Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

and the magnitude of the abnormalities compared with a reference standard. In a digital world, this analogue nuance is often lost.

Interestingly, only the N-terminal pro B-type brain natriuretic peptide (pro-BNP) and IL-6 concentrations were significantly associated with coronary artery abnormalities. This finding simultaneously implies an association with increased inflammatory state and advises caution because most of the other laboratory markers usually examined do not aid in prognostication. However, the likelihood of shock was significantly associated with almost all of the other factors—elevated D-dimer, troponin, BNP, pro-BNP, and C-reactive protein, ferritin, and IL-6, and decreased platelet and lymphocyte counts. Therefore, for the initial management of patients with MIS-C, considering the laboratory results will allow clinicians to stratify patients and ensure that everyone has access to the level of care suitable for the individual.

The ongoing emergence and rapid dissemination of knowledge around MIS-C is incredibly important for clinical teams around the world to treat their patients carefully, correctly, and with knowledge. Many of the treatments have substantial potential side-effects and resource implications (especially for low-income and middle-income countries), and should be used only when the patient's condition necessitates treatment, and when the treatment has been show to be effective.

I declare no competing interests.

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1 Kang H, Whittaker E, Piccinelli E, et al. Abstract 17354: clinical outcomes for children with paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS) *Circulation* 2020; **142:** A17354.
2 Whittaker E, Bamford A, Kenny J, et al. Clinical characteristics of 58 children with a pediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2. *JAMA* 2020; **324:** 259–69.
3 Gruber C, Patel R, Trachtman R, et al. Mapping systemic inflammation and antibody responses in multisystem inflammatory syndrome in children (MIS-C). *Cell* 2020; **183:** 982–95.
4 Consiglio C, Cotugno N, Sardh F, et al. The immunology of multisystem inflammatory syndrome in children with COVID-19. *Cell* 2020; **183:** 968–81.
5 Abrams JY, Oster ME, Godfred-Cato SE, et al. Factors linked to severe outcomes in patients with multisystem inflammatory syndrome in children (MIS-C) in the USA: a retrospective surveillance study. *Lancet Child Adolesc Health* 2021; published online March 9. https://doi.org/10.1016/S2352-4642(21)00050-X.
6 Davies P, Evans C, Kanthimathinathan H. et al. Intensive care admissions of children with paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS) in the UK: a multicentre observational study. *Lancet Child Adolesc Health* 2020; **4:** 669–77.

Effect of the COVID-19 outbreak on paediatric cancer care in low-income and middle-income countries

Childhood cancer is a highly curable disease when health-care systems provide timely, accurate diagnoses and appropriate therapy. In Latin America, the paediatric cancer survival rate is significantly lower than in high-income countries, and approximately one in two children diagnosed with cancer will die of the disease. This disparity is due to health system challenges such as limited access to early detection and effective treatment and care.[1] During the COVID-19 outbreak, children with cancer have been particularly at risk of suffering the consequences of resource reallocations by having treatments delayed, interrupted, or substantially modified. The pandemic has forced paediatric oncology units to alter their basic operationality to minimise the risk of the virus spreading while providing the best possible management of cases found positive for COVID-19 and, above all, to ensure that children and adolescents are able to access their oncology treatment.

In *The Lancet Child & Adolescent Health*, Dylan Graetz and colleagues[2] present the results of a cross-sectional survey (from June 22 to Aug 21, 2020) distributed to 311 health-care professionals at 213 institutions in 79 countries. The study aimed to investigate the effect of the COVID-19 pandemic on childhood cancer care worldwide, and assessed the institution's characteristics, the number of patients diagnosed with COVID-19, and disruptions and adaptations to cancer care. The authors concluded that although the COVID-19 pandemic has substantially affected childhood cancer diagnosis and management worldwide, its effect has been more prominent in low-income and middle-income countries than in high-income countries. For example, unavailability of chemotherapy agents (p=0·022), treatment abandonment (p<0·0001), and interruptions in radiotherapy (p<0·0001) were more frequent in low-income and middle-income countries.


