



Essay

Strategies to promote sustainable care for children with cancer in Ukraine

Background

The Russian invasion of Ukraine caused the fastest growing displacement crisis since World War 2, forcing over 8 million people to seek refuge abroad.¹ Additionally, the war resulted in extensive damage to crucial civilian infrastructure and disruption of health-care delivery. As of October, 2023, WHO reported 1280 verified attacks on health-care infrastructure in Ukraine, resulting in 1142 impacted facilities.² Along with direct damage to health-care facilities, indirect impacts, such as decreased accessibility of health-care services, disruptions of operations, displacement and migration of the health-care workforce, and health-care funding constraints,³ pose substantial risks to sustainable delivery of health care.

Among the most vulnerable to these disruptions are children diagnosed with cancer and blood disorders. While survival of paediatric cancer is high for most common cancers, timely diagnosis and access to multidisciplinary, multimodal treatments remain major determinants of treatment outcomes. As a result, delays or disruptions in cancer treatment or lack of access to timely supportive care can be fatal.

Impacts of war on health care

The impact of war on childhood cancer treatment and outcomes is an example of its broad impact on civilian health.³ During armed conflict, maintaining medical care while considering the associated risks and anticipating further threats to health-care services is crucial. These threats include challenges caring for displaced patients, damage to health-care infrastructure, funding constraints, disruption of the health-care workforce, and cessation of research activities.

Displacement

Internally and externally displaced people are among the most vulnerable, facing multiple obstacles accessing health care. As of April 18, 2023, approximately 8·2 million Ukrainians have migrated abroad and another 6 million are internally displaced across Ukraine; children comprise about 50% of this refugee population.¹ Owing to these fluctuating movements of the population (both internally and externally), estimation of the numbers of patients needing cancer care and subsequent allocation of financial resources become complicated.⁴

Damage to crucial infrastructure

Direct destruction of health-care facilities and disruption of operations due to damage to crucial

civilian infrastructure—eg, electricity, heat, and water supply—inevitably affects all aspects of patient care. In addition to direct threat to lives, missile attacks disrupt operations of health-care facilities, forcing patients and medical staff to intermittently shelter in underground facilities during productive work hours, further increasing disruption of health care by delaying treatment and increasing risk of infectious complications.⁴ Damage to health-care infrastructure also affects access to technology crucial for cancer treatment, such as radiotherapy, specialised surgery, and supportive care.

Health-care funding

Funding has been identified by WHO as a crucial building block of health systems⁵ and a key component to re-establish health care in post-conflict settings.⁶ In conflict-affected areas, health-care financing is characterised by a reduction in public funding and a rapid increase in humanitarian and non-governmental assistance. External humanitarian funding and governmental budgets for health care in these settings are primarily focused on providing acute and protracted crisis relief.⁶ Resources are often diverted away from specialised care, making it difficult to provide necessary diagnostic and treatment services for children with cancer. These constraints are further affected by a contested policy environment and a reliance on fluctuating international aid, resulting in highly volatile funding not always aligned with local needs.⁶

The ongoing war in Ukraine has led to a substantial 20·6% decrease in total state budget, a 28% inflation rate, and a 10% decrease in health-care budget in nominal value. Consequently, the price of domestic and imported medicines and supplies has increased, causing the further burden of out-of-pocket payments for patients and families.⁷

Disruption of medical workforce

There are multiple challenges affecting the health-care workforce during conflict and post-conflict periods, including direct threats to their lives, displacement and task-shifting, the psychological stress of working in an ongoing conflict, and disruption of medical education.⁸

Continuous attacks on health-care services in Ukraine have an inevitable detrimental effect on medical personnel. Since the start of war, multiple attacks on humanitarian transports and medical personnel have

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been reported, averaging more than two attacks per day and resulting in over 100 patient and provider deaths.² In 2022, the number of Ukrainian health-care workers decreased by approximately 89 000 (14%), with many being displaced or relocated to the frontlines, and the largest decrease in health-care providers (28–68%) occurring in occupied regions.⁹ This drastic reduction in the health-care workforce affects quality of health care delivered and further burdens remaining staff. To accommodate staffing shortages, facilities are forced to use task shifting to redistribute existing workload among a smaller number of less qualified staff. In addition, health-care staff are forced to implement prolonged work hours, often staying for days or weeks at the hospital for safety reasons and to accommodate the rapid influx of patients.¹⁰ Combined, these factors lead to extreme pressure on the workforce, putting staff at risk of burn-out, post-traumatic stress disorders, anxiety, and depression.¹¹

See Online for appendix 2

To mitigate workforce shortages, the early post-conflict period presents an opportunity to re-establish health care through increased education and training, including topics such as cancer care. However, high pressure to increase medical workforce size might result in less attention to the quality of workforce training.⁸ During war, the quality of medical training in Ukraine was affected by forced transition to virtual education, impaired ability to provide experiential learning to students,¹² and displacement of medical university students and faculty. Re-establishing high-quality medical training will require substantial time, resources, and commitment from health-care authorities and government bodies.

