

# The impact of the coronavirus disease 2019 pandemic on a central Italy transplant center

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## Abstract

Coronavirus disease 2019 (COVID-19) is challenging health care systems worldwide, raising the question of reducing the transplant program due to the shortage of intensive care unit beds and to the risk of infection in donors and recipients.

We report the positive experience of a single Transplant Center in Rome, part of the National Institute for Infectious Diseases Lazzaro Spallanzani, one of the major national centers involved in the COVID-19 emergency.

**Abbreviations:** BAL = broncho-alveolar-lavage, COVID-19 = Coronavirus disease 2019, ICU = intensive care unit, INMI = Istituto Nazionale per le Malattie Infettive (National Institute for Infectious Disease), NAT = nucleic acid testing, NP = nose-pharyngeal, SCF = San Camillo Forlanini.

**Keywords:** COVID 19, Italy, liver, transplantation

## 1. Introduction

The coronavirus disease 2019 (COVID-19) outbreak in China, in December 2019, quickly became a world emergency. In Italy, COVID-19 started spreading at the end of February in the North, rapidly involving the entire peninsula and causing a pressure on the health system never seen before. The preliminary data analysis showed that in Italy around 10% of infected patients needed intensive care, which caused the saturation of the intensive care units (ICUs). This can negatively affect all major surgical activities requiring ICU support, including transplants. Preliminary Italian data, recently published, showed that a 25% reduction in organ procurement already occurred in the first 4 weeks of the COVID-19 outbreak.<sup>[1]</sup> In addition, an article reporting the opinion of specialists in infectious diseases in transplanted patients from all over the world suggested the

opportunity to limit the liver transplant activity only to high Model of End-stage Liver Disease (MELD) score patients.<sup>[2]</sup> They expressed concern for the possibility of COVID-19 transmission through transplantation, the reliability of the nose-pharyngeal (NP) swab, the management of immunosuppression in the perioperative period, and the possibility of becoming infected during admission, in addition to the shortage of ICU beds. We will report the experience in Polo Ospedaliero Interaziendale Trapianti (POIT), a transplant center in Rome.

The Transplant Center is a separate organizational structure within the Istituto Nazionale per le Malattie Infettive (INMI, "National Institute for Infectious Disease"), bringing under one roof the collaboration between inter-medical institutions such as INMI and San Camillo Forlanini (SCF) Hospital. The POIT has a Hepatology-Infectious Disease Unit and an ICU Unit inside INMI, a Surgical Unit from the SCF Hospital, which resides and operates within INMI, and a Hepatology Unit in the SCF Hospital. Since the national lockdown (March 10), INMI has become one of the major Italian centers for COVID-19 patients; nonetheless, the POIT organization has been able to safely maintain its transplant activities.

## 2. Methods

We analyzed the impact of COVID-19 on the number of transplants between March 10 and April 15; then, we compared it with the previous 2 months and with the same period in the previous three years. Since February 22, when COVID-19 first spread in the North of Italy, a nucleic acid test (NAT) on a NP swab or a bronchoalveolar-lavage (BAL) was performed in all donors, as per WHO recommendations<sup>[3]</sup>; we also performed a NT swab in all transplant candidates upon admission, and we waited for the results before proceeding with the surgery. Two suitable candidates were called at the same time, in order to have an option in case of a positive NP swab. NP swabs were repeated on the recipients after they were transferred from the ICU to the Surgical Ward, and before discharge. We maintained the surgical activity at INMI, but moved the transplanted patients to an

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Data sharing not applicable to this article, as no datasets were generated or analyzed during the current study.

