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Original Article

Single Centre Experience of Treating Children with Cancer in the United Arab Emirates

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Abstract

Introduction: Cancer is a leading cause of death in children. Advancements in medical sciences have significantly improved childhood cancer outcome. However, the pattern of malignancy and outcomes of childhood cancer in the UAE have not been published in the literature in the recent period. Therefore, we aim to investigate this in a leading cancer institute in Abu Dhabi, United Arab Emirates (UAE).

Methodology: This is a retrospective study. We collected data including diagnosis; age at diagnosis; treatments used e.g., chemotherapy, radiation, surgery, immunotherapy and bone marrow transplant (BMT) and outcomes. Overall survival (OS) and Event–Free Survival (EFS) were estimated using the Kaplan Meier method.

Results: There are 82 children with cancer. The male–to–female ratio is 1.2. Most patients (45%) were diagnosed between one to five years of age. The most common malignancies are B cell Acute Lymphoblastic Leukaemia (32, 39%), brain tumours (12, 15%); Neuroblastoma (9, 10%), Hodgkin Lymphoma (8, 9%) and Wilms Tumour (5, 6%); Acute Myeloid Leukaemia (3, 4%); Non–Hodgkin Lymphoma (3, 4%); Ewing Sarcoma (3, 4%); T ALL (2, 2%); Osteosarcoma (2, 2%); Angiosarcoma (1, 1%); Synovial Sarcoma (1, 1%).

28 (34%) of patients had completed all treatment at Burjeel Cancer Institute (BCI); 15 (18%) had completed their treatment at another centre and attending follow–up at BCI; and 5 (6%) commenced their treatment at BCI and were transferred to another centre. 34 (41%) but currently still undergoing treatment at BCI. The abandonment rate is 0%. Overall survival is 94% and event–free survival is 90%.

Discussion: The rapid progression of UAE cancer care over the past four decades has contributed massively to our favourable survival outcomes. Radiation therapy, bone marrow stem cell transplantation, strict medication regulation and monitoring by the UAE Department of Health have been established in recent years to further enhance treatment for cancer patients in the UAE.

Conclusion: The results of our study are comparable to the international standard. More studies involving multiple centres in the UAE are needed to ascertain the exact pattern of paediatric malignancy and outcomes in the UAE.

Keywords: Paediatric Oncology; Leukaemia; Neuroblastoma; Lymphoma

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Introduction

Cancer is the leading cause of non–accidental mortality in children on a global scale, and can bring detrimental impacts to both the child's current and future health. [1] Childhood cancer is rare in the United Arab Emirates (UAE) – in 2021 childhood cancer constituted 2.7% of all registered invasive cancer cases.[2] Previously childhood cancer was a fatal diagnosis but recent advancements in medical science have propelled the five–year survival rate for childhood cancer patients in High Income Countries (HIC) to 80% on average. However, this figure is not uniform across different countries or socioeconomic groups – in Low Middle Income Countries (LMIC) five–year survival rates are less than 30.[3] The United Arab Emirates (UAE) is classified as a high income country.[4] Medical advancements in paediatric oncology encompass improvements in diagnostic techniques and enhanced antineoplastic therapies. Accurate clinical evaluation and staging can prompt timely initiation of treatment to drastically improve survival.[5] Additionally, paediatric cooperation groups, such as Children's Oncology Group (COG), execute clinical trials and ensure standardisation of treatment protocols to further propel advancements in this field.[6] Careful follow–up with specialists is required to manage cancer treatment related complications in the long term, such as organ dysfunction, subfertility and secondary malignancies.[7] Along with the above aspects of care, the pattern of paediatric malignancy varies between countries. This has not been studied or published in recent United Arab Emirates (UAE) literature. Many major cancer centres globally have analysed the pattern of paediatric malignancy, presentation, management and outcome. We aim to do the same in Burjeel Cancer Institute (BCI), Abu Dhabi UAE.

Patients and Methods

Aim:

The primary aim of our study was to utilise the Kaplan–Meier method to calculate survival trends including overall survival (OS) and event–free survival (EFS). Additionally, we aimed to analyse the pattern of paediatric malignancy at our centre. To consolidate our findings, we intended to correlate them to the international standard.

Study design:

This was a retrospective observational cohort study. We included patients aged one month to 16 years who were treated for a paediatric malignancy at BCI between January 2022 and January 2025. 82 patients were included, and both paper case files and electronic patient records were reviewed via the hospital electronic system (SAP). Data was extracted from clinic documents, medical and laboratory reports and case notes. This was entered onto a detailed and confidential Microsoft Excel spreadsheet.

Data collection:

This consisted of four pillars: patient demographics; diagnosis details; management; clinical outcome.

Patient demographics data collection: gender; age at diagnosis; date of diagnosis.

