Childhood Cancer Fact Library 2019

All statistics below are for U.S. children from birth through age 19 unless stated otherwise. This summary relies on the most recent published data with respect to its contents, some of which dates back one or more years.

Diagnosis

- The overall incidence of childhood cancer is on the increase, averaging 0.7% increase per year since 1975. Children (0-14) increased 0.9%, while adolescents and young adults, overall cancer incidence rates increased an average of 0.9% per year from 2012 to 2016. (37, 7F)
- 1,190 children (aged 0 -14) and 540 adolescents (aged 15-19) are expected to die from cancer in 2020 (excluding benign and borderline malignant brain tumors). (1A)
- About 1 in 285 children will develop cancer before the age of 20. (6A)
- 46 children per day or 16,850 children per year are expected to be diagnosed in 2020 with cancer (11,050 ages 0 to 14, and 5,800 ages 15 to 19) (1A)
- Approx. 5,270 children under 20 years will be diagnosed with brain and other CNS Tumors. (35)
- The average age at diagnosis is 8 overall (ages 0 to 19), 5 years old for children (aged 0 to 14), and 17 years old for adolescents (aged 15 to 19) (9), while adults' average age for cancer diagnosis is 65 (7a)
- Childhood cancer is not one disease - there are more than 12 major types of pediatric cancers and over 100 subtypes. (1)
- Most new cancer diagnoses in children are for leukemia (26.1%) brain/CNS cancers (17.2%), while brain/CNS cancers (21%) and lymphoma (20%) were top cancers for the adolescents. (9)

Long Term Health-Effects Associated with Treatments & Survival

- Cancer in children and young adults is different from cancer that develops later in life. Some of the unwanted side effects of cancer treatments cause more harm to children than they do to adults. This is because children's bodies are still growing and developing, so cancer and its treatment are more likely to affect developing organs. (7H)
- More than 95% of childhood cancer survivors will have a significant health related issue by the time they are 45 years of age (2); these health related issues are side-effects of either the cancer or more commonly, the result of its treatment. 1/3 rd. will suffer severe and chronic side effects; 1/3rd will suffer moderate to severe health problems; and 1/3rd will suffer slight to moderate side effects. (2)
- Female childhood cancer survivors who were treated with chemotherapy— even if they did not receive radiation treatments to their chest — are six times more likely than the general population to be diagnosed with breast cancer later in life. For those who did receive chest radiation, that chance increases exponentially and is on par with those who have the BRCA1 or BRCA2 mutations. (28)
- Childhood cancer survivors are at a 15-fold increased risk of developing Congestive Heart Failure and are at 7-fold higher risk of premature death due to cardiac causes, when compared with the general population. There is a strong dose-dependent relation between anthracycline chemotherapy exposure and CHF risk, and the risk is higher among those exposed to chest radiation. (33)

Treatment, Research, Funding

- Compared with the average stay among children and adolescents, those for cancer care were more than twice as expensive ($17,500 compared with $8,500 per stay) and about two days longer than the typical stay (6.4 versus 4.5 days). Pediatric cancer stays were also more expensive ($17,500 versus $12,100), but not any longer than adult cancer stays. (5)
- The average cost associated with childhood cancer in 2018 was $833,000 for one child for medical costs and lost parental wages. (36)
- One in four families lose more than 40% of their annual household income as a result of childhood cancer treatment-related work disruption, while one in three families face other work disruptions such as having to quit work or change jobs. (36)

- More than 90% of children and adolescents who are diagnosed with cancer each year in the United States are cared for at a children's cancer center that is affiliated with the NCI-supported Children's Oncology Group (COG). Children's Oncology Group is the world's largest organization that performs clinical research to improve the care and treatment of children and adolescents with cancer. Each year, approximately 4,000 children who are diagnosed with cancer enroll in a COG-sponsored clinical trial. COG trials are sometimes open to individuals aged 29 years or even older when the type of cancer being studied is one that occurs in children, adolescents, and young adults. (4)
- As reflected below in the National Cancer Institute's (NCI) Funded Research Portfolio, from 2008 through 2017, the NCI spent an average of 3.97% of its research funding on childhood cancers research. (7C)

