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Childhood cancer survivorship care during the COVID-19 pandemic: an international report of practice implications and provider concerns

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Abstract

Purpose Long-term follow-up (LTFU) care is essential to optimise health outcomes in childhood cancer survivors (CCS). We aimed to assess the impact of the COVID-19 pandemic on LTFU services and providers.

Methods A COVID-19 working group within the International Late Effects of Childhood Cancer Guideline Harmonization Group (IGHG) distributed a questionnaire to LTFU service providers in 37 countries across Europe, Asia, North America, Central/South America, and Australia. The questionnaire assessed how care delivery methods changed during the pandemic and respondents' level of worry about the pandemic's impact on LTFU care delivery, their finances, their health, and that of their family and friends.

Results Among 226 institutions, providers from 178 (79%) responded. Shortly after the initial outbreak, 42% of LTFU clinics closed. Restrictions during the pandemic resulted in fewer in-person consultations and an increased use of telemedicine, telephone, and email consultations. The use of a risk assessment to prioritise the method of LTFU consultation for individual CCS increased from 12 to 47%. While respondents anticipated in-person consultations to remain the primary method for LTFU service delivery, they expected significantly increased use of telemedicine and telephone consultations after the pandemic. On average, respondents reported highest levels of worry about psychosocial well-being of survivors.

Conclusions The pandemic necessitated changes in LTFU service delivery, including greater use of virtual LTFU care and risk-stratification to identify CCS that need in-person evaluations.

Implications for Cancer Survivors Increased utilisation of virtual LTFU care and risk stratification is likely to persist post-pandemic.

Keywords Paediatric oncology · Childhood cancer · Long-term follow-up care · COVID-19

Introduction

Cancer and its treatment may adversely affect growth and development, organ function, reproductive potential, and risk of secondary carcinogenesis as well as psychosocial health and well-being of long-term childhood cancer survivors (CCS) [1–6]. To optimise health outcomes and improve quality of life, long-term follow-up (LTFU) care for CCS is essential. LTFU care focuses on prevention, early detection and timely treatment of adverse health outcomes.

For a full list of collaborators, see the Appendix

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Evidence suggests that survivors suffering from chronic health conditions are more prone to COVID-19 related complications [7]. In addition, fear of exposure to COVID-19 and concerns about experiencing severe complications of COVID-19, as well as measures to mitigate spread of the coronavirus (e.g., physical distancing and limited size of social gatherings) may adversely impact CCS' psychosocial health [8].

Due to implications of the COVID-19 pandemic on CCS' physical and psychosocial health, appropriate LTFU care may be more important than ever. Yet efforts to reduce the risk of infection of CCS and their caregivers (i.e., restrictions for in-person clinic visits), as well as safety concerns related to travel and medical encounters during the pandemic have challenged delivery of appropriate LTFU services. To gain insight about the impact of the COVID-19 outbreak on LTFU service delivery and on service providers, international healthcare providers of LTFU clinics completed a semi-structured questionnaire distributed by the COVID-19 working group of the International Late Effects of Childhood Cancer Guideline Harmonization Group (IGHG).

Methods

Questionnaire design

The questionnaire comprised 35 items (see Online Resource 1) that assessed provider and institutional characteristics and LTFU services, changes in LTFU service delivery induced by the pandemic, and the personal impact of the pandemic on LTFU service providers. Providers were asked about their perceptions about the severity of the outbreak in their country. Subsequently, we inquired about restrictions on in-person consultations due to the pandemic. Providers from institutions with restrictions on in-person consultations were asked to indicate current and anticipated future proportions of in-person, telemedicine (e.g., video calls), telephone, and email encounters. Response options for each method and at each time point included: 1) None (0%), 2) 1–25%, 2) 26–50%, 3) 51–75%, 4) 76–99% or 5) All (100%). Furthermore, providers were asked about their current use of a needs or risk assessment to identify individual CCS who needed in-person LTFU care and to rate the likelihood of future use (0–100%). In addition, we solicited retrospective reflections and anticipated changes related to LTFU care delivery. To assess the personal impact of the pandemic, LTFU service providers were asked to rate their level of worry (0% = not at all worried, 100% = extremely worried) about delivery of LTFU services, personal and institutional finances, health of CCS, their own health, and that of family and friends. Providers had the option to decline to respond to any personal questions.

Participants and procedures

Within the COVID-19 working group, country representatives provided information about ethical requirements for survey research. Prior to questionnaire distribution, ethical review board approvals were obtained in The Netherlands, Belgium, Germany, Canada, and Japan. Within other participating countries, this study was viewed as a service evaluation that did not require ethical review board approval.