Diagnosis: malignancy; bone marrow result and risk stratification in Leukaemia; histology and grade in Solid Tumour.

Management: full or partial treatment at BCI; treatment method (chemotherapy, radiotherapy, surgery, bone marrow transplant, immunotherapy); treatment start and end date.

Clinical outcome: last follow up date; complications present; recorded outcome (continuing treatment, complete remission, relapse, death); living or dead.

Statistical analysis:

All data was normally distributed, and a mean ± standard deviation was calculated. The Kaplan Meier method was utilised to assess event free and overall survival metrics.

Results

Out of the 82 patients included in this study 45 (54.9%) were male and 37 (45.1%) were female resulting in a 6:5 male: female ratio. Age of diagnosis ranged from 3 months to 17 years. The mean and median age of diagnosis was 13.5 years of age with a calculated standard deviation of ± 4.94. The modal age bracket was between 1–5 years of age. The most common malignancy was B Cell Acute Lymphoblastic Leukaemia, affecting 32 (39.5%) of patients. In descending frequency came brain tumours (12, 14.8%) consisting of medulloblastoma (3, 3.7%); ependymoma (3, 3.7%); glioma (3, 3.7%); pilocytic astrocytoma (2, 2.4%); atypical teratoid/rhabdoid tumour of brain (1, 1.2%) within the brain tumour category. Neuroblastoma (9, 11.1%), Hodgkin Lymphoma (8, 9.9%) and Wilms Tumour (5, 6.2%); Acute Myeloid Leukaemia (3, 3.7%); Non–Hodgkin Lymphoma (3, 3.7%); Ewing Sarcoma (3, 3.7%); T ALL (2, 2.4%); Osteosarcoma (2, 2.4%); Angiosarcoma (1, 1.2%); Synovial Sarcoma (1, 1.2%). 34 (41%) are currently still undergoing treatment at BCI. 28 (34%) of patients had completed all treatment at BCI; 15 (18%) had completed their treatment at another centre and attending follow–up at BCI; and 5 (6%) commenced their treatment at BCI and were transferred to another centre. Common locations for

transfer included: Sheikh Khalifa Medical Centre in Abu Dhabi, or countries outside of UAE (USA, UK and India). The abandonment rate is 0%.

We identified 5 methods of treatment used – chemotherapy, radiotherapy, surgery, bone marrow transplantation and immune–based therapy. 27 (32.9%) patients were treated with a combination of these methods. Chemotherapy was used for 80 (97.6%); radiotherapy was used for 20 (24.4%); surgery was used for 12 (14.6%); immunotherapy was used for 9 (11.0%); bone marrow transplantation was used for 8 (9.8%) patients. Chemotherapy protocols established by paediatric cancer centers such as Children's Oncology Group (COG); SICKKID; United Kingdom Children Cancer & Leukaemia Group (UKCCLG) were recommended for all patients.

82 patients included in this study were categorised into four outcome groups: continuing treatment; complete remission; relapse; death. 38 (46.3%) entered complete remission after treatment; 36 (43.9%) are continuing

