Discharge ward during the SARS-CoV-2 pandemic: an effective way to increase patient turnover when human resources are scarce

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SUMMARY

During the SARS-CoV-2 pandemic, the province of Brescia (Italy) had a significant number of COVID-19 cases, which led to a subversion of the ordinary structure of the university hospital ASST Spedali Civili, driven by the need to hospitalize as many patients as possible in a narrow period of time. At the peak of the epidemic, a rapid hospitalization discharge area, the Discharge Ward (DW), was set up with the aim of facilitating the rapid turnover of patients in the wards where the most severe patients had to be hospitalized. The organization and activities carried out are described in the results of this reproducible experience during epidemic events.

Keywords: SARS-CoV-2, pandemic, discharge ward.

INTRODUCTION

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was initially reported in December 2019 in China. Its high transmissibility quickly led to a pandemic spread of the disease mainly affecting the elderly [1]. Patients with previous heart and respiratory diseases are at higher risk of developing severe pneumonia, Acute Respiratory Distress Syndrome (ARDS), multi-organ failure and death [2, 3].

As of August 14th, 2020, SARS-CoV-2 has infected more than 20,956,158 million people in 188 countries, 13,019,210 recovered (62,1%) with a global mortality of approximately 760,318 people (3,6%) [4].

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Lombardy was the most affected Italian region and, between February 20th and April 26th 2020, 72,889 cases of disease were diagnosed (out of a national total of 197,675), and 13,325 deaths (out of a national total of 26,644) were recorded among SARS-CoV-2 patients.

A significant proportion of cases occurred in the Provinces of Brescia and Bergamo (Italy), leading to a subversion of the ordinary structure of the hospitals determined by the need to hospitalize as many patients as possible in a narrow period of time.

At the peak of the epidemic phase, in the ASST Spedali Civili Hospital of Brescia, about 900 beds out of the 1.400 of the hospital were occupied by patients affected by COVID-19 (COrona VIrus Disease 2019). The ICU beds were quadrupled.

A rapid hospitalization discharge policy was adopted by creating a specific ward (Discharge Ward, DW), annexed to the Division of Infectious Diseases. The DW unit is a hospital area where

recovering patients can be transferred to complete the discharge process before eventually leaving the hospital, with the aim of facilitating the turnover of patients in more intensive wards. The activities carried out are described thereafter in the results of this reproducible experience during epidemic events.

PATIENTS AND METHODS

From March 14th to April 25th 2020, in the ASST Spedali Civili Hospital of Brescia, the 19-bed Thoracic Surgery Division, initially closed in order to urgently reallocate physicians and nurses in COVID-19 treating wards, was reopened with infectious disease medical staff and cardiology nursing staff with the task of receiving improving patients from more intensive wards with the final aim of facilitating their turnover.

Demographic data, medical history (co-morbidities), duration of symptoms before the hospitalization, virological and radiological diagnosis, all the therapies carried out, length of hospitalization and the type of discharge (home/rehabilitation/hotel facilities) were recorded and analyzed [5-7].

A standardized score was applied to the standard thoracic radiography: each lung was divided in 3 fields (upper, middle, lower) and to each field was attributed a score from 0 to 3 according to percentage of parenchyma involved (from 0 to 3 for involvement greater than 75%, up to a maximum score of 18) [8, 9].

The "permanent" staff included three infectious disease doctors and one resident in infectious diseases. The afternoon and night guard shifts were covered by other physicians (dermatologists, surgeons), whose activity was temporarily limited or suspended due to the emergency situation, and by physicians Civil's Defence from all over Italy.

The nursing staff was present with two members in the morning and with one person during the afternoon and night; a nursing assistant was present during the day.

The Head Nurse coordinated both the supply of medicines and the staff shifts as well as the contacts with social services for the allocation of recovered (but still SARS-CoV-2 positive) patients who could not return home due to the impossibility to assure domiciliary isolation.

Patients were discharged mainly in the late morning after the round, while acceptances were scheduled in the early afternoon; both operations were possible every day of the week. According to the general rule of the hospital during the pandemic, significant others visits were forbidden and information on the state of health was made by telephone by the ward physicians.

Due to the reduced number of staff members, patients were selected from 11 COVID-19 Units of the Hospital according to the following specific criteria:

- symptomatic patient for 10 days and / or hospitalized for at least 7 days;
- self-sufficient (personal hygiene, movement, nutrition);
- clinically stable;
- apiretic for at least 24 hours;
- respiratory rate <22 breaths per minute;
- oxygen saturation >92% in open air or with a maximum of 2-4L oxygen/min. therapy by nasal cannulas;
- limited need for multiple daily intravenous infusions to reduce the number of entries in the room.

The requests for admission to the DW from the 11 COVID-19 Units of the ASST Spedali Civili Hospital were received in the morning, followed by direct phone contacts with the requesting Unit to counter check the entry criteria.