To ensure generalisability, country representatives (most of whom were LTFU service providers) identified eligible LTFU clinics in their country. To prevent overlap of responses, one respondent per clinic was allowed. The cloud-based clinical data management platform Castor Electronic Data Capture (Castor EDC) was used to electronically distribute the questionnaire to 226 providers at paediatric cancer programs offering LTFU services in 37 countries across Europe, Asia, North America, Central/South America, and Australia (Table 1 of Online Resource 2). Responses were collected from September 16 to November 20, 2020. During this period, non-responders received two reminders.

Statistical analyses

All statistical analyses were performed with the SPSS statistical software (version 25.0. Armonk, NY: IBM Corporation). Normality for all variables was checked by means of a normal probability plot and Kolmogorov–Smirnov test. To compare use of different LTFU service delivery methods at each time point (before, during, and after COVID-19), a Wilcoxon signed-rank test was performed ("before COVID-19" always being the reference). Pearson's Chi-Squared test was used to compare the use of a needs or risk assessment before and during the pandemic. Changes in LTFU service delivery and personal impact of the pandemic were compared across continents by utilising a Kruskal Wallis test (for skewed variables) and one-way ANOVA (for normal variables). For all statistical analyses, the significance level (α) was set at 0.05.

Table 1 Institutions contacted and responding

Region	Institutions contacted	Institutions responded	
	n	*n*	%
Europe	121	95	79
Asia	50	45	90
North America	34	24	71
Central/South America	14	10	71
Australia	8	4	50
Total	226	178	79

Results

Responding institutions

Among the 226 contacted institutions, providers from 178 institutions from 34 different countries responded (response rate 79%) (Table 1). The number of responses per country is visualised in Fig. 1. Ninety-one percent of respondents were paediatric oncologists (Table 2). The majority (70%) of respondents had more than 10 years of experience in LTFU care and worked in academic (53%) or publicly funded (37%) hospitals/clinics. Staff involved in LTFU services was diverse. 171 of 178 (98%) of the respondents mentioned that their staff included pediatric oncologists; other caregivers mentioned were endocrinologists (61%), (neuro)psychologists (61%), social workers (44%) and general practitioners (12%). Most institutions offered LTFU services to CCS of all ages (61%) and all paediatric cancer subtypes (94%). Thirty percent of responding institutions had upper age limits for LTFU services and 5% had services limited to adult CCS older than 18 years.

Restrictions for in-person clinic visits

Local COVID-19 cases were reported to be increasing by 52% of respondents and either stable or decreasing by 47%. Since the outbreak of COVID-19, 75% of clinics had imposed restrictions for in-person clinic visits ($n = 134$). Shortly after the initial outbreak, 42% of clinics closed for all in-person consultations, whereas 32% still allowed specific subgroups of CCS to visit the clinic. Twenty-five percent of clinics remained open for LTFU care for all CCS, yet many CCS declined to attend or could not travel for appointments due to restrictions enforced by the respective governments.

Methods of LTFU service delivery

The use of different methods for LTFU service delivery before, during, and after COVID-19 is shown in Fig. 2A (all responding institutions), Fig. 2B (data per continent), and Table 2 of Online Resource 2. Before the outbreak of COVID-19, LTFU services were predominantly delivered by in-person clinic visits with 84% endorsing use of in-person visits for over 75% of LTFU care delivery. Compared to before the outbreak, restrictions during the pandemic resulted in fewer in-person consultations ($p < 0.001$) and an increased use of telemedicine ($p < 0.001$), telephone ($p < 0.001$), and email ($p < 0.01$) encounters.

Multiple LTFU clinics described the introduction of telemedicine as a positive development for providers as well as their patients. Respondent: "For some it has helped reduce their dependency on hospital follow-up which has ultimately been a benefit to their survivorship journey." In hindsight,