Funding

There are two conflicting reporting methods available that are used to gauge federal childhood cancer research investment. A report used in the past and often cited by advocates, is the National Cancer Institute's Funded Research Portfolio (NFRP)(7C) below. It indicates that from 2008 through 2018, the NCI spent an average of 4.08% of its obligations on childhood cancer research. According to NCI's Office of Advocacy Relations (OAR), the NFRP *does not* reflect NCI's *total* investment in any one particular area of research—including childhood cancers—because it does not account for basic science awards, which are not categorized by cancer type and which may have applications to multiple types of cancer.

NCI Childhood Cancers Research Investment*

Year	Total Budget NCI Funding	Childhood Cancers Funding	Percent
2008	$4,827,552,152	$189,672,374	3.93%
2009	$4,966,926,530	$192,844,826	3.88%
2010	$5,098,146,876	$197,126,947	3.87%
2011	$5,058,104,978	$195,529,112	3.87%
2012	$5,066,969,036	$208,070,156	4.11%
2013	$4,787,897,881	$185,134,664	3.87%
2014	$4,932,807,990	$203,716,485	4.13%
2015	$4,951,675,428	$205,060,620	4.14%
2016	$5,206,169,249	$206,767,589	3.97%
2017	$5,636,393,224	$220,273,687	3.91%
Total	$50,532,643,344	$2,004,196,460	3.97%

About the NCI Funded Research Portfolio (https://fundedresearch.cancer.gov/nciportfolio/)
The NCI Funded Research Portfolio (NFRP) web site contains information about research grants, contract awards, and intramural research projects funded by the National Cancer Institute. The NFRP provides access to various NCI budget reports that contain information about research funding according to specific research categories. It also provides the ability to search the database in various ways, including text searching of project abstracts and the ability to search the NIH research categories that are assigned to projects carried out by extramural and intramural groups. (7D)

How does NCI generate NFRP funding data?
At the close of each fiscal year, NCI asks each of its scientific organizations to report their research funding according to specific research categories. The reports that NCI intramural and extramural programs provide are then combined to determine the NCI funding totals for individual research areas. The total research funding for each category is reviewed and verified before NCI publishes on the NCI web site, **Cancer.gov**. (7D)

What is scientific coding?
Scientific coding refers to the categorization of research projects according to scientific focus. In this process, research projects are analyzed and classified according to scientific topic and content. Scientific coding allows the development of science-based budget information, which can be used in portfolio analysis to examine the distribution of funds across research areas. Scientific coding is also necessary to answer inquiries about the scientific and budgetary aspects of Institute-funded research. NCI employs a sophisticated system of scientific coding in which trained professionals and/or scientific staff analyze grant applications, contracts, and intramural projects to classify each project for its degree of relevance to Special Interest Category (SIC) and Organ Site (SITE) codes. This coding structure is meant to describe in a consistent way the major scientific disciplines requested by NIH, DHHS, Congress, and the public. A critical characteristic of coded data is comparability from one fiscal year to the next. This process allows the Institute to respond quickly to requests for information from NCI staff and the broader community. The coding

definitions used by the NCI intramural program are consistent with those used for extramural grants and research and development (R&D) contracts to maintain accuracy across the Institute's portfolio. (7D)

- Another report, preferred by OAR, is the NIH RePORTER, which is a congressionally-mandated system all NIH Institutes and Centers (ICs) use to report data by fiscal year (FY). This tool highlights annual support for various research, condition, and disease categories (RCDC) based on grants, contracts, and other funding mechanisms *used across* NIH.