The Discharge Ward consisted of 6 three-bed rooms and a single one-bed room, without filter area requesting dressing to took place in the corridor and the undressing with disinfection in the area facing the door inside the room. We tried to synchronize multiple operations every time we entered the rooms to optimize dressing/undressing procedures and the use of Personal Protective Equipment (PPE). Each room was equipped with stethoscope, sphygmomanometer, oximeter, Venturi masks and nasal cannulas, syringes for blood gas analysis, gloves and hand disinfectants.

Patients with nasal cannulas or freely breathing in open air wore surgical masks to further reduce the possibility of direct and indirect transmission of the virus to healthcare professionals.

Chronic therapies, antivirals, antibiotic therapy, prophylaxis or thromboembolic therapy with low molecular weight heparin were continued during the hospital stay [10].

The transition to oral anticoagulants was carried out together with weaning from oxygen therapy and steroid therapy, metabolic control of diabetic

disease and rebalancing of frequently altered electrolytes blood levels. Any diagnostic procedures and specialist consultations are available on request.

In order to facilitate turnover, patients were discharged even when nasopharyngeal SARS-CoV-2 test was still positive, provided that the following criteria were met:

- negative walking test or, if positive, not less than SO_2 90%;
- oxygen saturation >94% (>90% for patients with chronic pulmonary diseases) in open air for at least 48 hours or, alternatively, P/F ratio in open air >300 for at least 48 hours;
- FR <22 breaths per minute at rest;
- being able to comply with mandatory home isolation;
- possibility to benefit of home-care supports.

Patients were discharged home if they could have one room and one bathroom available for exclusive use (if a dedicated bathroom were not possible, this had to be sanitized after each use). At home, recovered patients who were discharged with SARS-CoV-2 still positive, had to comply with the isolation obligations consisting of:

- mandatory permanence at home, in a separate area from the rest of the family;
- limit the transit to common areas to the strict minimum, which in any case had to be done by wearing gloves and surgical mask;
- promptly notify the patient' General Practitioner of the onset of any symptom or changes in health.

At the end of the 14 days quarantine, two nasopharyngeal swabs at a distance of 48-72 hours were performed in patients to verify viral clearance. In case of persistence of the positivity of the swab, the quarantine was postponed and new control swabs were rescheduled.

In case the patient's house did not met with the above criteria for home isolation, a hotel facility was available to spend the quarantine period.

RESULTS

During the 42 days of operation (from March14th to April 25th, 2020), 121 patients were referred to the Discharge Ward before final discharge home or to the isolation facility. Patients were 65 males and 56 females, all Caucasian, with a mean age of 63 (range 32-89 years, IQR 48-81 years) coming mainly from the COVID-19 Units of Internal Medicine (66 patients, 54%), Infectious Diseases (43 patients, 36%) and Pulmonology (10 patients, 8%), all diagnosed with SARS-CoV-2 pneumonia. During the same period, the patients discharged from DW were 10.6% of all patients discharged from COVID-19 Units.

Not all the transfer criteria were always respected, with particular regard to the need of oxygen supplementation.

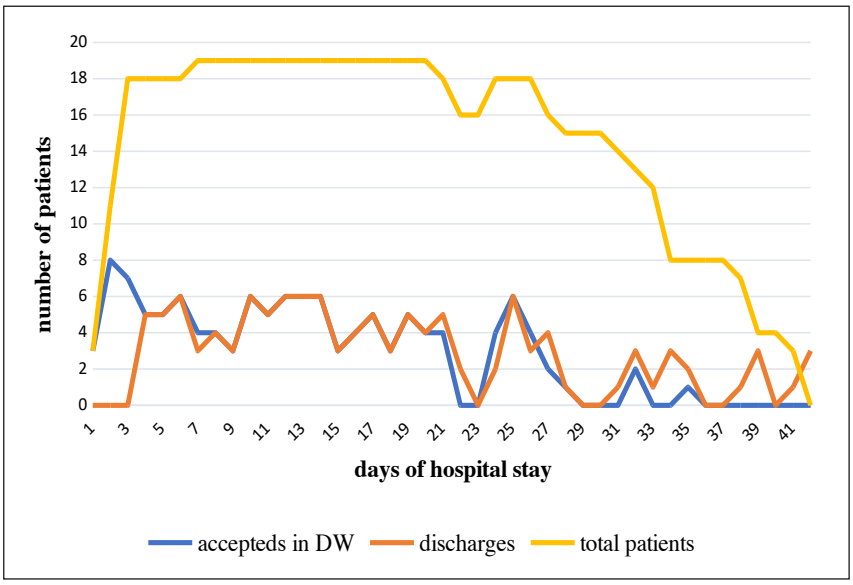
Medical history revealed that the symptoms appeared on average 9 days before entering the hospital. At Emergency Room screening, 116 (96%) patients had a positive SARS-CoV-2 swab, for three (2.4%) patients the diagnosis required broncho-alveolar lavage while for two (1.6%) the criterion was based on symptoms and/or radiology findings. Cigarette smoking was reported in 5% of patients. Overall, 45 (37%) of the patients had co-morbidities considered at high risk for severe COVID-19 (Table 1).