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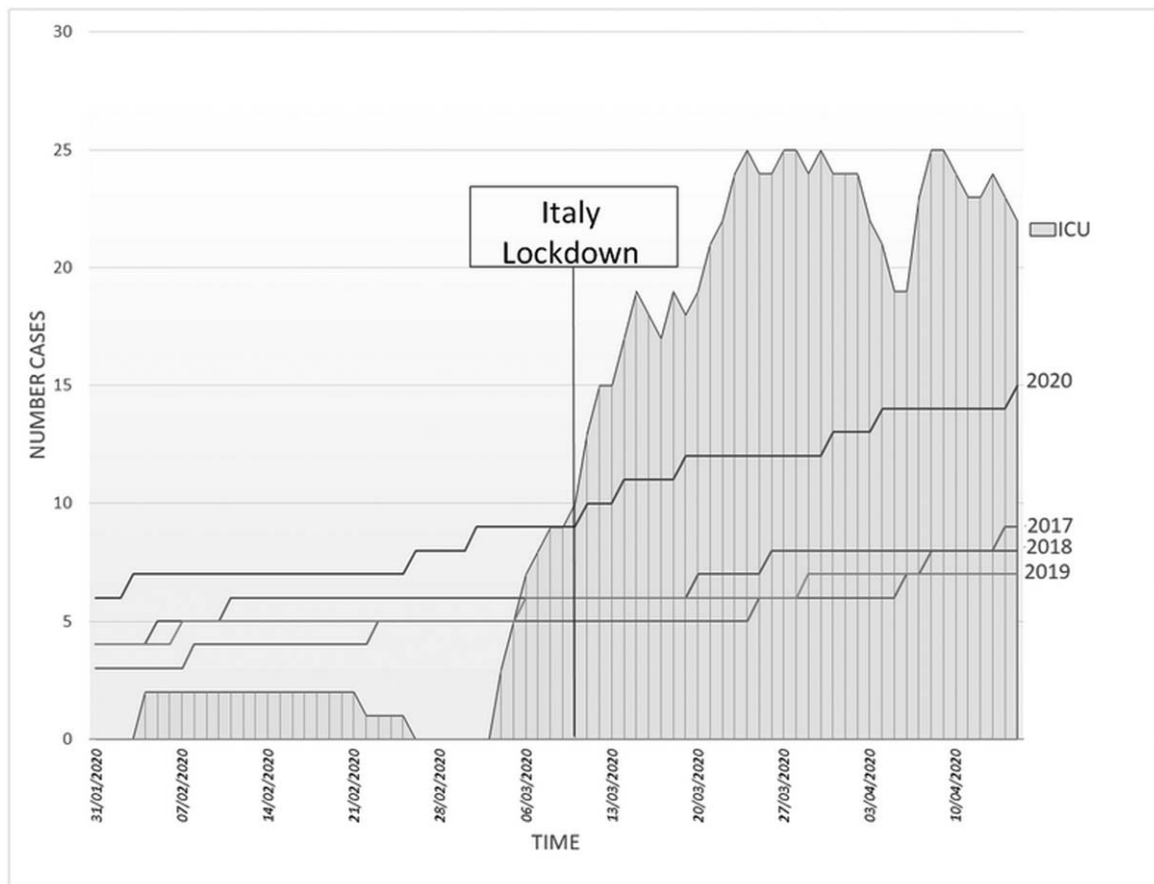
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**Figure 1.** Number of liver transplantation according to the last 3 years and to the ICU COVID-19 cases.

external ICU in the SCF hospital, which was not entirely dedicated to COVID-19 patients, whereas the ICU in INMI was completely reserved to COVID-19 patients.<sup>[4]</sup> The Hepatology-Infectious Disease UNIT in INMI had also become a COVID ward, and the patients on the liver transplant waiting list—or the transplanted ones—were managed through smart working. If in need of hospitalization, the patients were admitted in the Hepatology Unit of the SCF hospital. A safe route from ward to operating room and to ICU was identified, and the required hospital staff—on each level—was specifically trained. This study was approved by the Institute Research Medical Ethics Committee of the INMI.

### 3. Results

Between March 10 and April 15, we performed 6 liver transplants, with no significant difference observed over the previous 2 months (9 transplants were performed between January 1 and March 9), or the previous years (Fig. 1). We did not have any positive NT swab in the recipients, and neither in the donors. Not one of the transplanted patients developed symptoms related to COVID-19 or had a positive NT swab after transplant.

After discharge, none of the transplant recipients developed COVID-19 related symptoms during this short follow-up. Accordingly, the experience of a North Italian center suggested that comorbidities are associated with a worse prognosis in liver transplant recipients.<sup>[5]</sup>

In Rome, there are 4 adult liver transplant centers. With regard to the centers' activities during the same period of COVID-19 pandemic, POIT—despite the increasing unavailability of the INMI ICU (Fig. 1)—managed to maintain the transplant activity, contrary to the other three centers (Fig. 2). This was made possible by just differentiating the activity between the 2 institutes and organizing specific routes for COVID-19 and non-COVID-19 patients. In addition, training the staff also played an important role.