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In a similar study in April, 2020, Vasquez and colleagues[3] evaluated the early effects of the pandemic on haematology and oncology practices across Latin America, revealing that COVID-19 had negatively affected the prognosis of children with cancer. The study showed that paediatric oncology units made efforts to provide chemotherapy for children with newly diagnosed cancer and those who required active ongoing treatment. Health-care providers reported an indefinite delay of follow-up appointments, outpatient procedures, cancer surgeries, radiotherapy schedules, outpatient consultations, stem-cell transplantation, and palliative care. Additionally, 36% of cases required modification of chemotherapy regimens because of a shortage of drugs, and 79% of survey participants reported a shortage of blood products. Discontinuation of or modification to therapy was significantly more frequent in countries with travel restrictions.[3]

These studies emphasised the challenges of delivering childhood cancer treatment and care during the pandemic, especially in resource-constrained settings. In low-income and middle-income countries, including in Latin America, the common issues of late diagnosis and treatment abandonment or interruptions have worsened during the pandemic.[4]

During the COVID-19 early crisis in March, 2020, the region's governments enforced the WHO guidelines, mainly social distancing. When the first cases were reported in mid-March in Latin America, country leaders closed both air and land borders and implemented quarantine measures. These lockdown measures, lasting until June or July in some countries,[5] included either partial or complete suspension of public transportation, which decreased mobility and considerably reduced patients' flow in health-care centres. As many households lost their wages, the expectation of substantial economic effect on families might have led to treatment abandonment in children with cancer or non-adherence to treatment (such as intermittently missing medication doses or appointments).[6,7]

In response to the challenges, countries have implemented new policies and distributed resources. Hospitals are inclined to decrease the need for hospital visits when patients have a high risk of death due to SARS-CoV-2 infection.[8] In El Salvador, the national paediatric cancer programme team recognised the importance of expanding telemedicine to optimise care through video calls. The health-care system affected by the lockdown imposed fear and forced patients to embrace telemedicine. Telemedicine attempted to safeguard resources in the oncology programme by seeing follow-up patients through it, while the medical team optimised the care to the newly diagnosed patients or those under active treatment. By mid April, the traveling restrictions became more severe, forcing patients to stay home. Eventually, as of September, the team provided care through telemedicine to all follow-up patients, and many patients in active treatment started receiving their post-chemotherapy laboratory evaluation results by telephone. Different paediatric oncology units have also reported implementing physical distancing measures, reorganising staff in 12-h shifts per group, or sending non-essential personnel to do telework to reduce exposure.[9]

Health-care systems in the Latin-America region need to reorganise health-care infrastructure to address the emergency to ensure sustained curative outcomes for children with cancer while maintaining public health and safety. The COVID-19 pandemic created an opportunity to develop legislation for childhood cancer services. For instance, the Peruvian legislature proposed the Childhood Cancer Law in April, 2020, which will have a substantial effect in the fight against childhood cancer in Peru, despite a global pandemic.[10] The Childhood Cancer Law strives to benefit children and adolescents with cancer by implementing universal health coverage, conferring parents a financial allowance (the equivalent of two minimum-wage salaries) while their child is under treatment, and building a National Program for Children and Adolescents with cancer that incorporates a population-based pediatric cancer registry. The law will effect the life of at least 650 patients per year, improving the survival rate of childhood cancer in Peru.

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1 Pan American Health Organization. Childhood cancer in the Americas. 2014. https://www.paho.org/hq/dmdocuments/2014/PAHO-Childhood-Cancer-Factsheet-2014.pdf (accessed Feb 23, 2021).
2 Graetz D, Agulnik A, Ranadive R, et al. Global effect of the COVID-19 pandemic on paediatric cancer care: a cross-sectional study. *Lancet Child Adolesc Health* 2021; published online March 3. https://doi.org/10.1016/S2352-4642(21)00031-6.
3 Vasquez L, Sampor C, Villanueva G, et al. Early impact of the COVID-19 pandemic on paediatric cancer care in Latin America. *Lancet Oncol* 2020; **21:** 753–55.

4 Guzman C PC, Cordoba MA, Godoy N, et al. Childhood cancer in Latin America: from detection to palliative care and survivorship. *Cancer Epidemiol* 2020; published online Oct 26. https://doi.org/10.1016/j.canep.2020.101837.

