

We declare no competing interests.

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Refugee children with cancer in Turkey

The number of refugees is increasing worldwide because of conflicts and war, which affect cancer care along with many other public health issues.^{1,2} Since the onset of the civil war in Syria in March, 2011, over 2 million Syrians have migrated to Turkey. In Turkish regions close to the Syrian border, 1.2 million people have been added to the existing Turkish population of 10 million.^{3,4,5} Cancer and cancer care are increasingly recognised as major worldwide challenges, because of their global, financial, social, and health implications,⁶ and so in October, 2015, we surveyed the demographic data, treatment and outcome of cancer in refugee children in Turkey, and the problems encountered in each paediatric haematology–oncology centre. 212 refugee children treated with cancer in 17 centres located in ten different cities were evaluated retrospectively. The male to female ratio was 1.5:1. The median age was 5 years (1–17 years). 197 (93%) patients were from Syria. 97 children were treated in the Mediterranean sea region, 47 in the southeast and east Anatolian regions, 42 in the Marmara region, 18 in central Anatolia, and 8 in the Aegean region. Most of the patients (68%) were treated in regions in the south and southeast of Turkey closer to the border with Syria ($p < 0.0001$) and almost half (45%) were treated in two medical centres located in the city of Adana. The table compares the frequency of the diagnosis of cancer types in refugee children in Turkey with the frequency in Turkish children. Most of the cancer types were similar in frequency ($p > 0.05$), but the percentage of children with neuroblastoma

($p = 0.0005$) and bone tumours ($p = 0.0058$) was significantly higher in refugees. As of Oct 10, 2015, 159 (75%) patients were alive, 31 (15%) had died, and 22 (10%) were lost to follow-up (median 20 months, IQR 1–48). The outcome was not different by region of treatment ($p = 0.087$). Six (3%) of the 212 children with cancer, and an additional nine patients who had aplastic anaemia or thalassaemia major, underwent haemopoietic stem cell transplantation. 11 of the transplanted patients were alive and four had died as of the same timepoint (median 4 months, IQR 1–30).

Of the 1.2 million immigrants, 85% of Syrians live outside the refugee camps.³ Some Syrians do not

	Turkish children (n=11 898) ^{a*}	Refugees (n=212) [†]
Leukaemia	3777 (32%)	52 (25%)
Lymphomas	2040 (17%)	35 (17%)
Brain tumours (CNS)	1588 (13%)	31 (15%)
Neuroblastoma	889 (8%)	29 (14%)
Retinoblastoma	371 (3%)	4 (2%)
Renal tumours	655 (6%)	13 (6%)
Hepatic tumours	166 (1%)	2 (1%)
Malignant Bone tumours	717 (6%)	21 (10%)
Soft tissue sarcomas	773 (7%)	13 (6%)
Germ cell tumours	531 (5%)	6 (3%)
Carcinomas and other epithelial cancers	323 (8%)	3 (1%)
Other	68 (1%)	3 (1%)

Data are n (%). ^aData from 2002 to 2008. [†]Data from 2013 to 2015.

Table: Cancer types in Turkish children and refugee children in Turkey

register in these camps because they aim to travel to other countries, despite the fact that to receive free medical care they must be registered. In the camps in Turkey where Syrian refugees live, there were more than 500 000 referrals to hospitals during 2011–15. In the Turkish regions close to the Syrian border, 30–40% of the patients in government hospitals are Syrians, which has led to a financial and a capacity burden in these hospitals. Some US\$4.5 billion has been spent on health care for refugees between April, 2011, and November, 2014 in Turkey alone. By October, 2015, this expense was reported to have increased to \$7.6 billion, of which \$2.3 billion was used for health issues, while only \$418 million was received as international aid.^{3,4,5} Turkey also had a substantial increase in the number of non-Syrian asylum applications over 2011–15, mainly from Iraq, Iran, and Afghanistan. There were an estimated 100 000 non-Syrian refugees in Turkey in 2014.³