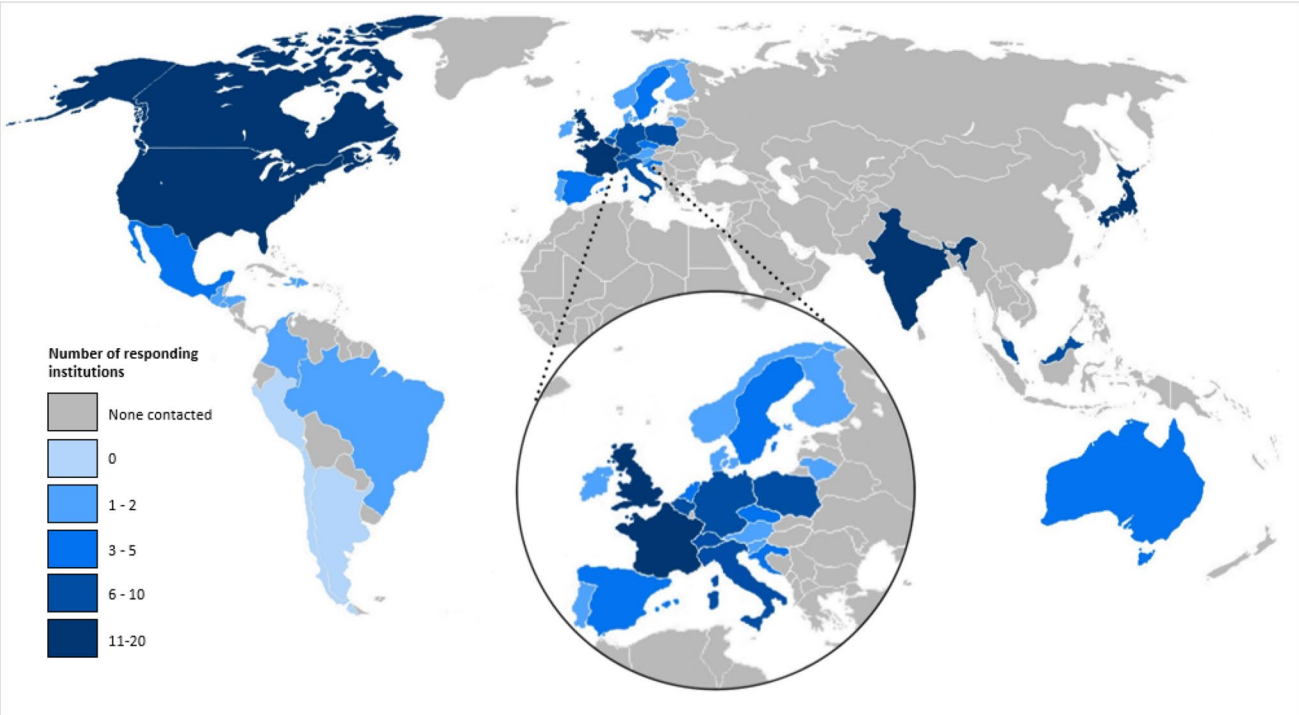

Fig. 1 Geographical overview of institutions contacted and responding

Table 2 Characteristics of respondents and their institutions

Characteristics	*n* (%)
Professional background	
Paediatric oncologist	162 (91)
Other oncologist	7 (4)
Other	9 (5)
Experience in LTFU services	
< 5 years	19 (11)
5–10 years	34 (19)
> 10 years	125 (70)
Type of institution	
Academic hospital/clinic	95 (53)
Publicly funded hospital/clinic	65 (37)
Privately funded hospital/clinic	14 (8)
Other	4 (2)
Staff involved in LTFU services (several possible)	
Paediatric oncologist/haematologist	171 (96)
(Neuro)psychologist	109 (61)
Endocrinologist	108 (61)
Social worker	78 (44)
Clinical nurse specialist/senior nurse	77 (43)
Radiation oncologist	43 (24)
Medical oncologist	29 (16)
Advanced practice provider	25 (14)
General practitioner	21 (12)
Other	44 (25)
LTFU services available for CCS	
Of all ages	108 (61)
Until a certain age limit	54 (30)
Above 18 years only	8 (5)
Other	8 (5)
LTFU services available for CCS	
Of all paediatric cancer subtypes	167 (94)
Of one specific paediatric cancer subtype	2 (1)
Other	9 (5)

some LTFU service providers would have preferred to initiate the use of telemedicine sooner. Another respondent: "We should have started with telemedicine soon after the COVID outbreak instead of cancelling consultations for a couple of months. Telemedicine is a useful tool for LTFU clinics. Biggest lesson learned for our clinic."

Compared to before COVID-19, LTFU service providers expected the use of in-person consultations to remain significantly reduced ($p < 0.001$) even after the pandemic ends. Respondents also related expectations of increased use of telemedicine and telephone after COVID-19 (telemedicine $p < 0.001$, telephone $p < 0.001$, email $p = 0.16$). Respondent: "I foresee virtual LTFU care can complement the in-person primary care visit for our survivors, resulting in less time off work or school, yet getting comprehensive LTFU care." Nevertheless, one respondent stressed the importance of in-person consultations: "Remote consultations via video and telephone have been beneficial for some patients, however there is the risk of missing things without hands-on care and with more disjointed screening." After COVID-19, 55% of LTFU clinics still expected to use in-person consultations for over 75% of LTFU service delivery.