Cessation of research activities

Prioritisation and funding of research has been emphasised by a *Lancet Oncology* Commission as a crucial factor for sustainable childhood cancer care.¹³ Research in childhood cancer includes the comprehensive continuum of methods and approaches to answer crucial questions regarding access to and quality of care, including improvement science, implementation science, clinical

trials, and translational research. In ongoing war, research is deprioritised and in Ukraine, ongoing clinical trials in childhood cancer were often suspended owing to the feasibility concerns of continuing research collaborations during conflict.¹⁴

Shifting epidemiology of childhood cancer in Ukraine during war

In December, 2022, at the request of the Ukrainian Ministry of Health, the St Jude Global program of St Jude Children's Research Hospital modelled the estimated number of paediatric patients with cancer in Ukraine over time (table; appendix 2 pp 3–6).

Before February, 2022, more than 1000 children per year were diagnosed with cancer in Ukraine.¹⁵ Approximately 150 physicians provided paediatric cancer care in over 30 facilities, with a total of 855 inpatient beds for childhood cancer treatment. Following the Russian invasion, over 1300 Ukrainian paediatric haematology–oncology patients evacuated to continue medical care abroad through the Supporting Action for Emergency Response in Ukraine (SAFER Ukraine) initiative,^{16,17} an additional unquantified number of patients left the country through other mechanisms. This mass evacuation substantially decreased the number of patients with childhood cancer in the country. In the past year, however, children have continued to develop cancer or had disease relapse. According to current data (Nogovitsyna Y, Kizyma R, and Kacharian A, unpublished), approximately 400–500 children with cancer continue to receive treatment in Ukraine. As of July, 2023, approximately 30 medical facilities in Ukraine continued to provide paediatric cancer care; however, the range of patient support and quality of service is geographically variable owing to historical inequity in health service provision across the country and ongoing damage to health-care infrastructure.

Based on our model, approximately 630 children will require paediatric cancer care (newly diagnosed patients and those being followed up) in Ukraine by the end of 2023, which will increase to approximately 700 in 2025 (table). As the total number of children with cancer is primarily dependent on identification of new diagnoses, rather than ongoing management of patients diagnosed before the war, the number of paediatric patients with cancer in Ukraine is anticipated to steadily increase as children return after the war. To support these patients, current work must focus on sustainability of the delivery of childhood cancer care in Ukraine despite ongoing hostilities and during post-war recovery.

Strategies for sustaining childhood cancer care in Ukraine

Despite challenges presented by the war, Ukrainian clinicians, health-care authorities, and non-governmental

| | Projected average number of children needing cancer care* | Projected lower limit of number of cases | Projected upper limit of number of cases |
|------|---|--|--|
| 2023 | 630 | 451 | 809 |
| 2024 | 664 | 502 | 827 |
| 2025 | 697 | 546 | 848 |

Data are n. Input data were obtained in December, 2022, and include data on the paediatric population in Ukraine, data from the UN High Commissioner for Refugees (UNHCR), UNICEF, UNICEF—Humanitarian Action for Children, International Organization for Migration, and WHO on displaced people outside of Ukraine, and epidemiological data of paediatric patients with cancer in Ukraine (annual newly diagnosed cases, age-standardised incidence rate, population-based registry); more information is in appendix 2 (pp 3–6). *Newly diagnosed patients and patients being followed up.

Table: Modelled epidemiology of childhood cancer in Ukraine by year

organisations remain resilient and determined to continue delivery of high-quality care for paediatric patients with cancer. To support these efforts, we propose the following strategies to promote sustainable long-term childhood cancer care during war and through post-war recovery (appendix 2 p 2).

