



LETTER TO THE EDITORS

An increase in kidney transplantation procedures from deceased donors during the COVID-19 epidemic in Slovenia

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Dear Editors,

The emergence of a new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and related disease (COVID-19) [1] has put an overwhelming burden on the healthcare system worldwide, and a negative effect on organ donation and transplantation is anticipated. A major concern is that transplant recipients might have greater susceptibility to infection due to immunosuppression [2]. A recent report has demonstrated a sharp reduction in deceased-donor organ transplantations by 51.1% in the United States and by 90.6% in France, largely driven by a decline in kidney transplantation [3]. As international comparisons are important, we present how contemporary effect of COVID-19 pandemic in the Eurotransplant (ET) region resulted in an increase in deceased-donor kidney transplantations in Slovenia.

In Slovenia, which has a population of 2.08 million, there is one kidney transplant centre. Since joining ET in 2000, we perform between 40 and 60 kidney transplants from deceased donors annually (i.e. 20–30 per million population). After the announcement of COVID-19 epidemic on 12 March 2020, our transplantation activity ground to a virtual halt as the epidemic began to spread. With strict nationwide preventive measures to limit the spread of infection, the epidemic was rapidly under control and Slovenia was the first country in Europe to declare end of COVID-19 epidemic effective from May 15 (for national data on COVID-19

epidemic, see <https://covid-19.sledilnik.org/en/stats>). After the first 3 weeks of epidemic when the spread of coronavirus flattened, we gradually opened up to doing more transplants. This decision was also based on an increase in the number of organs offered from other ET centres experiencing a significant reduction in solid organ transplantations [4]. To ensure safety of transplant procedures, recipients and donors were screened for COVID-19 symptoms and epidemiologic history and were universally tested for SARS-CoV-2 by nucleic acid testing obtained from nasopharyngeal swab and in organ donors from an additional lower respiratory sample (tracheal aspirate or bronchoalveolar lavage). In addition, nonurgent transplantations in recipients ≥ 65 years (ET senior programme) who are at greater risk for severe complications from COVID-19 and living-donor transplantations were put on hold. All recipients were counselled about potential risks for acquisition of SARS-CoV-2 during the COVID-19 pandemic and have signed a written consent form.

During the outbreak of COVID-19, increase in monthly mean transplant procedures was 3.7 when compared to 2019, and 4.4 when compared to the pre-COVID-19 period between 1 January and 11 March 2020 (Table 1). The majority of kidneys (73%) were imported from other ET countries. As we temporarily suspended the ET senior programme, we were able to transplant younger recipients who spent longer time on dialysis and waiting list. Furthermore, the donor population was younger with a lower proportion of expanded criteria donors available as compared to 2019. Despite longer cold ischaemia times, associated with suspension of commercial air traffic, the procured kidneys recovered more quickly from ischaemic injury (Table 1). As shown in Fig. S1, COVID-19 epidemic had no significant effect on the absolute number of deceased donors in Slovenia.

As COVID-19 spreads across continents, healthcare providers and leaders of medical institutions have to

Table 1. Kidney transplantation procedures from deceased donors before and during the outbreak of COVID-19 in Slovenia (total number of transplants, recipient, donor and transplant-related characteristics are compared between 2019 and 2020, before and during the COVID-19 epidemic).

Characteristic	1 January–31 December 2019	1 January–11 March 2020 before COVID-19	12 March–15 May 2020 COVID-19
Number of procedures	38	6	15
Monthly mean	3.2	2.5	6.9
Recipients			
Age	58 ± 14	49 ± 13	45 ± 10*
Male gender (%)	76	100	53**
Time on dialysis (months)	32 (0–129)	17 (2–69)	44 (8–79)**
Time on the waiting list (months)	6.4 (0–56)	5.4 (4–11)	14.3 (3–73)**
Peak PRA value (%)	0 (0–99)	0 (0–12)	3 (0–95)
SARS-CoV-2 infection	/	/	0
Donors			
Age	56 ± 16	30 ± 15	48 ± 13*
Male gender (%)	42	83	53
Expanded criteria donor (%)	55	17	27*
SARS-CoV-2 infection	/	/	0
Transplant-related			
Organs imported from abroad (%)	26	17	73**
Pre-emptive transplantation (%)	13	0	0
Retransplantation (%)	8	0	7
HLA mismatch	3.3 ± 1.5	3.8 ± 1.7	3.1 ± 1.0
Cold ischaemia time (h)	18.5 ± 5.0	18.0 ± 6.0	21.5 ± 6.0
Primary nonfunction (%)	5	0	0
Delayed graft function (%)	18	17	13

COVID-19, coronavirus disease 2019; HLA, human leucocyte antigen; PRA, panel-reactive antibodies; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

Data are presented as means ± SD, medians (ranges), total numbers or percentages.

* $P < 0.05$ versus transplant procedures in 2019 (Student's t -test or Fisher's exact test).

** $P < 0.05$ versus transplant procedures in 2020, before COVID-19 epidemic (Mann–Whitney U -test or Fisher's exact test).

make difficult decisions about how best to deploy limited medical resources [5]. In Slovenia, a small country with persistent lack of healthcare personnel and resources related to intensive care units, first sets of governmental restrictive measures were focused on assuring free capacities for the treatment of potentially large number of COVID-19 patients. These choices could be devastating for patients in need of an organ transplant. While living-donor transplants could be rescheduled for a future date, deceased-donor organs must be procured immediately, or the opportunity is lost. When deceased-donor kidneys are being accepted in the resource-limited COVID-19 hospital environment, they will most likely be higher-quality organs which go against the current trend of expanding the organ pool.

Based on effective intervention measures to mitigate the consequences of SARS-CoV-2 in our general

population and no mortality from COVID-19 among our transplant recipients, we have been able to increase deceased-donor kidney transplant programme through the coronavirus crisis. Nevertheless, decision to consider kidney transplantation as a safe procedure during COVID-19 pandemic should be made on a case-by-case basis, with concerns shared among the entire transplant team and patient after careful assessment of the risks and benefits.

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Conflict of interest

None.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Figure S1. Absolute number of deceased donors before and during the outbreak of COVID-19 in

Slovenia (total numbers are presented for the periods between January 1–March 11 and March 12–May 15, 2020, compared with 2019).

REFERENCES

1. Huang C, Wang Y, Li X, *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020; **395**: 497.
2. Fishman JA, Grossi PA. Novel coronavirus-19 (COVID-19) in the immunocompromised transplant recipient: flattening the curve. *Am J Transplant* 2020); **20**: 1765. <https://doi.org/10.1111/ajt.15890>
3. Loupy A, Aubert O, Reese PP, Bastien O, Bayer F, Jacquelinet C. Organ procurement and transplantation during the COVID-19 pandemic. *Lancet* 2020); **395**: e95. [https://doi.org/10.1016/S0140-6736\(20\)31040-0](https://doi.org/10.1016/S0140-6736(20)31040-0)
4. de Vries APJ, Alwayn IPJ, Hoek RAS, *et al.* Immediate impact of COVID-19 on transplant activity in the Netherlands. *Transpl Immunol* 2020; **61**: 101304.
5. Anderson RM, Heesterbeek H, Klinkenberg D, Hollingsworth TD. How will country-based mitigation measures influence the course of the COVID-19 epidemic? *Lancet* 2020; **395**: 931.