Use of a needs or risk assessment

Figure 3 shows the prevalence of LTFU clinic use of a needs or risk assessment before, during, and after COVID-19. Before COVID-19, only 12% of LTFU clinics made use of a needs or risk assessment to prioritise the method of LTFU consultation for individual CCS. These needs or risk assessments were based on criteria such as diagnosis, type of treatment, risk of relapse, risk/presence and severity of late effects, follow-up time, CCS' residential distance from the LTFU clinic, the necessity of imaging or other surveillance investigations, availability of specialists, and time since the last consultation with a care provider. Compared to before COVID-19, use of a needs or risk assessment increased significantly during the pandemic (47% of clinics, $p < 0.001$). In addition to the above-mentioned criteria, the risk of a severe course of COVID-19 was often included as a new criterium. To minimise exposure to COVID-19, LTFU service providers advised CCS at risk against coming to the clinic. After COVID-19, 50% of respondents anticipated they would be more likely (likelihood > 50%) to use a needs or risk assessment to identify individual CCS who need in-person care.

Provider concerns

The extent of LTFU service providers' worry about the personal impact of the pandemic is shown in Fig. 4. On average, providers related the highest level of worry about psychosocial well-being of survivors (median 68%, IQR 50%) and lowest about their personal financial challenges (median 10%, IQR 30%). Providers endorsed slight to moderate worry about their personal health (median 30%, IQR 50%) and risk of exposure (median 50%, IQR 55%), as well as that of family and friends (health family; median 50%, IQR 55%, health friends; median 48%, IQR 45%, risk of exposure family and friends; median 50%, IQR 55%). Multiple respondents indicated that the availability of good quality personal protection equipment (PPE) in their LTFU clinic made them and their families feel safer. Respondent: "What makes it easier for us to come to the hospital every day to do our job is that the hospital grants us a good quality of PPE. If we are protected our family is going to be protected."

Overall, respondents from Central/South America related significantly more worry about the pandemic's impact on all parameters assessed than respondents from Europe

