Chronic Respiratory Disease

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Volume 17: 1–4

DOI: 10.1177/1479973120961843
journals.sagepub.com/home/crd
SAGE

Management of suspected COVID-19 patients in a low prevalence region

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Abstract

The spread of the SARS-CoV-2 infection among population has imposed a re-organization of healthcare services, aiming at stratifying patients and dedicating specific areas where patients with suspected COVID-related respiratory disease could receive the necessary health care assistance while waiting for the confirmation of the diagnosis of COVID-19 disease. In this scenario, the pathway defined as a "grey zone" is strongly advocated. We describe the application of rules and pathways in a regional context with low diffusion of the infection among the general population in the attempt to provide the best care to respiratory patients with suspected COVID-19. To date, this process has avoided the worst-case scenario of intra-hospital epidemic outbreak.

Keywords

COVID-19, respiratory symptoms, health-care management

Date received: 25 May 2020; accepted: 02 September 2020

Introduction

The spread of the COVID-19 infection among population has increased worldwide,[1] imposing a drastic and sudden re-organization of healthcare services. Decisions had to be made quickly to accommodate acute care hospital beds to SARS-Cov-2 positive patients with respiratory symptoms, by transferring inpatients to "COVID-free" facilities, and dedicating specific areas (or entire hospitals) to COVID-positive patients. The redefinition of pathways to differentiate the admission of patients with documented positivity to COVID infection versus those with suspected COVID-related respiratory disease has led to the identification of "grey zones" which are supposed to provide optimal health care assistance while waiting for the results of the nasal-pharyngeal swab. In areas with increasing trends of infected individuals and overwhelming volume of subjects who needed admission to the hospital, this poses a challenge. Some reports confirm that in the epicenter of the pandemic the Emergency Departments (ED) for highly suspected COVID patients must be kept separated from

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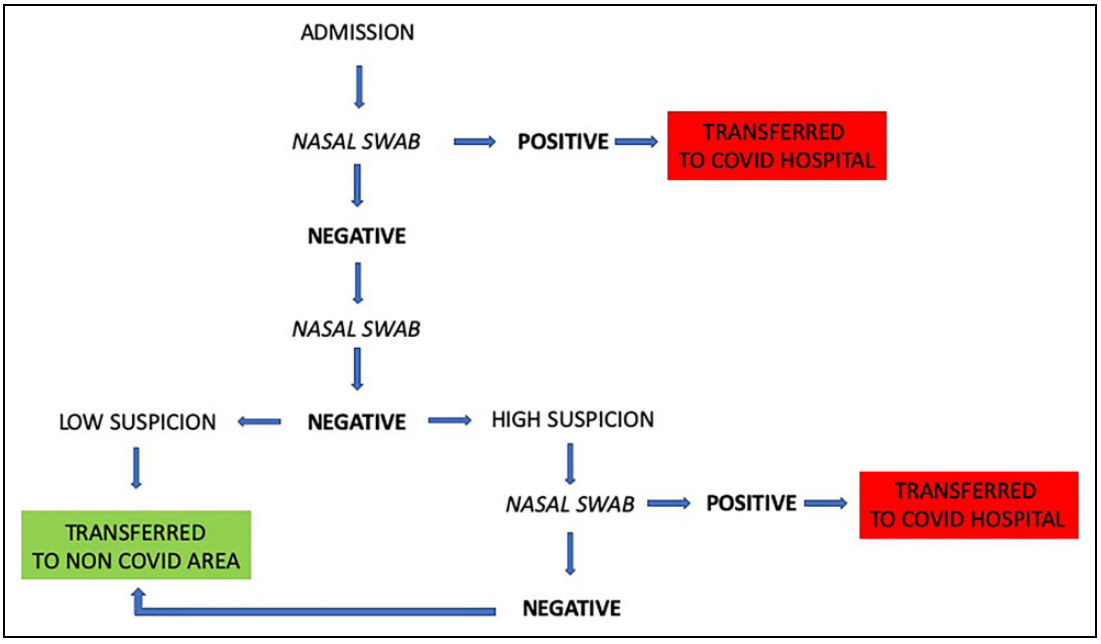

Figure 1. Flow-chart of the procedures adopted after admission of the suspected patients to the Lung Unit.