NIH RePORT Categorical Spending (RCDC)
NCI – Pediatric Cancer Category

Fiscal Year	NCI Pediatric Cancer $ Amount	Total NCI Obligations	% of Total Obligations
2016	$289,845,271	$5,206,169,272	5.57%
2017	$351,782,326	$5,636,392,678	6.24%
2018	$413,099,150	$5,927,729,104	6.97%
2019	**$437,681,409**	**$5,992,439,908**	**7.30%**

According to OAR, like the NFRP, the NIH RePORTER also does not account for the totality of NCI's investment in a given area of research because basic science awards cannot be categorized by individual cancer type. Using Total NCI Obligations, without making allowances for NIH items included in the Pediatric Cancer Amount, would distort the percentage of Total Obligations.

While both of the above reports, The NFRP and the NIH RePORTER, seem unable to capture a completely accurate measure of childhood cancer research expenditure as it relates to total research dollars, perhaps a better method to measure progress may be to compare NIH RePORTER pediatric dollars (c) to the Total NIH Dollars (d) for each fiscal year. This method would show changes from one year to the next. Note that the chart below shows that the pediatric cancer expenditures are growing from 2016 to 2019.

	NCI (a) Funded Research Portfolio		NCI (b) Obligations	NIH (c) RePORTER			NIH (d) Obligations
Fiscal Year	Dollars	% to NCI	Total Dollars	Dollars	% to NCI	% to NIH	Total Dollars
2016	$206,767,589	3.97%	$5,206,169,272	$289,845,271	5.57%	0.90%	$32.311 Billion
2017	$220,273,687	3.91%	$5,636,392,678	$351,782,326	6.24%	1.03%	$34.301 Billion
2018	Unavailable		$5,927,729,104	$413,099,150	5.97%	1.11%	$37.311 Billion
2019	Unavailable		$5,992,439,908	$437,681,409	7.30%	1.11%	$39.313 Billion

a. NCI Funded Research Porfolio https://fundedresearch.cancer.gov/nciportfolio/
b. NCI Obligations https://www.cancer.gov/about-nci/budget/fact-book/archive
c. NIH RePORTER https://projectreporter.nih.gov
d. NIH Obligations https://www.everycrsreport.com/reports/R43341.html

Survival

Pediatric Cancer 5-Year Observed Survival Rates, Ages Birth to 19 Years (1) The table below is a representation of the estimated 5-year survival rates for various types of childhood cancers for years 2009 through 2015. It should be noted the survival rates listed below reflect general rates and in no way are a representation of an anticipated actual survival outcome for any individual child. (1A)

5-Year Relative Survival % Ages 0-19

(1A) 5-Year Relative Survival (2009 through 2015) ICCC Type, United States

	Birth to 14 Survival %	15 to 19 Survival %
All ICCC groups combined	**84**	**85**
Leukemias, myelopfroliferative & myelodysplastic diseases	87	73
Lymphoid leukemia	91	74
Acute myeloid leukemia	66	66
Lymphomas and reticuloendothelial neoplams	94	94
Hodgkin lymphoma	98	97
Non-Hodgkin lymphoma (including Burkitt lymphoma)	91	88
Central Nervous System neoplasms (d.)	74	77
Benign/borderline malignant tumors	97	98
Neuroblastoma & other peripheral nervous cell tumor	81	57
Retinoblastoma	96	_b
Nephroblastoma & other nonepithelial renal tumors	93	_b
Heptic tumors	79	44c
Hepatoblastoma	83	_b
Malignant bone tumors	73	68
Osterosarcoma	69	67
Ewing tumor & related bone sarcomas	76	58
Rhabdomyosarcoma	71	45
Germ cell & gonadal tumors	91	93
Thyroid carcinoma	99	99
Malignant melanoma	95	95

Footnotes:

Abbreviation: ICCC, International Classification of Childhood Cancer
Survival rates are adjusted for normal life expectancy and are based on follow-up of patients through 2016.
a. Benign and borderline brain tumors were excluded from survival calculations except where specified.
b. Statistic could not be calculated due to fewer than 25 cases during 2009 through 2015.
c. The standard error of the survival rate is between 5 and 10 percentage points.
d. Includes Astrocytoma, Ependymoma, Medullioblastoma, Germ Cell, Brain Stem Glioma