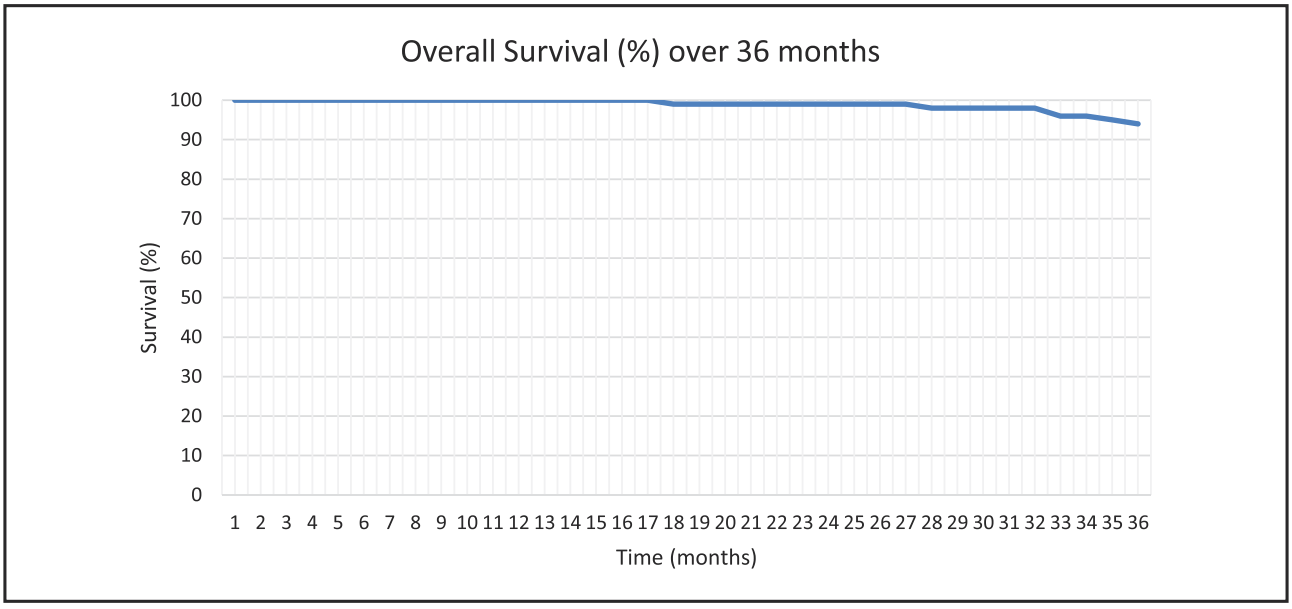


Figure 1. Overall Survival. Over the 36–month study period.

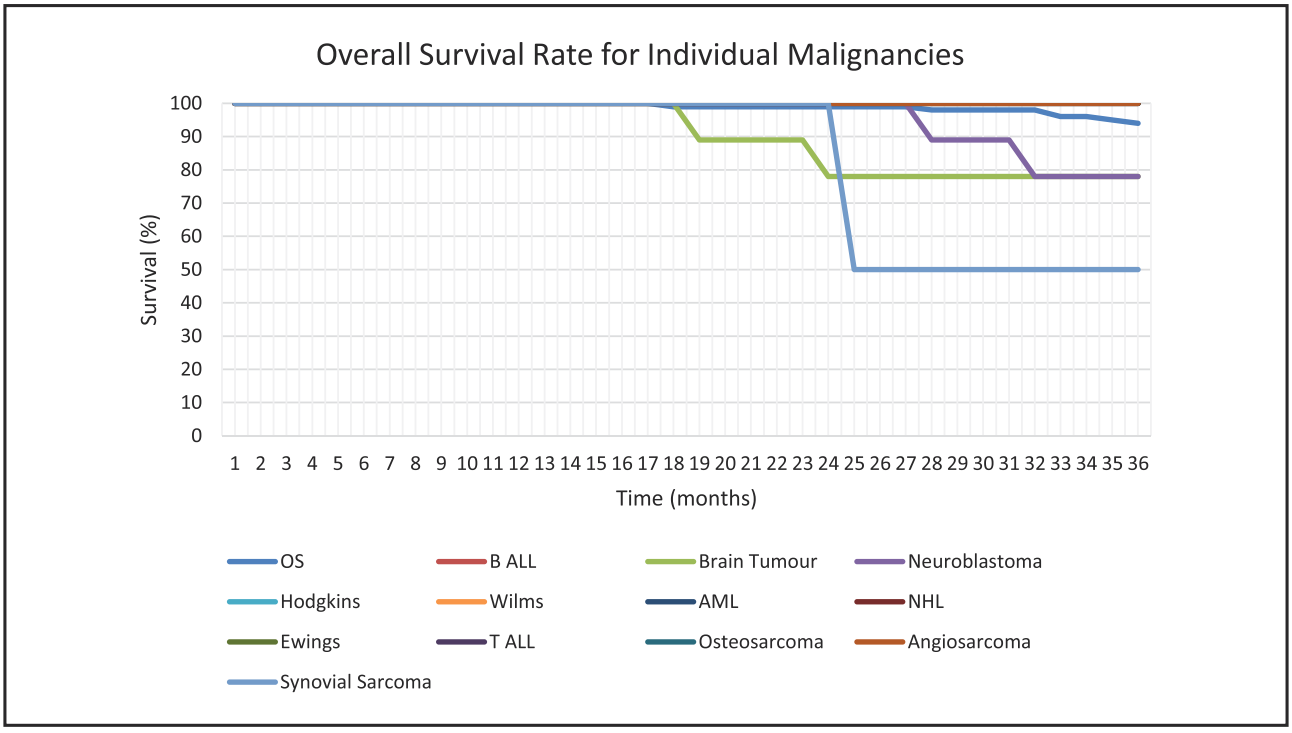


Figure 2. Overall Survival Rate for Individual Malignancies

treatment; 5 (6.1%) patients had died; 3 (3.7%) patients encountered relapse. Out of the 5 deaths, neuroblastoma accounted for 2 (40%); ependymoma accounted for 1 (20%); atypical teratoid/rhabdoid tumour accounted for 1 (20%); synovial sarcoma accounted for 1 (20%). Out of the 3 cases of relapse, neuroblastoma accounted for 2 (66.7%) and angiosarcoma accounted for 1 (33.3%).

Survival analysis was calculated using the Kaplan Meier method, which assumes that survival probabilities remain the same following the progression of time, and that there are no competing risks to survival. We identified an overall survival (OS) of 94%, as shown in Figure 1, and event free survival (EFS) of 90%. Individual survival analysis for each malignancy was also calculated as shown in Figure 2. Both were plotted on a survival analysis curve.

