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Early impact of the COVID-19 pandemic on paediatric cancer care in Latin America

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Although previous studies have suggested that the complications and mortality rate related to COVID-19 are substantially lower in the paediatric population,[1] it is reasonable to consider that children with underlying conditions such as cancer will be at increased risk of severe disease.[2,3] Some reports have examined the impact of COVID-19 in children with cancer; in all cases no deaths or disease-related complications have been reported.[4-6] In order to prevent the rapid spread of the virus as seen in many European countries, most Latin American countries implemented early epidemiological actions with social distancing, interruptions of commercial activities, transportation, and schooling. Preparation for the pandemic throughout Latin America, in terms of hospital capacity, human resources, and testing capacity is, however, heterogeneous.[7] In this scenario, there is emerging concern about the collateral effect of the COVID-19 pandemic on access to diagnosis and treatment in children with cancer.[8] In response to this problem, the global paediatric oncology community has summarised some of the anticipated challenges.[9]

To examine the potential impact of COVID-19 on the management of children with cancer in Latin America, we did a cross-sectional survey of paediatric onco-haematologists in April 12–19, 2020, early in the spread of the outbreak in the region (appendix p 1). The survey was electronically distributed through the Latin American Society of Pediatric Oncology (SLAOP) email list and St Jude Global regional partners. Additionally, SLAOP's national delegates for each country contacted their centres for an increased response and reviewed the responses from their countries for validation before analysis.

453 paediatric onco-haematologists (267 faculty members, 142 medical directors, and 44 residents from public and private institutions) from 20 countries were surveyed (appendix p 2). Most participants reported that chemotherapy was administered for newly diagnosed (429 [95%]) and active ongoing (441 [97%]) treatment cases. However, indefinite postponement or delay of surveillance consultations (405 [89%]), outpatient procedures (264 [58%]), cancer surgeries (206 [45%]), radiotherapy schedules (122 [33%]), outpatient consultations (119 [26%]), stem-cell transplantation (173 [73%]) and palliative care (87 [19%]) were reported. In 36% of cases, modification of chemotherapy regimens was required because of shortage of drugs (figure; appendix p 3).

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Multivariate logistic regression revealed that the type of oncology hospital, number of paediatric onco-haematologists in a centre, travel restrictions, COVID-19 incidence rate and fatality rate (appendix p 4), and national health-care expenditure were independent factors for any type of discontinuation of or modification to oncological therapy in children (appendix pp 5–6).

Nearly 60% of respondents reported a decrease in their paediatric onco-haematology staff because of

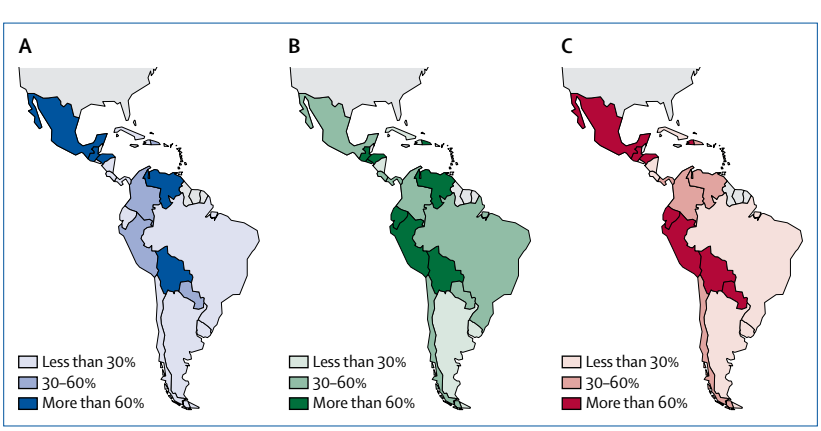

Figure: **Proportion of suspensions or alterations to paediatric cancer treatment by country**
(A) Chemotherapy modification due to shortage of drugs. (B) Indefinite postponement or delay of cancer surgery. (C) Indefinite postponement or delay of radiotherapy sessions. Countries shaded grey were not included.

COVID-19 infection or quarantine. Half of the surveyed respondents reported that their centres did not provide a platform for telemedicine consultations, although non-professional social media channels were used. Shortage of blood products was reported by 79% of respondents, which was significantly more frequent in countries with travel restrictions, high COVID-19 incidence rates, and a health-care expenditure less than 7% of GDP (appendix pp 5–6). In countries with the highest health-care expenditure and lowest COVID-19 incidence and case-fatality rates, physicians stated that they perceived the pandemic would not affect children with cancer, probably due to greater confidence in their health-care systems (appendix pp 5–6). Facility funding, participants position, and tests per million population at risk were not independently associated with any outcome (appendix pp 5–6).