- The <u>average</u> 5-year survival rate for childhood cancers when considered as a whole is 84%. [1A, 3]
- Cancer survival rates vary not only depending upon the type of cancer, but also upon individual factors attributable to each child. [6]
- The average 5-year survival rate, not including children with ALL, is 80%. [1]

- Survival rates can range from almost 0% for cancers such as DIPG, a type of brain cancer, to as high as 90% for the most common type of childhood cancer known as Acute Lymphoma Leukemia (ALL). [1]
- Diffuse intrinsic pontine glioma (DIPG) represents approximately 80% of the malignant brainstem tumors occurring in children. Despite numerous clinical trials, the outcome of children with DIPG continues to remain dismal, with a median survival of 9–12 months and a 2-year overall survival (OS) rate of less than 10%. [34]
- 12.2% of all newly diagnosed brain tumors occur under age 20. [7G]
- In 2015 there were nearly 429,000 childhood cancer survivors in the United States. This number is projected to grow to more than 500,000 by 2020. [27]
- Approximately 1 in 530 young adults between the ages of SEP 20 and 39 is a survivor of childhood cancer. [1]
- Children who were treated for bone cancer, brain tumors, and Hodgkin lymphoma, or who received radiation to their chest, abdomen, or pelvis, have the highest risk of serious late effects from their cancer treatment, including second cancers, joint replacement, hearing loss, and congestive heart failure. [4]
- Long-term follow-up analysis of a cohort of survivors of childhood cancer treated between 1970 and 1986 has shown that cancer survivors remain at risk of complications and premature death as they age, with more than half of survivors having experienced a severe or disabling complication or even death by the time they reach age 50 years. Children treated in more recent decades may have lower risks of late effects due to modifications in treatment regimens to reduce exposure to radiotherapy and chemotherapy, increased efforts to detect late effects, and improvements in medical care for late effects. [4]

Mortality

- Cancer is the number one cause of death by disease among children. [4]
- On average, about 16% of children die within 5 years of diagnosis. Among those children who survive to five years from diagnosis, 18% of them will die over the next 25 years. [8]
- Overall cancer death rates among children ages 0 to 14 years decreased an average of 1.4% per year. Among adolescents and young adults ages 15 to 39 years, overall cancer death rates decreased an average of 1.0% per year. [37]
- Those that survive the five years have an eight times greater mortality rate due to the increased risk of liver and heart disease and increased risk for reoccurrence of the original cancer or of a secondary cancer. [8]
- There are 70 potential life years lost on average when a child dies of cancer compared to 15 potential life years lost for adults. [7B]
- Brain cancer represents 29.9% of total childhood cancer deaths while leukemia accounts for 24.9% [7E]
- A diagnosis of diffuse intrinsic pontine glioma (DIPG) is normally terminal with less than 25% of children surviving even two years. [29]
- Worldwide, 100,000 children lose their lives every year to cancer. [33A]

Drug Development

- Between the years of 2009 and 2019, nine of the 11 drugs used to treat acute lymphoblastic leukemia — which is the most common childhood cancer — were in and out of shortage. [32]
- While hundreds of cancer drugs have been developed and approved for adults, the FDA, through 2019 has approved a total of 34 drugs for use in the treatment of childhood cancers. 30 of the drugs were originally approved only for adult use. Today we have only four drugs that were approved in the first instance for use in cancer treatment for children: Teniposide (1992 for ALL) use now discontinued by NCI, clofarabine (2004 for ALL), dinutuximab (2015 for NB), tisagenlecleucel (2017 for ALL) and calaspargase pegol-mk (2018 for ALL). [7]