### 4. Discussion

Although concerns were expressed on the maintenance of the transplant activity during the COVID-19 pandemic and a 25% reduction in deceased donor organ procurement was described in Italy, we did not register any reduction in our liver transplant activity, beside the issue of being located inside the National Institute for Infectious Diseases, which is fully dedicated to caring for COVID patients. Being located in an area with a medium incidence of COVID-19 cases is not only positive, but also creates the possibility to differentiate ICU admissions, allowing to maintain a regular transplant activity. INMI had already been previously involved in the SARS and Ebola emergency, thus developing expertise in isolation procedures. The POIT staff had been trained in advance for the eventuality of an epidemic event, and safe routes had already been identified. This facilitated a quick adjustment to the new situation. In fact, the POIT

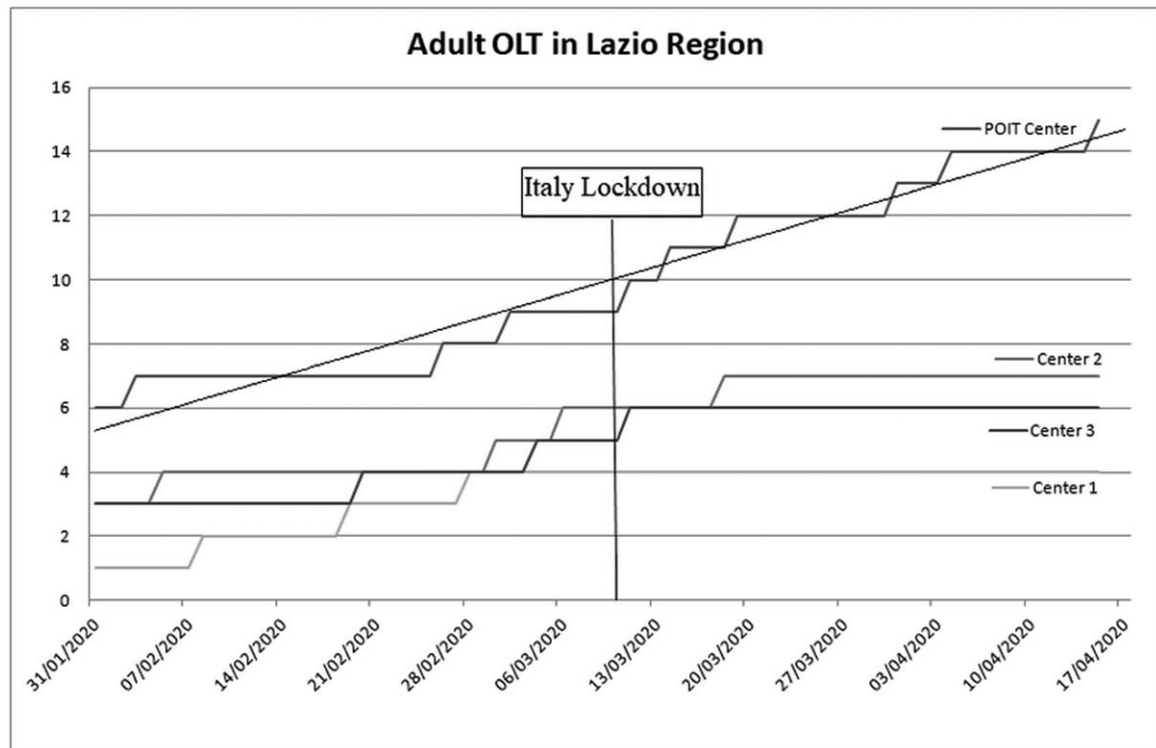


Figure 2. Evolution of the liver transplantation between all transplant centers in Lazio Region.

organization made it possible to respond to the current emergency, but at the same time not to neglect patients with end-stage liver disease in need of transplant, while maintaining a good level of safety. All the NT swabs performed in donors and recipients were negative, as well as those performed after discharge from the ICU. No patients developed symptoms attributable to the COVID-19 infection. This demonstrates that there is not a high risk of infection in performing liver transplant, if the organization has been well planned previously.

## 5. Conclusion

We were able to continuing our transplant activity in a geographic area of Italy characterized by a medium incidence of COVID-19 cases. The previous organization for potential pandemic as a well-tested system able to ensure isolation—together with dedicated routes—allowed us to keep unchanged important surgical activities, such as liver transplant. The COVID-19 may leave an important lesson to health care organization, in order to be ready to ensure surgical activities.

## Author contributions

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**Provision of study materials or patients:** Giammauro Berardi; Nicola Guglielmo; Ubaldo Visco Comandini; Raffaella Lionetti; Laura Vincenzi.

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