Access to health-care facilities

In war-affected areas, challenges accessing health-care facilities can lead to substantial delays in treatment for childhood cancer, treatment abandonment, and ultimately increased mortality.⁴ Key aspects of securing access to health-care services in war-affected areas include ensuring security and safety of health-care workers and patients, securing infrastructure and logistics (such as roads, transportation, communication systems, water, and sanitation systems), and effective communication and collaboration among all stakeholders.¹⁸ For paediatric patients with cancer, timely access to essential health-care and diagnostic services are integral to treatment effectiveness and survival.¹³ These services must be maintained to assure sustainable delivery of childhood cancer care in Ukraine.

Centralisation of childhood cancer care

According to the European Standards of Care in paediatric oncology,¹⁹ centralising care on a national level allows for consolidation of resources and expertise, leading to development of specialised centres that can provide high-quality, comprehensive care to paediatric oncology patients, resulting in improved outcomes. Additionally, centralised care allows for development of coordinated tiered systems for referral and treatment, reducing the burden on patients and families and allowing for efficient use of limited health-care resources.

In alignment with the Priorities for Healthcare System Recovery in Ukraine,⁷ childhood cancer care should be consolidated into several centres of excellence that are appropriate to meet existing patient volume and allow for reintegration of refugee patients returning to Ukraine. At the same time, a resource-appropriate referral system and tiered follow-up network must be established in collaboration with existing paediatric facilities to allow for continuity of cancer care despite ongoing conflict.

Safeguard health-care financing

The WHO report on health financing policy and implementation in fragile and conflict-affected areas suggests that traditional health financing mechanisms such as taxes, out-of-pocket payments, and external assistance are often insufficient to meet population needs.²⁰ Given reduced fiscal capacity in these settings,

development of effective humanitarian and external resources is key to protect access to essential services while ensuring a well coordinated funding pool to minimise fragmentation and duplication on a systems level.⁶ WHO highlighted that ongoing war is likely to disrupt progress made towards Universal Health Coverage, emphasising the importance of adjusting provider payment mechanisms to account for displacement, anticipated financial hardship, and post-war health-care needs.

For long-term sustainability of childhood cancer care in Ukraine, funding, including diagnostics, treatment, and supportive care, must be secured by leveraging temporary external funder and private-public partnership with planning for long-term sustainable domestic financing in the post-conflict period.

Secure medication procurement

Beyond financing, availability of cancer medications, such as chemotherapy and supportive medicine, is a crucial part of curative treatment for paediatric cancer.¹³ Before the war, approximately 48% of health expenditures per capita in Ukraine were covered by the Government (St Jude Global Country Collaboration for Childhood Cancer Control C5 2021, internal report). A reported decrease in the value of the Ukrainian hryvnia by 30% since the start of war has affected the price of imported medications and other supplies.²¹ Accordingly, the affordability of medications has decreased, with up to a third of Ukrainians not able to afford much needed medicine.⁹

To sustain childhood cancer care in Ukraine, strategic planning, engagement with governmental and non-governmental stakeholders, centralisation to childhood cancer care, and dynamic assessments are needed to ensure consistent availability of essential medications and mitigate delays on imported medicines required for cancer treatment.

Re-establish medical training

WHO recognises the health workforce as an integral component of health systems, emphasising the importance of restoring and maintaining sufficiently trained workforce during protracted crises.⁸ Before the war, improvement of paediatric haematology and oncology education was identified as a key priority to improve paediatric cancer care in Ukraine by the WHO mission on cancer care (2019, internal report) and the St Jude Global Country Collaboration for Childhood Cancer Control C5 (2021, internal report).

Re-establishment of medical education in Ukraine during health systems recovery must be prioritised to allow sustainable delivery of health care, including childhood cancer care, and offers a unique opportunity to address

previously identified pre-war health-care education system gaps.

National and international collaboration

Optimum childhood cancer care requires a coordinated approach across disciplines and professions. Additionally, as patients often move geographically between centres during different phases of their treatment, collaboration between clinicians across centres is essential for optimum outcomes. International expertise can aid childhood cancer care through mentorship, training, clinical decision support, and capacity building initiatives.

In Ukraine, sustainable delivery of childhood cancer care must prioritise teamwork among the national workforce of interdisciplinary health-care professionals and leverage international expertise through national and international collaborations.

Conclusion

The impact of war on childhood cancer care in Ukraine is profound and requires coordinated support aligned with the broader national agenda and health systems recovery plan. Early diagnosis and timely access to comprehensive treatment are significant predictors of childhood cancer outcomes. Therefore, successful delivery of childhood cancer care requires a coordinated, multi-level approach that leverages national and international collaborations. The strategies we propose here could aid in the delivery of resilient and sustainable childhood cancer care in Ukraine during war and throughout post-war recovery.

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