FDA Approved Drugs For Childhood Cancers *

last update 12/27/2019

Drug	Approved for	Type	Original Approval	Pediatric Approval	Indication	
Mercaptopurine	Adults/Peds	Chemo	9/11/1953	4/28/2014	ALL	
Cyclophosphamide	Adults/Peds	Chemo	11/16/1959	****	Leukemia, lymphoma, NBL, retinoblastoma	♥
Vincristine	Adults/Peds	Chemo	7/10/1963	***	ALL, lymphoma, Wilms, rhabdomyosarcoma, NBL	
Dactinomycin	Adults/Peds	Chemo	12/10/1964	8/23/2013	Ewing Sarcoma, sarcoma botryoides	
Cytarabine	Adults/Peds	Chemo	6/17/1969	***	Acute non-lymphocycic leukemia	
Procarbazine	Adults/Peds	Chemo	7/22/1969	***	Hodgkin lymphoma	
Daunorubicin	Adults/Peds	Chemo	12/19/1979	1/30/1998	ALL	♥
Teniposide	Pediatrics	NME**	7/14/1992	10/1/2002	Refractory ALL (DISCONTINUED)	
Pegaspargase	Peds/AYA	NME**	2/2/1994	4/24/2006	ALL	*ct
*FDAMA, enacted Nov. 21, 1997, amended the Federal Food, Drug, and Cosmetic Act relating to the regulation of food, drugs, devices, and biological products						
Gemtuzumab	Adults/Peds	MAB***	5/17/2000	9/1/2017	Relapsed or refractory CD33+AML	
Clofarabine	Pediatrics	NME**	12/28/2004	9/1/2017	Refactory ALL	*ct
Nelarabine	Adults/Peds	NME**	10/28/2005	9/1/2017	T-cell ALL	*ct
Dasatinib	Adults/Peds	Targeted Therapy	6/28/2006	11/9/2017 12/21/2018	Ph+CML in the chronic phase PH+ ALL	*ct
Imatinib	Adults/Peds	Targeted	9/27/2006	11/9/2017	PH+ ALL and PH+ CML	*ct
Nilotinib	Adults/Peds	Targeted	10/29/2007	3/22/2018	Ph+CML in the chronic phase	
Ipilimumab	Adults/Peds	MAB***	3/25/2010	7/21/2017	Unresectable or metastatic melanoma ≥ 12 yrs	
Everolimus	Adults/Peds	Chemo	10/29/2010	9/25/2012	SEGA / subependymal giant cell astrocytoma.	
Asparaginase Erwinia	Adults/Peds	NME**	11/18/2011	11/18/2011	ALL	*ct
Pembrolizumab	Adults/Peds	MAB***	9/4/2014	3/14/2017 5/232017 6/13/2018 12/19.2018	refractory classical cHL Micosatellite instability-high (MSI-H) or mismatch repair deficient solid tumor Adult and pediatric patients with refractory primarymediastinal largeB-cell lymphoma MatasticMerkel cell carcinoma(≥12years)	*ct
Dinutuximab	Pediatrics	NME**	3/10/2015	3/10/2015	High risk NBL See *NB basic research note below	*ct
Avelumab	Adults/Peds	MAB***	3/23/2017	3/23/2017	MatasticMerkel cell carcinoma(≥12years)	
Blinatumomab	Adults/Peds	MAB***	7/12/2017	7/12/2017	B-cell acute lymphoblastic leukemia	
Tisagenlecleucel	Pediatrics	NME**	8/30/2017	8/30/2017	Relapsed or refractory ALL	*ct
Nivolumab	12 yrs or older	MAB***	7/11/2018	7/11/2018	mismatch repair-deficient and microsatellite instability-high colorectal cancer	
Iobenguane I 131	12 yrs or older		7/30/2018	7/30/2018	malignant pheochromocytoma paraganglioma	
Calaspargase Pegol-mk	1mo -21 yrs.	Multi-Agent Component		12/20/2018	ALL Used with combination chemotherapy	*ct
Tagraxofusp-erzs	Adults/Peds	Targeted	12/21/2018	12/21/2018	Blastic plasmacytoid dendritic cell neoplasm	
Larotrectinib	Adults/Peds	NME**	11/26/2018	11/26/2018	Solid tumor with (NTRK) gene fusion	*ct

