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Building a Covid-19 unit in a state of emergency: a cross-generational working model. Healthcare delivery lessons from the pandemic

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By the end of March 2020, Italy had one of the highest 2019 coronavirus disease (COVID-19) clinical burdens in the world, with an average of 4,000 new diagnoses per day and a daily increase above 19%[1-4]. Particularly, in the northern regions of the country, the number of confirmed cases rose to 30,138, of which 40.8% were hospitalized, and the intensive care units were functioning near their maximum capacity with an occupancy rate of approximately 96%[5-8]. Therefore, with hospitals running under considerable strain, it was crucial to implement effective strategies to relieve the upscaling pressure on the national health services. The main efforts were directed towards the creation of new intensive care units and the temporary conversion of medical and surgical divisions into Covid-19 isolation wards. On the other hand, long-term care facilities for chronically ill individuals were paramount to guaranteeing a rapid turnover of hospital patients and delivering post-acute care in appropriate settings. Accordingly, a Covid-19 unit for non-critically ill individuals was launched on March 30, 2020 within a building under final construction in the town of Verduno, Piedmont.

The floor designated to host the unit was rushed to completion, allowing the first patient admission within three working days. This area was the only operative part of an otherwise empty hospital and consisted of 36 rooms with a total of 55 beds. The medical staff was enrolled through an urgent two-day national recruitment campaign. Since the majority of health care workers were already employed, mostly newly qualified medical graduates and retired professionals answered the call. Once assembled, the selected team included 17 recent graduates (four of which from the Italian Navy and Air Force), who were assisted by three practicing specialists and three retired physicians. Given the state of emergency, none of the employees had received targeted clinical training, or previously worked in an isolation ward. The main fields of expertise included internal and emergency medicine, pneumology, and surgery, but any substantial prior exposure to Covid-19 was lacking. This composition was unprecedented for the Italian National Health Service and required a tailored working model.

The limited clinical experience of the young professionals, still in need of supervision, was mitigated by organizing the medical staff into separate teams, each consisting of one specialist and two recent graduates, and dividing the unit into three sections of approximately 18 beds. Morning shifts were allocated to three groups (one per section), while a single team was responsible for the afternoon duty. The night shift was assigned to two recent graduates, supported by an on-call anesthesiologist in case of a life-threatening emergency.

During the morning round, every graduate examined nine inpatients and discussed all

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clinical choices with the team specialist, who was responsible for overseeing the less experienced colleagues throughout the diagnostic process and sharing in every treatment decision. This particular approach allowed younger physicians to receive extensive on-the-job training and gain wide-ranging hands-on clinical skills. The knowledge acquired during the daily activities was further consolidated through a weekly journal club in which frontal lessons were held by a rotation of specialists on specific topics of internal and general medicine.

In addition, administrative tasks, such as contacting receiving facilities and organizing discharges, were carried out by two doctors working outside the ward. The nursing staff reflected a similar working pattern, thus enabling a more prolific collaboration between nurses and doctors. Finally, a team of physical therapists delivered a motor rehabilitation program to patients in need on a daily basis.

Implementation of this model enabled the smooth coordination of activities at the newly launched medical ward in spite of the relentless spread of the epidemic and the concurrent lack of human resources, which was partially caused by the loss of many health care workers to quarantine or illness. Overall, from March 30 to May 30, 151 patients with an average age of 76 were admitted to the Covid-19 Unit in Verduno, following a diagnosis of SARS-CoV-2 infection. Remarkably, 19.5% of inpatients had no coronavirus disease symptoms, but presented acute medical conditions requiring hospitalization. The clinical complexity of such patients unraveled the vital need of a multidisciplinary approach, which provided itself an enhanced opportunity for young doctors to gain firsthand large-scale medical knowledge and experience. 91% of patients had at least one comorbidity or chronic underlying condition, and 61% had three or more. Specifically, cardiovascular diseases were found in the vast majority of inpatients. 66.2% had arterial hypertension, 21.2% atrial fibrillation, 15.9% coronary artery disease, 10.6% chronic heart failure, and 12.6% other heart diseases. Approximately one fourth of patients (24.5%) had a history of diabetes mellitus, whereas one tenth (9.9%) were affected by chronic obstructive pulmonary disease. Lastly, chronic renal disease and cancer were present in 12.6% and 11.3% of individuals, respectively. In addition, a number of acute complications were diagnosed during the hospitalization, including venous thromboembolism (9.2%), cardiogenic pulmonary edema (5.3%) and acute kidney injury (4.0%). In this setting, the diverse backgrounds of the experienced physicians proved to be an invaluable resource for a thoughtful delivery of care. As a consequence, 91% of patients were eventually discharged to their original domicile, leaving a minority of cases to be transferred to other hospitals for intensive treatment. Overall, 7 patients (4.6%) with an average age of 89.4 years expired during the hospitalization. Finally, among the medical personnel, no cases of Covid-19 were detected.

At the same time, several logistical challenges had to be tackled. The ward was supplied with a three-probes ultrasound machine, a blood gas analyzer, a C-PAP machine, two electrocardiographs and 55 oxygen delivery systems. However, the absence of a preexisting internal organization made it necessary to start everything from the ground up and create charts, arrange schedules and standardize management protocols. A radiology department with an X-ray machine and a CT scan was swiftly set up, with radiologists from the neighboring hospitals working remotely. Nevertheless, the facility was inevitably not equipped to the standards of a functioning hospital. The lack of a laboratory or a pharmacy within the building was overcome by a dedicated continuous courier service connecting the facility with the closest hospital. Furthermore, consultations were carried out by leveraging the benefits of telemedicine. Notably, a device originally designed to help patients perform home-based peritoneal dialysis was converted into a medium of communication, enabling remote medical assistance via a high-definition camera system.

Finally, the heterogeneity of the group and the different degrees of experience of its members may have posed some disadvantages. However, carefully chosen work shift schedules helped to provide continuity of care, while they simultaneously facilitated the integration of diverse competences and offered unparalleled training opportunities for the newly graduated. Such a work model, which is backed by a learning-by-doing approach, represented an effective way of team building and resource management – especially under emergency circumstances.

Young doctors and retired professionals are often underestimated instead of being seen as valuable resources. However, the pandemic showed that the combination of the positive learning attitude of young physicians and the

knowledgeable experience of medical specialists can be successfully merged into an efficient organizational model that creates effective synergies not to be dismissed in times of crisis.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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