ED that are dedicated to non COVID patients.[2] This does not apply to regional contexts in which the constrain measures and the lockdown of activities has limited the diffusion of the infection among the general population. Herein, we describe our experience in the metropolitan area of Palermo, in the Southern part of Italy, which has been characterized by low prevalence of cases, in the attempt to provide tools to provide the best care to respiratory patients with suspected COVID infection.

Methods

In the prediction of the mass influx of patients during the COVID-19 pandemic, we set up a new Lung Unit in our regional academic medical center (AOUP Policlinico Giaccone, Palermo, Italy) that had to meet the following criteria: streamlining admissions, flexibility in accommodating different respiratory diagnoses, ease of discharge or transfer to other medical divisions of the hospital. A distinction was made between patients with low pre-test clinical probability of being infected by the SARS-Cov-2 virus, i.e. those with symptoms other than respiratory, and individuals accessing the ED for respiratory symptoms, with signs of lung failure and/or imaging features suggestive of COVID pneumonia. Therefore, all respiratory patients underwent nasal-pharyngeal swab and immediately admitted in our Lung Unit for proper care. The SARS-CoV-2 nasal-pharyngeal swab is a RT-PCR test, which selects three of the main molecular targets (E, N and RdR) according to WHO indications[3]; results are available within 6 hours. Health care providers complied with the mandatory steps to eliminate any potential for infection. Each patient was isolated in a single room following a grading allocation with respect to a "probability" judgment: those with altered laboratory exams (high PCR, LDH and D-dimer with or without lymphopenia), CT-scan findings suitable for pulmonary SARS-CoV-2 infection[4] and respiratory symptoms suggestive for SARS-CoV-2 infection[5] were placed in the "high probability" area of the ward. Patients were also tested for other viruses (e.g. H1N1, CMV) and monitored for signs or symptoms indicative of associated vasculitis or pulmonary embolism. We came to the agreement to always perform a second swab in all subjects within 48–72 hours, eventually followed by a third exam in case of discrepancy between clinical and/or presentation and negative results (Figure 1). Figure 2 describes the patients flow through the unit following rigid protocols. The collection of the clinical information and subsequent analysis of the findings was approved by the local Ethics Committee.

Results

In the first 100 consecutive subjects admitted to our Lung Unit (Table 1) between March 16 and April 20, 2020, we were able to identify 4 COVID-19 positive

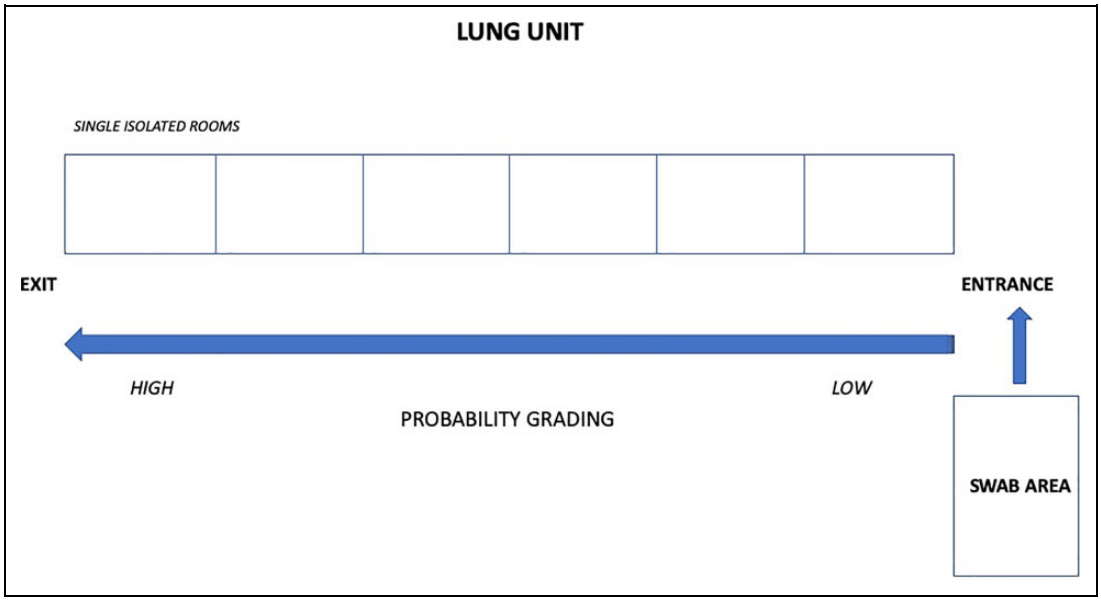

Figure 2. Description of the paths followed by the admitted patients to the Lung Unit.