* Source: https://www.cancer.gov/research/areas/childhood/fda-approved-drugs-childhood-cancers?cid=eb_govdel

*ct = Data from NCI-sponsored clinical trials were used to support the approval

** NME = New Molecular Entities

*** MAB= Monoclonal Antibody

****Exact pediatric-specific approval date is unknown.

♥ Possible late-onset cardiotoxicity https://www.uspharmacist.com/article/chemotherapy-agents-that-cause-cardiotoxicity

*NB Dinutuximab - NCI basic research 1960-2015 https://www.cancer.gov/research/areas/childhood/childhood-cancer-basic-cancer-research

Information Supplied by the FDA:

Supportive Care Oncology Drugs to treat pediatric patients with toxicty associated with cancer treatment

Drug	Approved for	Type	Original Approval	Pediatric Approval	Indication
Pegfilgrastim	Adults/Peds		1/31/2002	11/13/2015	Decrease incidence of infection,increases survival in patients acutely exposed ot myelossuppressive doses of radiation
Rasburicase	Adults/Peds	NME*	7/12/2002	7/12/2002	Management of plasma uric acid levels in patients at riask for tumor lysis syndrome
Palifermin	Adults/Peds		12/15/2004		Decreased incidence and duration of severe oral musositis
Levolcucovorin	Adults/Peds		3/7/2008	3/7/2008	Rescue after HD-MTX
Tocilizumab	Adults/Peds	MAB***	1/8/2010	8/30/2017	Treatment of chimertic antigen receptor (CAR) T cell-induced cytokine release syndrome
Voraxaze	Adults/Peds		1/17/2012	1/17/2012	Treatment of toxic plasma methotrexate concentration based on delayed MTX clearance

Global Facts

- In 2018, The World Health Organization (WHO) launched the Global Initiative for Childhood Cancer with partners to provide leadership and technical assistance to support governments in building and sustaining high-quality childhood cancer programs. The goal is to achieve at least 60% survival rate globally by 2030, for all children with cancer. This represents an approximate doubling of the current cure rate and will save an additional one million lives over the next decade. The objectives are to increase capacity of countries to deliver best practices in childhood cancer care and also to prioritize childhood cancer and increase available funding at the national and global levels. (30)
- It is estimated that there will be 13.7 million cases of childhood cancer between 2020-2050. Unless there are major improvements in diagnosis and treatments, of this, 45% will go undiagnosed and

11.1 million will die if no further investments in interventions are made. The vast majority, almost 85%, will be concentrated in developing countries. [33A]

Psychosocial Care [20]

- Childhood cancer threatens every aspect of the family's life and the possibility of a future, which is why optimal cancer treatment must include psychosocial care. [11]
- The provision of psychosocial care has been shown to yield better management of common disease-related symptoms and adverse effects of treatment such as pain and fatigue.[12]
- Depression and other psychosocial concerns can affect adherence to treatment regimens by impairing cognition, weakening motivation, and decreasing coping abilities. [13]
- For children and families, treating the pain, symptoms, and stress of cancer enhances quality of life and is as important as treating the disease. [14]
- Childhood cancer survivors reported higher rates of pain, fatigue, and sleep difficulties compared with siblings and peers, all of which are associated with poorer quality of life. [15]
- Changes in routines disrupt day-to-day functioning of siblings .[16] Siblings of children with cancer are at risk for emotional and behavioral difficulties, such as anxiety, depression, and post traumatic stress disorder.[17]
- Symptoms of posttraumatic stress disorder are well documented for parents whose children have completed cancer treatment. [18]
- Chronic grief has been associated with many psychological (e.g., depression and anxiety) and somatic symptoms (e.g., loss of appetite, sleep disturbances, fatigue), including increased mortality risk. [19]
- Cancer survivors in the United States reported medication use for anxiety and depression at rates nearly two times those reported by the general public, likely a reflection of greater emotional and physical burdens from cancer or its treatment. [21]
- Financial hardship during childhood cancer has been found to affect a significant proportion of the population and to negatively impact family wellbeing. [22]
- Adolescents with cancer experienced significantly more Health Related Hindrance (HRH) of personal goals than healthy peers, and their HRH was significantly associated with poorer health-related quality of life, negative affect, and depressive symptoms. [23]
- Peer relationships of siblings of children with cancer are similar to classmates, though they experience small reductions in activity participation and school performance. [24]
- Chronic health conditions resulting from childhood cancer therapies contribute to emotional distress in adult survivors. [25]
- Parents have been found to report significant worsening of all their own health behaviors, including poorer diet and nutrition, decreased physical activity, and less time spent engaged in enjoyable activities 6 to 18 months following their child's diagnosis. [26]

