EMERGENCY DEPARTMENT is determined to be an EPICENTER once a certain numerically defined threshold of cases, based on epidemiological criteria, had been surpassed
- ERs/ADMISSIONS AND EMERGENCY DEPARTMENTS situated within epidemic outbreak areas (EPICENTERS) are to be identified as red zones, with inlet and outlet filters for all operators, technicians, specialists and suppliers
- Access by ER/ADMISSIONS AND EMERGENCY DEPARTMENT operators to the canteen and to other hospital rooms after the first peak of positive Covid-19 accesses is forbidden
- EPICENTER ER/ADMISSIONS AND EMERGENCY DEPARTMENT healthcare workers must place themselves under home quarantine, though they may also perform their duties if they are asymptomatic (wearing adequate PPEs)
- It is not appropriate to perform swabs on asymptomatic health workers (numerous false negatives); in the event a worker has a fever or flu symptoms he/she should stop working and immediately enter quarantine and undergo the diagnostic checks indicated according to the clinical picture (X-ray, Ultrasound, CT, ABG test in room air), in addition to the swab (taking into consideration the frequent false negatives of initial screenings)
- EPICENTER ER/ADMISSIONS AND EMERGENCY DEPARTMENTS should activate pathways for first level (X-ray) and second level (CT) radiological diagnostics for potentially infected patients.

For the use of PPEs, the indications provided by the World Health Organization are deemed valid, based on the available evidence of transmission of the virus by close contacts and "droplets" and not by air [WHO Interim guidance. Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19). February 27,



SPACES, EQUIPMENT AND TECHNOLOGY

To be prepared for Epicenter Hospitals

- Large inventories of PPEs for staff and patients
- Large stocks of O₂ and dispensing devices (Venturi and NRB masks)
- Adequate availability of stretchers
- Areas, technologies and devices for respiratory support with CPAP (Sub-Intensive Care Unit – SICU)
- Areas, technologies and devices for invasive respiratory support (Intensive Care Unit - ICU)
- Hospitalization areas (with filter systems) for hospitalization of Covid-19 positive patients (in the event that the overall number of cases does not allow for the concentration of these patients to only some hospitals in each region)

Identification of streamlined procedures to ensure the supply of consumables with particular regard to PPEs for staff and patients, ABG syringes, oxygen therapy and CPAP devices.

Frequent periodic verification of hospital oxygen supplies.

ER/ADMISSIONS AND EMERGENCY DEPARTMENT DIAGNOSTIC-THERAPEUTIC PATHS

Diagnostics

- Nasopharyngeal swab for Covid-19 in all suspected cases (to be eventually repeated at 72 hours if negative)
- ABG test in room air at triage or as soon as possible, used to get an initial overview of the patients (normal oxygen, slight hypoxia > 60 mmHg, moderate to severe hypoxia <60 mmHg)
- Chest X-ray, specific, but with limited sensitivity
- Echo chest more sensitive than Chest X-ray (interstitial lung disease with multiple B-lines > "White lung") and predictive for Orotracheal intubation (in the presence of multiple consolidations)
- CT more sensitive than Chest X-ray, but with logistical problems
- LAB: blood count, PCR, creatinine, glucose, albumin, AST ALT, bilirubin, pneumococcal and legionella urinary Ags, PT-INR, D-dimer, troponin

Definition of clinical phenotypes and management

1. Fever without respiratory failure (normal ABG and walking test) and normal chest X-ray > may be released with instructions to self-quarantine pending the outcome of the swab
2. Fever with chest X-ray and ABG indicating lung focus and/or moderate respiratory failure (PO₂ > 60 mmHg in room air) > O₂ therapy - Short-Stay Observation or ordinary hospitalization
3. Fever with moderate-severe respiratory failure documented by ABG test in room air at triage (PO₂ < 60 mmHg in room air) > O₂ therapy / CPAP - admission to ordinary hospitalization or SICU
4. Respiratory failure with suspected initial ARDS or complicated pneumonia > O₂ therapy / CPAP / Orotracheal intubation and invasive ventilation - admission to SICU or ICU
5. ARDS immediately obvious > CPAP / Orotracheal intubation and invasive ventilation - admission to SICU or ICU

The observations made during the first few weeks led to the identification of the described phenotypes, with possible rapid evolution from one phenotype to another. During peak inflows, there are approximately 5 dependent PEEP patients and 20 dependent O₂ patients for each patient to be intubated.



Phenotypes 4 and 5 are assessed jointly by the emergency physician and the ICU physician.