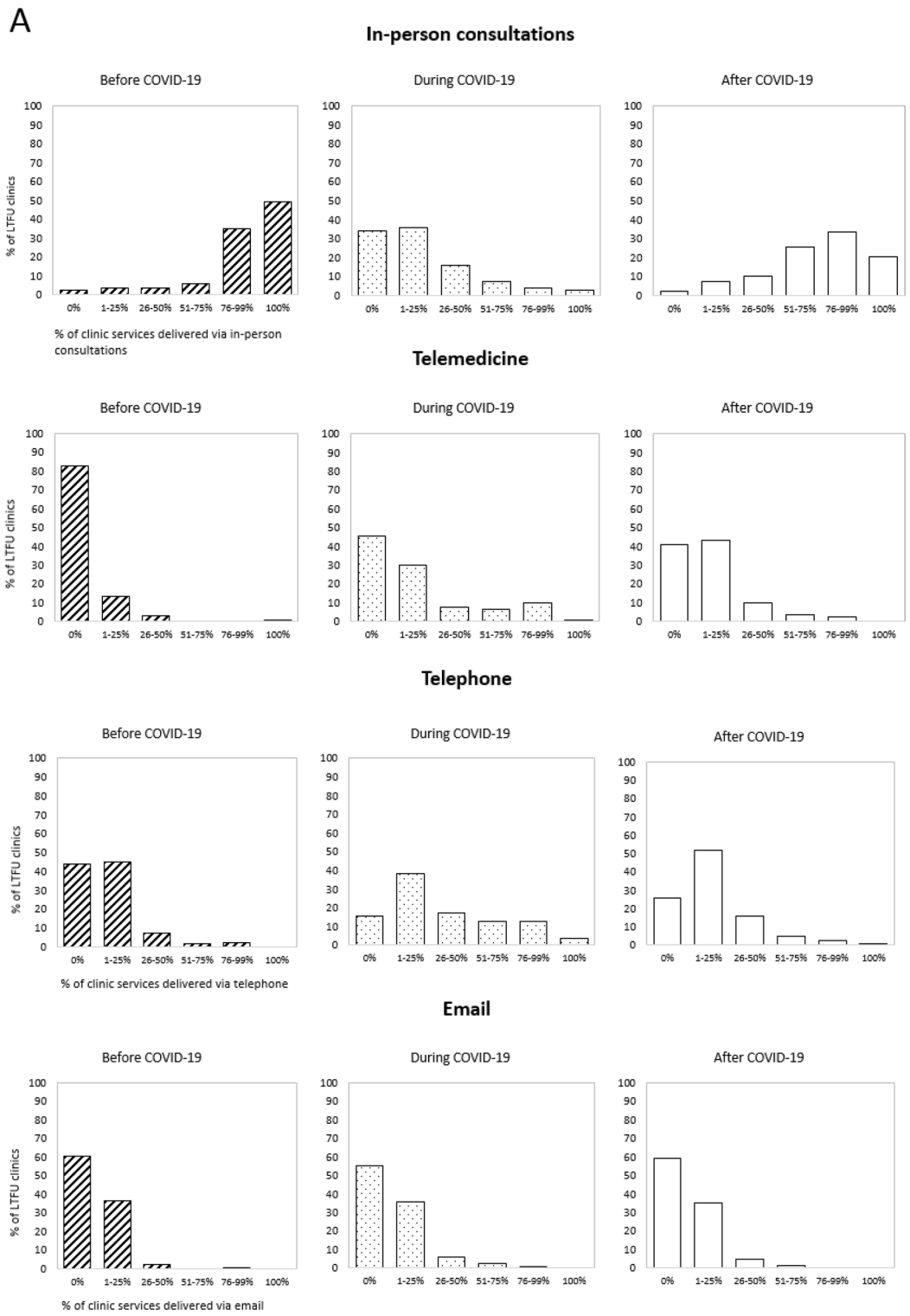

Fig. 2 **A.** Delivery of LTFU services before and during the COVID-19 outbreak, and future expectations. During COVID-19, use of in-person consultations significantly decreased ($p < 0.001$), while use of telemedicine, telephone, and email increased ($p < 0.001$, $p < 0.001$, and $p < 0.01$ respectively). Compared to before COVID-19, providers expect use of in-person consultations to remain significantly reduced ($p < 0.001$) and use of telemedicine and telephone to remain increased after COVID-19 (telemedicine $p < 0.001$, telephone $p < 0.001$, email $p = 0.16$). **B.** Delivery of LTFU services before and during the COVID-19 outbreak, and future expectations per continent