Almost all participants (99%) reported that their hospitals are implementing social distancing measures, suspension of functions of non-essential personnel and students, reorganisation of teams to reduce exposure, and implementation of educational materials that are aligned to recently published international recommendations (appendix p 7).[10] However, some participants expressed concerns about the lack of governance of health-care systems overwhelmed with COVID-19, poor availability of personal protective equipment, issues in the shipment and processing of pathology samples (by flow cytometry and for minimal residual disease assessment), and delays in access to diagnosis in new cases, mostly in countries where treatment is centralised (appendix p 7).

The major strength of this study is its high participation rate and geographical coverage, with responses from all Latin American countries with official paediatric oncology programmes. However, the main limitation was the imbalanced number of participants between countries, making it difficult to compare across countries.

Our data suggest that even in this early epidemiological phase where health-care systems have not been substantially affected in Latin America, COVID-19 has already affected the care of children with cancer. In addition to the potential risk of severe disease by COVID-19 in these patients, prognosis could be negatively affected because of alterations to paediatric oncology management. As the pandemic evolves and the burden on health-care systems increases, these disruptions might be even more severe if preventive actions are not taken.

We declare no competing interests.

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NIH funding for research underlying new cancer therapies

Contemporary discovery and development of cancer drugs are based on the model that investments in basic biomedical science will provide insights that can be translated into new cures. In the USA, basic research is primarily funded by the National Institutes of Health (NIH),[1] which allocates half of its research budget to basic science,[2] with smaller amounts contributed by philanthropy, academics, or industry.[1] Basic science is formally defined as the "systematic study directed toward fuller knowledge or understanding of the fundamental aspects of phenomena and observable facts without specific application towards processes or products in mind".[3] However, science is often use-inspired,[4] and much of the NIH funding for basic research comes from institutes with specific health missions.[2,4] Is there a direct link between NIH funding for basic science and the emergence of new cancer therapies?

The number of new cancer drugs has grown from 4% of all US Food and Drug Administration (FDA) approvals in the 1980s to 27% between 2010 and 2018.[5] Evidence shows that this growth has been driven by advances in basic science,[6] and by the maturation of basic research in areas such as cancer immunology, cancer genetics, and cell signalling, which mostly originated in the 1970s and 1980s.[7]

A 2018 study by Cleary and colleagues[8] showed that NIH funding contributed to the research underlying all 210 new drugs approved by the FDA between 2010 and 2016. This study identified more than 2 million publications in PubMed related to these 210 drugs and their 151 biological targets. Of these publications, more than 600 000 (30%) had US federal government research support cited in the NIH RePORTER database.[9] This support consisted of more than 200 000 project years of funding from 1985 to 2016, and more than US$100 billion in project costs between 2000 and 2016.[8] Notably, more than 90% of NIH-funded research was associated with publications on biological targets rather than the drugs themselves, and the research was considered basic science. Conversely, less than 10% of this funding was associated with research on drugs and was considered applied or translational science.[8]

The largest proportion (28%) of new drugs tested in this study[8] were indicated for the treatment of cancer. From 2010 to 2016, 59 new drugs were approved for cancer therapy, including 56 antineoplastic drugs and three products indicated for the management of side-effects caused by chemotherapy. These 59 products are associated with 41 distinct biological targets (appendix pp 1–2). Of the 59 cancer therapies, 49 (83%) were discovered by screening against a known biological target (targeted discovery) and 24 (41%) were classified as first-in-class—ie, the first approved products associated with that target. The other 10 of 59 (17%) therapies were originally identified by their biological activity and subsequently screened for cancer therapy (phenotypic discovery).

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Using the methods and datasets described by Cleary and colleagues (appendix p 3),[8] we identified 711 702 publications in PubMed related to the 59 cancer drugs or their 41 biological targets. Of these, 266 154 (37%) had federal support cited in the NIH RePORTER database.[9] Accounting for publications related to more than one drug or target, there were 82 539 unique publications citing NIH support. Only 3936 (5%) of these unique publications described research related to the drugs and were classified as applied or translational research. The other 78 603 (95%) described research on the drug targets, but not the drugs themselves, and were classified as basic research.