5 Pagés C, Aclan C, Alfonso M, et al. Del confinamiento a la reapertura: Consideraciones estrategicas para el reinicio de las actividades en America Latina y el Caribe en el marco de la Covid-19. 2020. https://publications.iadb.org/es/del-confinamiento-a-la-reapertura-consideraciones-estrategicas-para-el-reinicio-de-las-actividades-en-america-latina-y-el-caribe-en-el-marco-de-la-covid-19 (accessed Feb 26, 2021).

6 Salaverria C, Rossell N, Hernandez A, et al. Interventions targeting absences increase adherence and reduce abandonment of childhood cancer treatment in El Salvador. *Pediatr Blood Cancer* 2015; **62:** 1609–15.

7 Rossell N, Salaverria C, Hernandez A, et al. Community resources support adherence to treatment for childhood cancer in El Salvador. *J Psychosoc Oncol* 2018; **36:** 319–32.

8 Fuentes-Alabi S, Salaverria C, Rogel FM, et al. Telemedicine in times of COVID-19, El Salvador pediatric oncology national program adapting resources to optimize patients' care during the outbreak. *Pediatr Blood Cancer* 2020; **67:** S23–S23.

9 Baker McKenzie. Latin America: coronavirus-a quick guide for employers. 2020. https://www.bakermckenzie.com/en/insight/publications/2020/03/latam-coronavirus-guide-for-employers (accessed Feb 23, 2021).

10 Vasquez L, Maradiegue E, Rojas N, et al. Catalyzing childhood cancer care in Peru after one year of the Global Initiative for Childhood Cancer. *JCO Global Oncology* 2021; **7:** 187–89.

Blood group-incompatible heart transplantation in children—an idea worth spreading

Heart transplantation has extended the lives of thousands of children with end-stage heart failure across many countries.[1] Despite the achievements, as many as one in five children will die while on waiting lists due to unavailability of a suitable donor. For children younger than 5 years, donor availability is further reduced and waiting list mortality increased. Therefore, efforts have been made to expand the donor pool in many areas, such as by stretching donor acceptance criteria by using grafts with an increasing donor:recipient weight ratio, tolerating donor organs with marginal physiological function, and accepting older adult donors for transplantation into children, all with acceptable post-transplant outcomes.[2]

One of the more captivating methods of expanding the donor pool has been to transplant disregarding acceptable blood group matches, an approach known as ABO-incompatible transplantation. This approach allows a donor heart from any blood group to be transplanted dependent upon acceptable blood group antibody titres, widening the donor pool for young children who have yet to develop these antibodies. This idea seems fundamentally foolish in the context of the rigorous process taken to avoid transfusion reactions while administering blood products in all other aspects of medicine. Despite these challenges, through research bravely pioneered by Lori West and her team in Toronto, ABO-incompatible heart transplantation has been accepted as a standard procedure, exploiting the immaturity of young children's immune systems and mammalian tolerance evident in early life.[3]

Scientific observations regarding neonatal immune tolerance were described in mice by Billingham and colleagues,[4] well before the first human heart transplant. They reported tolerance to skin grafts from different strains of mice when cells from the donor strain were injected into the recipient during fetal life, priming the recipient mouse to accept a foreign graft. Earlier experiments in chicks[5] had similarly shown that skin grafts exchanged between different strains of newborn chick were tolerated if transplanted early enough after birth. These findings have direct relevance for paediatric heart ABO-incompatible transplantation.

One fundamental opportunity for ABO-incompatible transplantation is afforded by the absence of blood group antibodies in young children (isohaemagglutinnins), protecting the donor organ from an early acute cross-match reaction. Additionally, the immune tolerance response suggests that exposure to foreign blood group antigens at the time of transplant should suppress antibody production in the future and hence prevent further delayed immune rejection. For example, a blood group O infant will be naive to anti-A and anti-B antibodies in early life. Without exposure to antigens in the form of a transplant, these antibodies usually develop within the first few years of life. If this infant requires a heart transplant before these antibodies appear and receives an ABO-incompatible transplant with a blood group A organ, this tolerance suppresses the normal expected development of anti-A antibodies and allows safe transplantation. The consequence of ABO-incompatible transplantation is expansion of the donor pool, reduction in waiting time, and comparable outcomes with ABO-compatible heart transplants in children.[6]

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