Diabetes mellitus was documented in 14% of patients, all aged 50 years or more, while cardiovascular disease was observed in 17% of patients and was prevalent in the age group ≥65 years, asthma and COPD in 6% of all patients. Arterial hypertension was reported in 30% of patients and was prevalent in the age group ≥65 years.

Table 1 - Co-morbidities of 121 adults hospitalized for COVID-19.

AGE / *CO-MORBIDITIES*	*18-49 N°*	*50-64 N°*	*>65 N°*	*Total N° (%) (N° = 305)*
Arterial hypertension	3	13	20	36 (30%)
Cardiovascular diseases	1	3	16	20 (17%)
Diabetes mellitus	–	7	10	17 (14%)
Neoplasms	–	5	6	11 (9%)
Hypothyroidism	1	1	6	8 (7%)
COPD/Bronchial asthma	–	2	5	7 (6%)
Thromboembolism	–	–	4	4 (3%)
Psychiatric diseases	1	3	–	4
Autoimmune diseases	–	4	–	4
HIV	1	2	–	3
Other diseases	1	6	11	18

Figure 1 - Trend of occupancy of beds in Discharge Ward.



All patients entering our Discharge Ward were initially diagnosed with interstitial pneumonia with varying degrees of respiratory failure. The mean chest x-ray score per patient was 8.7/18 points: 36 patients had a score between 1-6, 50 patients had a value between 7-12 and 22 between 13 and 18. In 13 patients, this value has not been recorded. Antiviral therapies, mostly in combination, with lopinavir/ritonavir (110 patients, 90%) and hydroxychloroquine (114 patients, 94%) continued during the hospital stay. Steroid therapy was in place in 59 patients (49%) while 15 patients (12%) had previously undergone tocilizumab therapy and only one patient was treated with remdesivir. In 80 patients (66%) oxygen therapy with Venturi mask (52, 43%) and nasal cannulas (28, 23%) was continued, only 5 (4%) were spontaneously breathing in open air.

The average saturation percentage of the beds was 80%, a value affected by the last 9 days of opening of the Discharge Ward, when the number of patients progressively decreased until the definitive closure (Figure 1).

The mean hospital stay in Discharge Ward was 6 days (range 2-23, IQR 11-18) while the total hospitalization was 14 days (range 5-44, IQR 24-34). As a whole, the total hospitalization length spent in the Discharge Ward represented 41% (721 days) of the total cumulative days (1745 days) spent in the hospital.

All patients improved and weaned from oxygen therapy, one patient was transferred back to the neurological ward for an intercurrent cerebral hemorrhage, 114 returned home to complete the quarantine, 5 transferred to rehabilitation and 1 moved in a hotel facility as her house was not adequate for safe quarantine. In two patients, additional diagnosis was reached after discharge, when the bioptic results were received: one patient with erosive esophagitis and another suffering from dermatitis.

DISCUSSION

The COVID-19 pandemic can be defined as a great generational event that will have long sequelae for the health of our population and, consequently, for the National Health Service. COVID-19 integrated surveillance data in Italy indicate that the elderly population paid the highest price in terms of lethality [11].

As with the flu, therefore, even in the case of COVID-19, the elderly is the most at risk, especially those suffering from chronic-degenerative diseases, and in any case patients with co-morbidities.

The epidemic event, unexpected and of large proportions, did not allow to take suitable measures to adapt hospital structures. Nonetheless, the organizational structure of the affected hospitals

had to urgently reconvert to respond to a public health need.
The Discharge Ward was conceptualized and developed in order to allow for faster turnover of patients in those wards where severe patients needed to be admitted.
Discharging from the hospital is a complex process, frequently affected by delays due to many administrative, organizational and clinical reasons. Our Discharge Ward has the potential to discharge patients at any time of the day, on any day of the week and could be used as an inpatient area if the patient needs to be transferred to a rehabilitation center, long term care facility or isolation facility. A Discharge Ward must have consolidated relationships and links to intermediate care facilities and, therefore, it can help to fill the gap between admitting acute care to the hospital and returning to the civil community [12, 13].
On the other hand, the functioning of our Discharge Ward also lead to an increase in the workload of health workers in the sending clinical wards, as they had to hospitalize patients at an accelerated pace.
The experts hypothesize, in a possible scenario of the return of the SARS-CoV-2 infection in the next winter season, a further difficulty in the differential diagnostics with the flu syndrome and with infectious agents particularly frequent in winter which could make the situation highly critical. It is urgent to protect the fragile sections of the population with vaccines and to provide hospitals or areas of the hospital dedicated to the treatment of COVID-19 also by organizing areas as the Discharge Ward we have described here [14].
The experience gained during this epidemic, also thanks to a cohesive team of professional Doctors and Nurses as well as other support workers, could serve as a model even in ordinary conditions to avoid waiting and to support patients in unsuitable departments.
The importance of a Discharge Ward must therefore be sought in making beds available for acute care quickly, in optimizing health personnel following the cohort effect of patients and in creating a stronger understanding with the territory.

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