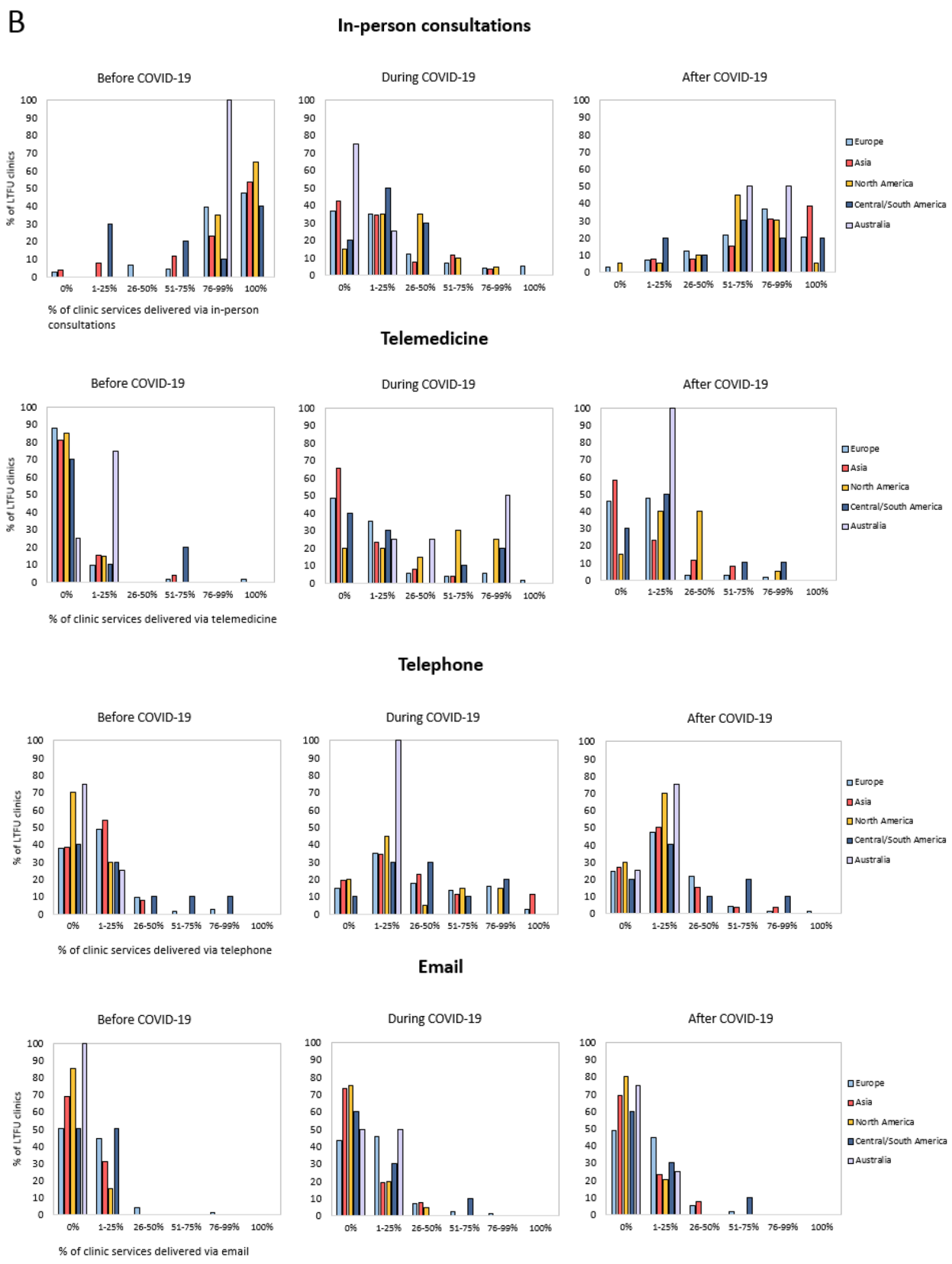

Fig. 2 (continued)

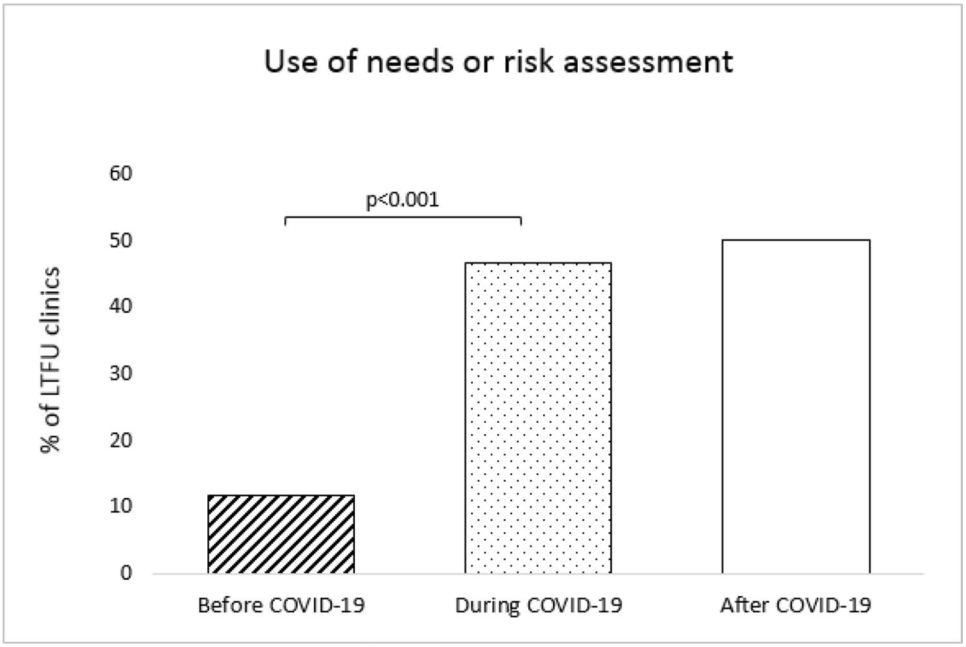

Fig. 3 Use of needs or risk assessment before and during COVID-19, and expected after COVID-19. Use of a needs or risk assessment increased from 12 to 47% ($p < 0.001$). After COVID-19, 50% of LTFU clinics indicated likelihood of use after COVID-19 > 50%

($p < 0.001$), Asia ($p < 0.01$), and North America ($p < 0.01$). Among other continents, there was no significant difference. In addition to worries, some providers observed positive aspects of the pandemic for LTFU care. Respondent: "COVID allowed/forced us to pause and rethink the service, hopefully for the better in some respects."

Discussion

The results from this IGHG study highlight a substantial shift from in-person consultations to telemedicine, telephone, and email consultations, as well as increased use of a needs or risk assessment to prioritise in-person survivorship care. Greater use of virtual LTFU care and risk-stratification for in-person evaluations is expected to persist even after the pandemic. Furthermore, respondents related the highest level of concern about the psychosocial well-being of survivors and lowest level of worry about their personal financial challenges.

Multiple studies have reported profound disruption in both paediatric and adult cancer care related to the COVID-19 pandemic [9–13]. Moreover, its detrimental impact on physical, psychosocial, and financial wellbeing of cancer survivors has been assessed [14]. Yet, to our knowledge, this study is the first to evaluate the impact of the COVID-19 pandemic on LTFU care for CCS and their professional caregivers.