Discussion

This retrospective study was conducted in Burjeel Cancer Institute, Abu Dhabi and provides some pertinent information regarding pattern of childhood cancer prevention and outcome in the UAE. Based on our best knowledge there has been no such study on the same subject published in recent years from the UAE, therefore our study carries important value to this field.

In our study we have found the four most frequent malignancies encountered to be leukaemia (39.5%), central nervous system tumours (14.8%), neuroblastoma (11.1%) and Hodgkin's lymphoma (9.9%). Our pattern of paediatric malignancy matches that of other recent studies conducted internationally. A study conducted in the United Kingdom from 1991 – 1996 produced similar results pertaining the pattern of paediatric malignancies, with the most frequently encountered malignancies being leukaemia, brain tumours and lymphoma at 43.1%, 19.1% and 9.3% frequency respectively.[8] These results are also concordant with figures found in the United States of America, with the top three malignancies also being leukaemia, brain tumours and lymphomas.[9] Additionally a study conducted in Romania by Bucurenci et al[10] between 2010 – 2017 found that leukaemia (30%), lymphoma (15%) and central nervous system (CNS) tumours (14%) were the three most frequent paediatric malignancies within their study population.

We have found an abandonment rate figure of 0%. Abandonment rates are less than 5% in HICs such as USA and Canada[11] compared to the significantly higher value of 30% seen in LMICs such as Ethiopia[12]. Our excellent figure could be attributed to compulsory health insurance for expatriates, free healthcare for local Emiratis, a wide availability of cancer medications and treatment centres in the UAE.[13] A study conducted by Abdalla et al in Sudan finds a higher abandonment rate of 32.2% linked to a lower OS rate of 41.5%, which could emulate the landscape of paediatric cancer care in Sudan, a LIC according to the World Bank.[14]

We have also discovered outstanding survival outcomes of 94% within our study population. Survival outcomes in HIC such as the USA exceed 80% as of a study conducted in 2011,[15] whereas LICs such as Sudan experience lower survival outcomes of 42% as shown by Abdalla et al[14]. A study conducted in Romania in 2017 by Bucurenci et al reports a 72% overall 5–year survival rate, which is less than our finding of 94%.[10] However to ascertain this comparison we should follow up our study population for 5 years.

Looking deeper, individual cancer survival outcomes from our study shows that Acute Lymphoblastic Leukaemia, Acute Myeloid Leukaemia, lymphoma carry the most favourable survival outcome of 100%. In comparison, neuroblastoma and brain tumours had a lower survival outcome of 78% and synovial sarcoma that of 50%.

These results match a study conducted by Roman et al in the United Kingdom in which Hodgkin lymphoma resulted in the most favourable overall survival rate of 96.2%[8]. Also similar to our findings, ependymoma and neuroblastoma resulted in considerably less favourable overall survival rates of 61.4% and 54.4% respectively.[8] The objectively lower survival rate for neuroblastoma specifically is concordant with a study conducted by Al Naqib et al in Saudi Arabia which finds a 55% OS rate.[16]

The rapid progression of UAE cancer care over the past four decades has contributed massively to our favourable survival outcomes. Radiation therapy, bone marrow stem cell transplantation, strict medication regulation and monitoring by the UAE Department of Health have been established in recent years to further enhance treatment for cancer patients in the UAE.[13] The World Health Organization has targeted a 60% OS rate globally by 2030, which the UAE can contribute massively to according to our findings.[17]

There were some limitations to our study. Firstly, we only recorded data from one cancer centre, therefore our sample size is small and doesn't accurately capture the pattern of malignancy or survival outcomes in the UAE. Additionally, our study period was three years – this reduced study period means that we weren't able to follow up the patients for a sufficient amount of time to anticipate any complications to obtain and accurate event–free survival figure. Furthermore, our study was retrospective, therefore the data could be at risk of misclassification and recall bias.

Conclusion

We have found a similar pattern of paediatric malignancy to studies conducted internationally, along with 0% abandonment rate and survival outcome figures. Our results are comparable to the international standard. Further studies including data from more UAE cancer centres, and 5 years follow up to accurately compare 5–year survival data with the help of a national cancer registry is recommended. This will aid in assessing an accurate pattern of paediatric malignancy to further improve childhood cancer care in the UAE.

Funding and Conflict of Interest

No funding was received to prepare this manuscript. There are no conflicts of interest.

Ethical Statement

This study was conducted according to the institutional research committee ethical standards in line with the 1964 Helsinki Declaration. Ethical approval was obtained from the Burjeel Institutional Review Board, reference number BH/REC/089/25. Informed consent was obtained from all parents of paediatric patients included in the study. Patient confidentiality was strictly maintained during all study phases.

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