Since the beginning of the crisis in 2011, The Disaster and Emergency Management Presidency of Turkey has supported basic daily needs, regular education facilities, and health services.^{3,5} In April, 2013, Turkey passed its first asylum law—the “Law on Foreigners and International Protection”, which regulates all proceedings for refugees living in Turkey.^{3,4,5} As a result of this law, people who have registered as refugees, including children, have been provided with free medical treatment as Turkish citizens, including cancer treatment and care at tertiary Government and university hospitals. Unlike refugees fleeing conflicts in Africa, where diseases of poverty such as malaria or cholera are widespread, Syrian refugees generally have more chronic, and more costly, non-communicable diseases such as diabetes, heart disease, and cancer.¹ Almost all standard and new chemotherapeutics, including many targeted agents, drugs for pain relief from cancer, and transplantation facilities are available to refugees as a result of the Turkish government’s legislation.^{7,8} Some refugees have arrived with advanced disease at diagnosis, or with relapse, due to delays in diagnosis and treatment because of conflict and war, leading to poor outcomes. The international humanitarian agencies that provide aid for health issues in refugees worldwide do not have enough funds to treat these diseases.¹

The incidence of paediatric cancer is around 120 per 1 000 000 for children, and 84% of childhood cancers

occur in low-income and middle-income countries.⁶ Cancer survival is around 60–70% in several countries in the Middle East, but only 30% in most countries.^{7,8} In Turkey, each year 2500–3000 new childhood cancer cases are expected.^{7,9} It is estimated that 60–100 children are diagnosed with cancer each year in the Syrian refugee population in Turkey.

The frequency of neuroblastomas and bone tumours in refugee children was higher than in Turkish children. Although a multidisciplinary treatment approach is needed in all paediatric cancer types, the need for experienced orthopaedic surgeons to do limb salvage surgery, the poor prognosis of advanced neuroblastoma, and the possibility of stem cell transplantation in Turkey might have led more parents of these children to come to Turkey as compared with other diagnoses. The 7 year survival rate in children with cancer, including leukaemias and all solid tumours, in Turkey is 65%.^{7,9} Higher survival rates at 7 years for children with cancer of 74% are reported in specific cancer centres in Turkey.¹⁰ Preliminary outcomes in the Syrian refugee children with cancer were similar to the outcome in Turkish children.

Shelter was one of the main problems for patients and their families, as most of the registered refugee families lived in tents or prefabricated houses in the camps. Hygiene in these sites is frequently inadequate. To overcome this issue, most centres extended the duration of hospital stay, sometimes throughout the entire treatment period. Provision of adequate healthy food for patients with cancer in refugee camps was a major problem, which was overcome by extended hospital duration, where healthy food was provided. Some families wanted to travel back and forth to their home in Syria, but this decision led to delays in returning to the hospital or in an inability to return due to war.

Language differences were another important barrier to treatment that needed to be overcome. Although a translator or translation service by phone was provided by the Turkish Government, most of the time it was inadequate with not enough translators. Medical staff or Turkish patients who spoke Arabic were reported to have helped voluntarily in some centres. Compliance with therapy was reported to be poor, especially regarding the use of oral drugs in the outpatient setting, for example, in the maintenance phase of

leukaemias. Communication problems between families and health-care personnel were reported, some due to poor adherence to adequate hygiene measures in some refugee families. Access to drugs as outpatients was reported as a problem. For inpatients, all medication was provided in the hospital. For outpatients, provision of medication takes longer, because all prescriptions must be registered by governmental organisations, which lead to delays in oral outpatient treatment. Locating medication donated by other patients or by non-governmental volunteer organisations, and extending inpatient stays in the hospital, were makeshift solutions. Not enough donors for blood and blood product transfusion was another problem, especially in transplantation where the number of transfusions needed is increased.

In conclusion, cancer in refugees causes a substantial burden for the health systems of the host countries. Health staff and families were confronted with some demanding problems such as shelter, hygiene, compliance to treatment, language barriers, and attempting to find practical solutions such as extended inpatient stays. Recommendations to improve prevention, diagnosis, and treatment of cancer in low-income and middle income refugee settings include improved health systems, innovative financing schemes, sustainable funding sources, balance of primary, emergency, and referral care, and development of online cancer registries. The analysis of cancer care in low-income and middle-income refugee settings, as in our survey, might provide a basis for future responses.

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