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Resuming liver transplantation amid the COVID-19 pandemic

We read with interest the Correspondence published during the first wave of the COVID-19 pandemic describing the response by the Birmingham Liver Unit (Birmingham, UK).¹ We describe the response across the UK, where seven adult and three paediatric centres do approximately 1000 liver transplantations per year (19 liver transplantations per week).² National Health Service Blood and Transplant (NHSBT) and the Liver Advisory Group, who oversee organ donation and liver transplantation, in collaboration with NHS England, coordinated that national response. When WHO declared a global pandemic with Europe as the epicentre on March 13, 2020,³ frequent meetings of NHSBT's clinical team were set up and a group comprising directors from every liver transplantation centre in the UK and NHS England was established to ensure timely decision making.

Initial actions by NHSBT (March 17, 2020) to support organ donation included implementing universal donor COVID-19 testing, the development of specific guidance (in collaboration with the British Transplantation Society) on the management of transplanted patients with COVID-19 and consenting patients for transplantation in the context of the pandemic, and the establishment of a COVID-19 waiting list and transplantation registry. The focus was on ensuring the safety and wellbeing of members of the national organ retrieval service, including recommendations on the use of personal protective equipment. All guidance was reviewed and updated regularly. From March 20, 2020, national organ offering policies were individually reviewed and liver transplantation centres were advised to continue on a case-by-case basis, with

decisions on unit closures made by commissioners and individual hospital trusts, supported by NHSBT. At the onset of the pandemic, there were major concerns that the intensive therapy unit (ITU) capacity of the NHS would be exceeded and additional field hospital capacity was being established across the UK. To reduce demands on ITUs for organ donation and transplantation, age for donation after brainstem death (DBD) was restricted to 60 years and donation after circulatory death (DCD) restricted to 50 years. These age restrictions were implemented on March 23, 2020, with a projected reduction of 51% in organ transplantation.

On March 27, 2020, after an options appraisal, changes were made to the national transplant benefit score (TBS)-based liver offering scheme in anticipation of reaching the COVID-19 peak. The objectives of the refinement were to maximise opportunities for liver transplantation, provide some autonomy in recipient selection, foreshorten the offering and donation process, reduce workflow inefficiencies for NHSBT, and ensure rapid implementation by avoiding time-consuming changes to information technology systems. A national high-urgency recipient category was established, populated by recipients who were anticipated to be at high risk of dying or progressing outside transplant criteria within the following 3 months. This category included patients with a UK Model for End-stage Liver Disease (UKELD) score of more than 60, hepatocellular carcinoma close to the limits of transplantation, and patients identified subjectively to have a worse prognosis than predicted by UKELD. Thereafter, all organs were simultaneously offered nationally to the three recipients with the highest TBS and centres were then able to select any suitable high-urgency recipient. With no suitable urgent recipient at any centre, organs were then offered for low-urgency patients, with centres deciding in the

circumstances whether the risk-benefit ratio warranted transplantation. On May 7, 2020, further refinements ensured that the donor offering runs were restricted to the TBS of patients deemed to be of highest urgency. With recovery, standard TBS offering resumed on July 9, 2020. Donor criteria were relaxed on April 8 (DBD age increased to 75 years), May 14 (DCD age increased to 60 years), and June 29, 2020 (removal of any age restrictions for DBDs and DCD age increased to 70 years).

Before the UK pandemic peak (April 8, 2020), all centre capabilities were monitored weekly to ensure that there was resilient capacity to accept and offer liver transplants to patients with acute liver failure (super-urgent) and those of high urgency. Two adult centres briefly closed for high-urgency liver transplantation during this phase; all others remained open for patients who were super-urgent and highly urgent throughout the pandemic. Coinciding with this peak there was an 86% reduction in organ donor offering, with the number of liver transplantations falling by 84% (three nationally per week) before a gradual recovery of organ donation and subsequently liver transplantation (appendix). During the first wave (March 23–July 9, 2020), almost all adult patients transplanted (148 of 157 liver transplantations) were super urgent (n=15) or high urgency (n=133). Of the 133 high-urgency patients, 92 patients had chronic liver disease (median UKELD score at transplant 58 [range 49–70], Model for End-stage Liver Disease score 18 [range 9–39]) and 19 patients had marginal hepatocellular carcinoma (median number of tumours 1 [range 1–5], median maximum tumour size 2.8 cm [range 1.4–4.8], median maximum α -fetoprotein level 10 IU/mL [range 1–853]). Liver transplantation of large paediatric recipients (aged younger than 17 years and weighing \geq 40kg) relieved some pressure on adult ITU capacity. Indeed, there

See Online for appendix

was excellent collaboration between paediatric centres sharing split livers, with 31 transplantations undertaken including six paediatric live donor transplantations at two centres.

Despite a reduction in liver transplantation list registrations (with centres only assessing high-urgency cases) and a truly national service being sustained, there has been an increase in liver transplantation waiting list size without an increase in waiting list mortality (appendix). There were backlogs of patients for assessment in some centres. Centres' recovery plans have been monitored weekly and, by creating additional capacity and incorporating new models of care, timely backlog clearance was achieved.

The focus now, as the UK liver transplantation service returns to normal activity, is to provide resilient COVID-19-protected transplant pathways and ensure advance planning for future surges in COVID-19 cases.

Through the exemplary collaboration of liver transplantation centres, commissioners, and all members of the NHSBT clinical team, we have been able to mitigate the effects of the first wave of COVID-19 and emerge with an enhanced national liver transplantation service that is equipped to meet the future needs of the UK population.

We declare no competing interests.

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- 1 Lembach H, Hann A, McKay SC, et al. Resuming liver transplantation amid the COVID-19 pandemic. *Lancet Gastroenterol Hepatol* 2020; **5**: 725–26.
- 2 National Health Service Blood and Transplant. Annual report on liver transplantation 2018–19. August 2019. <https://nhsbt.dbe.blob.core.windows.net/umbraco-assets-corp/16782/nhsbt-liver-transplantation-annual-report-2018-19.pdf> (accessed Oct 21, 2020).
- 3 WHO. WHO Director-General's opening remarks at the media briefing on COVID-19. March 13, 2020. <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-mission-briefing-on-covid-19---13-march-2020> (accessed Oct 21, 2020).