ICU admissions are to be considered when the age and general conditions of the patients are compatible with intensive care.

Treatment

- **O2 therapy** - in hypoxic patients
 - progressive increase in FIO₂ (up to the NRB mask) if saturation remains or falls below 90% in patients with COPD, and 94% in other patients
- **CPAP** - in patients who do not respond adequately to O₂ therapy (consider early CPAP start, with SaO₂ < 94% in O₂ therapy and elevated FR)
 - PEEP up to 12-15 cm H₂O, with a 1 hr trial
- **Orotracheal intubation and invasive ventilation** - in patients who do not respond adequately to CPAP
 - high PEEP, up to 16-18 cm H₂O, and TV 6 ml/Kg IBW; this method of ventilation prevents the volutrauma that occurs after long CPAP trials and limits posterior consolidations that are difficult to resolve.

The presence of an increase in lactates, hypercapnia, leukocytosis, positivity of the early antigens of legionella or pneumococcus are due to a different etiology and suggest opportunity of utilizing antibiotic therapy; in the absence of these indicators, neither blood culture nor antibiotic therapy is currently indicated.

During peak inflows adopt flexible models to ensure the administration of O₂ to all patients for whom O₂ therapy is indicated and do not hesitate to place a CPAP on all those who maintain a saturation < 90% with a 15 L/m NRB mask.

Patients who respond to CPAP are those treated early and with ultrasound evidence of interstitial lung disease but without multiple posterior basal consolidations.

Monitoring

- Monitoring of the pulse oximetry related to the FiO₂ administered, along with the RR, identifies the stability of the clinical picture or the evolution of the pathology with sufficient accuracy; HR, BP and temperature (the development of critical instability is often preceded by cardiac dysfunction and atrial fibrillation) should also be controlled
- ABG sampling should only be performed if strictly necessary (also to reduce subsequent difficulties in positioning a stable arterial catheter in the ICU), after the first ABG test in room air (for the correct management setting designation), the second when the patient desaturates below 90% in O₂ with a 15 L/m NRB mask, the third when the patient has a saturation < 90% in CPAP 12- 15 cm H₂O and FiO₂ 60%
- Lung ultrasound monitoring of parenchymal involvement is useful

PATIENT FLOWS AND DESTINATION

- In EPICENTER hospitals, the risk of spreading Covid-19 and the number of patients who need hospitalization for respiratory failure are such that there should be no waiting for the result of the swab test before starting the recovery path (unless the result is available quickly)
- The same applies to patients recommended for admission to the ICU and a lack of places available in the hospital
- Patients with similar syndromic pictures should be hospitalized by applying cohort isolation immediately, even without the result of the swab test
- The wards of hospitals with ERs/ADMISSIONS AND EMERGENCY DEPARTMENTS that have become EPICENTERS must provide an adequate number of beds for different levels of intensity of care within the



- first 24 hours (before the second potential access peak); indicatively, for an ADMISSIONS AND EMERGENCY DEPARTMENT with 50,000-75,000 accesses/year: 5 ICU beds, 20 "CPAP area" beds to manage
- CPAP patients and 40 beds for patients with pneumonia and slight or moderate respiratory failure
 - A total need of up to 100 beds per 100,000 inhabitants may be estimated
 - The Internal Emergency Plan for Massive Casualty Inflows (PEIMAF) must be revised to include a dual infected/clean path, not only in the ER, but throughout the entire hospital
 - Transfers from EPICENTER hospitals to other hospital facilities (starting with non-infected patients), with the support of the healthcare transport system, should be facilitated

ORGANIZATIONAL STRUCTURE AND STAFF MANAGEMENT

- Each facility should have a Crisis Unit, which includes the Director of the ER/ADMISSIONS AND EMERGENCY DEPARTMENT and meets daily to coordinate all activities
- A twin-track bed-management system is needed (critical area and ordinary hospitalizations)
- In the early stages, it is useful to have an ER Director on duty permanently in order to coordinate the organization of activities and make any necessary structural adjustments to the ER, and monitor the effectiveness of the solutions applied for local logistical, material and organizational problems in general
- The organizational model of the operating unit should be revised according to the context; it may be necessary to switch to a schedule that is checked daily with shifts drawn up according to the confirmed presence of staff on duty
- Regular meetings (every 2-3 days) should be held with the ER/ADMISSIONS AND EMERGENCY DEPARTMENT staff, and a computer folder should be placed on the local ER/ADMISSIONS AND EMERGENCY DEPARTMENT network that includes all useful information and instructions

