CORRESPONDENCE

COVID-19 NOTES

To rapidly communicate short reports of innovative responses to Covid-19 around the world, along with a range of current thinking on policy and strategy relevant to the pandemic, the Journal *has initiated the Covid-19 Notes series.*

Adaptations and Lessons in the Province of Bergamo

Lombardy, and particularly the province of Bergamo, has been the area of Italy most affected by Covid-19. As of April 26, 2020, the province had 11,113 confirmed cases and 2932 deaths from Covid-19. Delays in recognizing SARS-CoV-2 in the few infected patients admitted to the small hospital in Alzano Lombardo — and delays in activating measures to protect other patients, hospital personnel, and visitors, as well as in implementing adequate containment measures in patients' villages — allowed the virus to spread rapidly and into the city of Bergamo. The province was not locked down until March 8, which was 2 weeks after the first documented cases at the Alzano hospital on February 23. By then, the virus had sickened thousands of people, many of whom visited the emergency department (ED) at ASST–Papa Giovanni XXIII, a referral hospital for high-need patients throughout the province, and were admitted. These patients rapidly overwhelmed the hospital's capacity, forcing a major reorganization led by a crisis team established on February 23. The infectious disease unit was reconfigured to treat only patients with Covid-19, and other patients were redistributed throughout the hospital or, when possible, discharged.

Dozens of patients were admitted each day, and the number of daily admissions continuously increased. To separate patients with Covid-19 from other patients, it was necessary to create Covid-19 units in both adult and pediatric internal medicine and surgery departments, intensive care units (ICUs), the subintensive critical care area, and the ED. On March 28, patients with Covid-19 occupied 498 of the hospital's 779 beds. Of these patients, 92 were admitted to ICUs and 12 to the subintensive critical care area.

At the beginning of the outbreak, 25% of staff doctors (regardless of their specialty) were redeployed to Covid-19 units, a figure that progressively increased to 70% during the following weeks. Peer education on Covid-19 management was provided to all hospital personnel; more than 1500 people were trained in 1 week. The exponential increase in cases of acute respiratory failure during the first 2 weeks forced ICUs to reorganize, increase their number of beds dedicated to patients with Covid-19 (Fig. 1), and create mixed teams of intensivists. By March 9, there were 49 ICU patients who needed mechanical ventilatory support. This development necessitated the relocation of 14 mechanical ventilators from operating theaters, and 29 additional ventilators were donated by Lombardy's regional health organization.

Difficult decisions about which patients would be assigned ventilators were made using a cumulative patient score that took into account the urgency of each patient's need and the patient's chance of benefiting from treatment. Anesthesiologists and intensivists cancelled most elective surgeries, including almost all transplants, with the exception of one lung transplant that was performed in a severely ill patient (who had previously been on the waiting list) when a suitable donor became available. Two of the 28 operating theaters remained open nonstop for urgent general and cardiac surgeries, and the hospital continued to provide nondeferrable outpatient services. Of the first 510 patients with confirmed Covid-19 who were admitted, 30% died. After weeks of work by doctors and nurses, total hospital mortality has dropped from an average of 17 to 18 (and a peak of 19) deaths per day to 2 deaths per day, which is similar to the average of 2.5 deaths per day recorded before Covid-19.

Two major lessons can be learned from Bergamo's experience. First, all health care workers in hospitals, nursing homes, and the community

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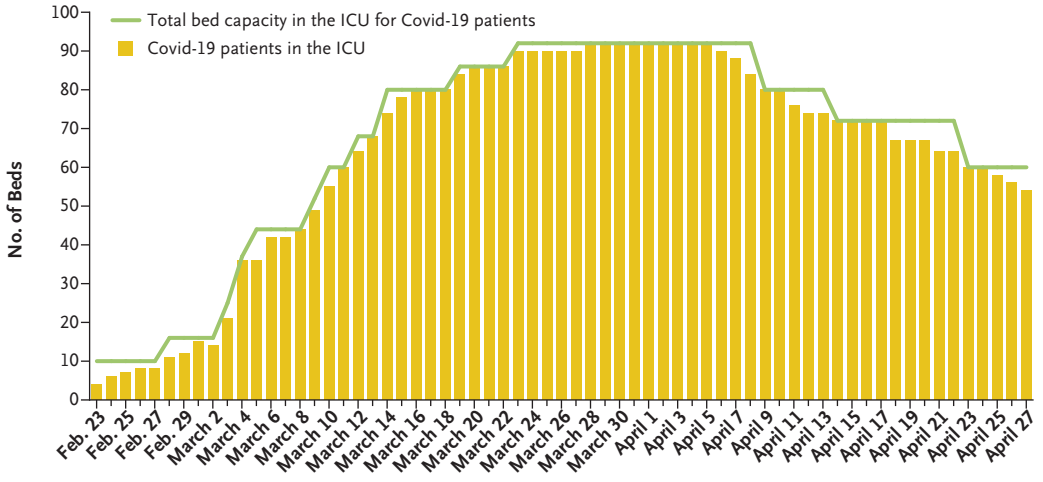

Figure 1. Availability of ICU Beds for Patients with Covid-19 and Hospitalization Trends in the ICU, February 23 through April 27, 2020.

All patients with Covid-19 hospitalized in the ICU were receiving mechanical ventilatory support. On February 28, and again on March 3, 9, 11, 13, and 19, new intensive care departments were dedicated to patients with Covid-19 and were filled within 72 hours. When ICUs began to overflow, some less-sick patients had to remain at home, where several of them died.

should have been tested for Covid-19, and those testing positive should have been isolated, even if they were asymptomatic. Clinicians were initially overlooked during attempts to identify and isolate infected people, which were focused on sick patients. For this reason, and because complete personal protective equipment was not made immediately available, especially to family physicians, 19 doctors in the Bergamo province (all between 62 and 74 years of age) have died. They were all involved in the care of patients with Covid-19, though none worked at ASST–Papa Giovanni XXIII. The second, even more important lesson is that an urgent and decisive regionwide lockdown should have been implemented to contain the epidemic. This step could have reduced the number of Covid-19 cases, prevented hospitals from being overwhelmed, and potentially limited the number of deaths in the province.

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Disclosure forms provided by the authors are available with the full text of this note at NEJM.org.

We acknowledge the many brave and committed physicians, nurses, and other hospital staff who worked tirelessly through the events reported here.

This note was published on May 5, 2020, at NEJM.org.

DOI: 10.1056/NEJMc2011599

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