Table 1. Main demographic and clinical features of the admitted patients.

M/F (%)	53/47
Age, yrs (mean (SD))	67.7 (18.91)
Smoking history (never/former/current) (%)	68.0/8.0/24.0
Epidemiological link, Y/N (%)	19.6/80.4
Comorbidities Y/N (%)	79.5/20.5
Fever Y/N (%)	38.0/62.0
• Temperature, C° (median [IQR])	36.5 [36.00, 37.50]
Dyspnea Y/N (%)	50.0/50.0
Dry cough Y/N (%)	25.6/74.4
Chest CT hallmarks of COVID-19 Y/N (%)	68.6/31.4
• Ground glass opacities Y/N (%)	37.2/62.8
Pleural effusion Y/N (%)	41.9/58.1
Lymphopenia Y/N (%)	81.0/19.0
LDH U/l (mean (SD))	247.10 (227.15)
CPR mg/l (mean (SD))	42.78 (52.52)
D-dimer ng/ml (mean (SD))	1901.01 (1546.44)

individuals. These patients were all highly suspected for COVID disease at the time of admission, and following the internal procedures, had been allocated in the "high probability" area of the Lung Unit. Two out of 100 patients had positive results on the first swab, whereas the other 2 patients had positive results on the second swab. The other 96 patients resulted negative on two consecutive swabs. A total of 22 patients also underwent a third swab since their clinical conditions were highly suggestive of COVID disease. This model allowed to keep patients isolated and properly treated. Indeed, differently than other medical observational wards, our unit exclusively served respiratory patients with the task to preserve isolation and to guarantee respiratory medical support. An intensive care unit was allocated in the same building to assist patients whose clinical and gas exchange parameters worsened. As soon as the results of a positive swab were made available with an automated alert to all clinicians, the pre-established constriction measures were put in action, and the COVID-positive patients were safely transferred to the COVID Hospital of the region. On the other hand, negative patients after two **(or three)** consecutive swabs whose clinical conditions became stable were transferred as promptly and safely as possible after a direct physician to physician referral and discussion process, whereas those with high probability of SARS-CoV-2 infection despite the negative swabs remained isolated in our Unit.

Discussion

Besides being identified as "grey zone," the Lung Unit represents a sub-intensive care area, which adopts criteria of probability to delimit the contaminated pathways while providing respiratory assistance. The adoption of this model with rigid protocols allowed to identify, and properly manage, COVID patients who otherwise would have been admitted to regular medical wards, treating at the same time COVID-19 negative respiratory patients who needed specialistic assistance. To the best of our

knowledge, none of the inpatients developed conversion to SARS-Cov-2 positivity in the following weeks because of the staying in the Lung Unit. To date, this process has avoided the worst-case scenario of intra-hospital epidemic outbreak.

The first challenge was to dramatically increase the bed capacity following the daily monitoring of new cases. As a consequence, a decision and creative thinking was necessary to allow patients to be accepted in an expeditious manner. This required a plan to design specific and well-differentiated pathways for admitted patients and for health-care providers, which was realized within 48 hours. All personnel was quickly trained to learn the pathways and the donning and doffing PPE procedures. Second, our standard operating procedures had to be changed and adapted to the new situation. Until confirmed negative, each admitted patient was treated as potentially COVID-19 patient.

In conclusion, we are aware that the degree of disruption to usual practice varies across regions depending on differences in population density, rates of community spread, and resource availability. In regions with low prevalence of SARS-CoV-2 infection among the population, respiratory patients are exposed to the risk of being undertreated because of the fear of being infected. Our experience suggests that the Lung Units will have to reconstruct the admission and referral processes, moving from the "grey zone" to the level of assistance in a *triage* fashion that guarantees optimal assistance in safe conditions.

Acknowledgment

The authors would like to thank all residents at the School of Respiratory Diseases of the University of Palermo for their dedication to the management of the respiratory inpatients and outpatients during the SARS-CoV-2 pandemic.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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