Many respondents described their experience with virtual LTFU care during the COVID-19 pandemic as beneficial. The potential value of telemedicine in facilitating the transition of CCS from paediatric to adult oncology care has been reported by Costello and colleagues. Despite technical difficulties, the vast majority of CCS and care providers included in this small feasibility study highly recommend a virtual transition visit [15]. In addition, a recent, single-center study reported a high level of CCS and provider satisfaction with virtual LTFU visits during the COVID-19 pandemic. Eighty-two percent of CCS in this study also said to prefer that virtual LTFU visits remain an option after the pandemic [16]. Telemedicine could therefore extend the care provided by LTFU programs, especially for CCS living in remote areas or with low risk of long-term effects. Nevertheless, it is important to stress that technical challenges and disparities in digital access may hamper accessibility to telemedicine for all CCS. These barriers are especially relevant for those living in remote areas and with lower social economic status who may have limited access to the internet and digital devices required for virtual care [17]. To ensure all CCS have equal access to high-quality LTFU care, accessibility to in-person clinic visits remains crucial. In addition, to ensure that CCS with a higher risk profile for physical health issues are prioritised for in-person care, employing a needs or risk assessment for determining the method of LTFU service delivery is essential. Moreover, prospective studies are required to determine the impact of increased use of virtual LTFU care on health outcomes in CCS.

Our results show that the personal impact of the COVID-19 outbreak on LTFU service providers differs greatly among continents. Whereas respondents from Europe, Asia, North America, and Australia related slight to moderate worry overall, respondents from Central/South America endorsed moderate to extreme worry about each of the topics addressed. This could potentially be explained by cultural differences or resource-restricted healthcare systems in low- and middle-income countries.