Endnotes

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[1A] American Cancer Society, A Journal for Clinicians, Cancer Statistics 2020, Table 12: Case Distribution (2012 Through 2016) and 5-Year Relative Survival (2009 Through 2015) a by Age and ICCC Type, Ages Birth to 19 Years, United States. https://acsjournals.onlinelibrary.wiley.com/doi/full/10.3322/caac.21590

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[6] American Society of Clinical Oncology
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[7A] National Cancer Institute, SEER Median Age of Diagnosis 2008-2012, Table 1.12
http://seer.cancer.gov/csr/1975_2012/results_merged/topic_med_age.pdf

[7B] National Cancer Institute, SEER Cancer Statistics Review 1973-1997 (NCI 2000)
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[7D] National Cancer Institute, NIH/NCI
https://fundedresearch.cancer.gov/nciportfolio/about.jsp

[7E] Centers for Disease Control and Prevention, https://www.cdc.gov/nchs/products/databriefs/db257.htm

[7F] National Cancer Institute, SEER Cancer Statistics. Annual Report to the Nation 2018

[7G] National Cancer Institute, Percent of New Cases by Age Group: Brain and Other Nervous System Cancer
SEER 21 2012-2016, All Races, Both Sexes,

[7H] National Cancer Institute, Pediatric Supportive Care (PDQ®)–Patient Version
https://www.cancer.gov/types/childhood-cancers/pediatric-care-pdq

[8] Journal of the National Cancer Institute "Cause-Specific Late Mortality Among 5 Year Survivors"
http://jnci.oxfordjournals.org/content/100/19/1368.full

[9] NCI, SEER Age-Specific Rates and Counts for Cancer Sites by Single Year of Age at Diagnosis, Table 28.13
http://seer.cancer.gov/csr/1975_2012/results_single/sect_28_table.13_2pgs.pdf

[10] Additional information in this statement was obtained from several reliable and authoritative sources

[11] Institute of Medicine, 2008 - Cancer Care for the Whole Patient

[12] Jacobsen et al., 2012 (Journal of Clinical Oncology, 30 (11), p.1151-1153)

[13] Institute of Medicine, 2008

[14] Institute of Medicine 2015 - Comprehensive Care for Children with Cancer and Their Families

[15] Children's Oncology Group Long Term Follow-Up Guidelines, 2013

[16] Alderfer et al., 2010 (Psycho-oncology, 19 (8), p. 789-805)

[17] Alderfer et al., 2003 (Journal of Pediatric Psychology, 28 (4), p. 281-286)

[18] Kazak et al., 2004 (Journal of Pediatric Psychology, 29 (3), p. 211-219)

[19] Alam et al., 2012 (Death Studies, 36 (1), p. 1-22)

[20] Psychosocial care addresses the effects that cancer treatment has on the mental health and emotional wellbeing of patients, their family members, and their professional caregivers. Psychosocial care is not provided by a single profession alone: Instead, every patient-healthcare provider interaction provides an opportunity to assess the stressors and concerns of children and their family members.

[21] Hawkins et al., 2017 (Journal of Clinical Oncology, 5 (1), 78-87)

[22] Bona et al., 2014 (Journal of Pain Symptom Management, 47 (3), 594-600)

[23] Schwartz & Brumley, 2017 (Journal of Adolescent & Young Adult Oncology, 6 (1), 142-149)

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