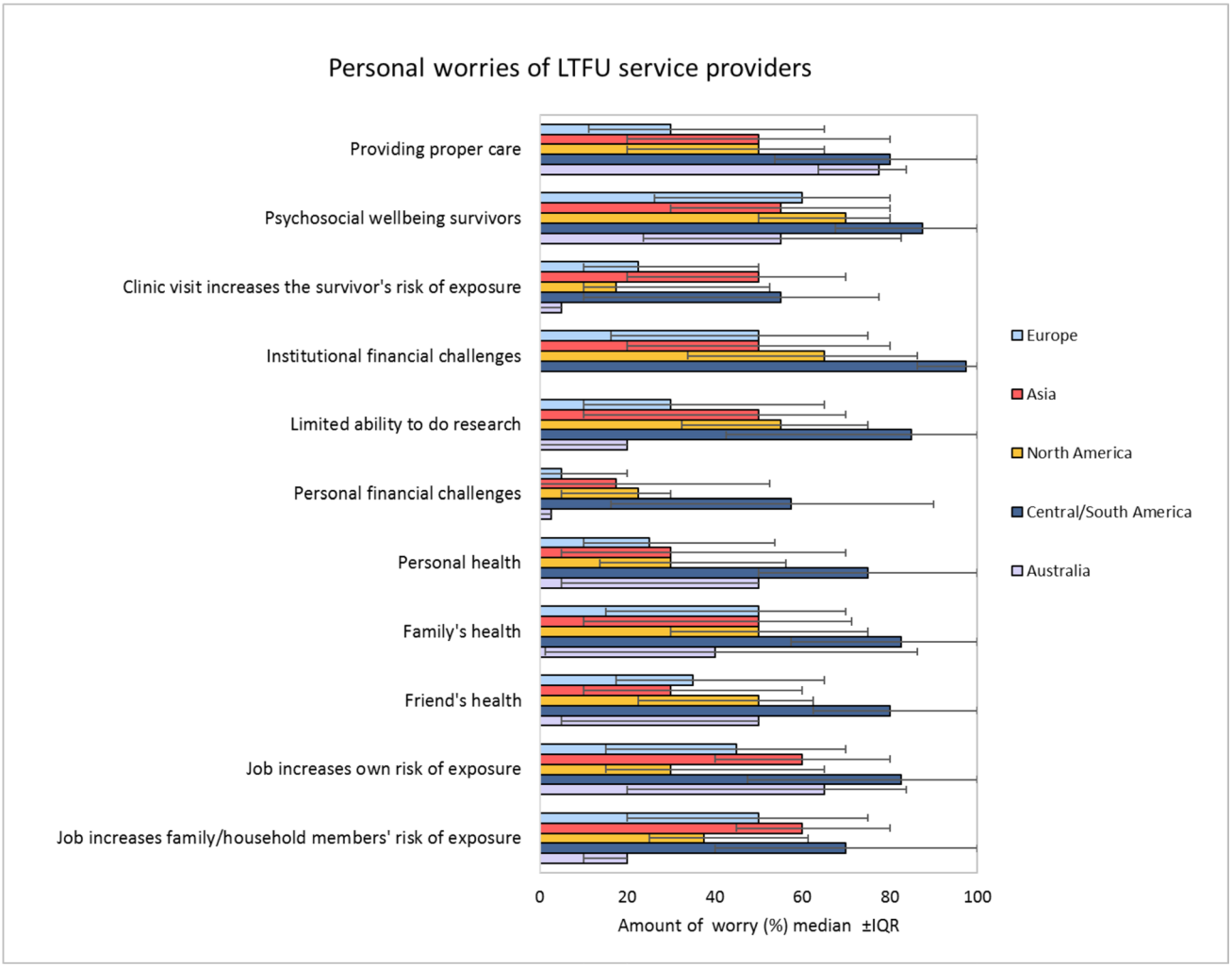

Fig. 4 Personal worries of LTFU service providers by continent. Bars show median for amount of worry (0% = not at all worried, 100% = extremely worried) and error bars indicate interquartile range (IQR). Overall, LTFU service providers from Central/South America endorsed more worry about the pandemic's impact than respondents from Europe ($p < 0.001$), Asia ($p < 0.01$), and North America ($p < 0.01$). Compared to respondents from Australia, the amount of worry from Central/South American respondents was not significantly increased ($p = 0.14$)

Overall, LTFU service providers expressed concern about the impact of the pandemic on CCS' psychosocial well-being. Evidence suggests that, compared to the general population, CCS may already be more susceptible to psychosocial morbidity [18–23]. Perceptions of potentially increased health threats if exposed to COVID-19 and closure of LTFU clinics may have heightened feelings of anxiety in CCS. Moreover, some CCS may be adhering more strictly to physical distancing measures (e.g., staying indoors and not receiving visitors), which can in turn increase feelings of social isolation and negatively impact psychosocial functioning and health [8, 24, 25].

To diminish anxiety in CCS and safeguard their psychosocial and physical health, continuity of LTFU care (albeit in a safe manner) is critically important. In turn, continuing LTFU care, either in-person or virtually, may alleviate providers' concerns about their ability to deliver high-quality survivorship care. Regardless of the method by which care is delivered, screening CCS for psychosocial functioning and linking risk groups to appropriate community resources are crucial components of comprehensive LTFU care, especially during the pandemic.

Strengths of this study include the high response rate and inclusion of LTFU clinics among 34 different countries worldwide. Nevertheless, this study has its limitations: responses were collected at one time point likely representing variable stages of the pandemic in different countries, or even within countries. The severity of the course of the pandemic at survey evaluation potentially influenced perceptions and responses, which challenged comparison of data from different geographical locations. Furthermore, due to the cross-sectional study design, our results may not reflect changing perspectives of LTFU service providers

over the long-term course of the pandemic. For most countries, the period during which responses were collected (September 16 to November 20, 2020) marked the end of the first or beginning of the second wave of the pandemic. Since then, the emergence of new, more infectious coronavirus variants has led to new records of COVID-19 incidence in many countries [26–28]. Now that many countries are experiencing a second or third wave, we expect a larger scale impact of the pandemic on LTFU care.

In conclusion, continuity of LTFU care is important to optimise physical and psychosocial health and quality of life of both CCS and their caregivers. The results from this study support a high level of integration of virtual consultations in LTFU service delivery that is likely to persist post-pandemic. Furthermore, in stratifying survivorship care needs, our data suggest the potential utility of a needs or risk assessment.

Appendix. Collaborators.

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Author contribution All authors and collaborators contributed to the conception and design of the study, design of the questionnaire, data analysis and data interpretation. The manuscript was written by the authors and revised by collaborators. All authors and collaborators approved the final version.

Data availability Study participants did not consent to data sharing outside the IGHG COVID-19 working group. Therefore, access to participant data is limited to national and international supervisory authorities. The study protocol can be made available to researchers upon request (please send an email to s.r.vandenoever-2@prinsesmaximacentrum.nl).

Code availability Not applicable.

Declarations

Ethics approval Ethical review board approvals were obtained in The Netherlands (Clinical Research Committee Princess Máxima Centrum), Belgium (Ethics Committee Research UZ/KU Leuven), Germany (Ethics Committee University of Lübeck), Canada (SickKids Research Ethics Board), and Japan (Ethics Committee Nippon Medical School). Within other participating countries, this study was viewed as a service evaluation that did not require ethical review board approval. This study was performed in line with the principles of the Declaration of Helsinki.

Consent to participate All participants were informed that by responding to the questionnaire, they consent to the collection, storage and usage of their data.

Consent for publication Responses to the questionnaire were pseudonymised. All participants were informed that by responding to the questionnaire, they consent to publication of their responses.

Conflict of interest The authors declare no competing interests.

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