Cancer in Children

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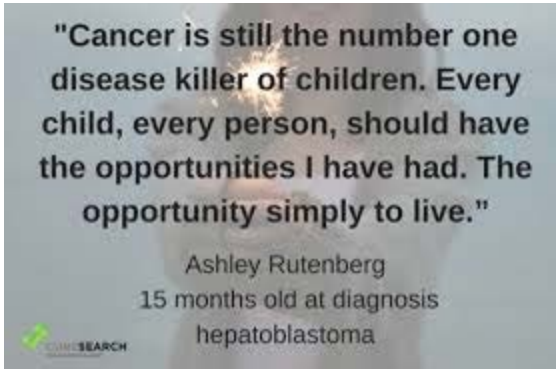
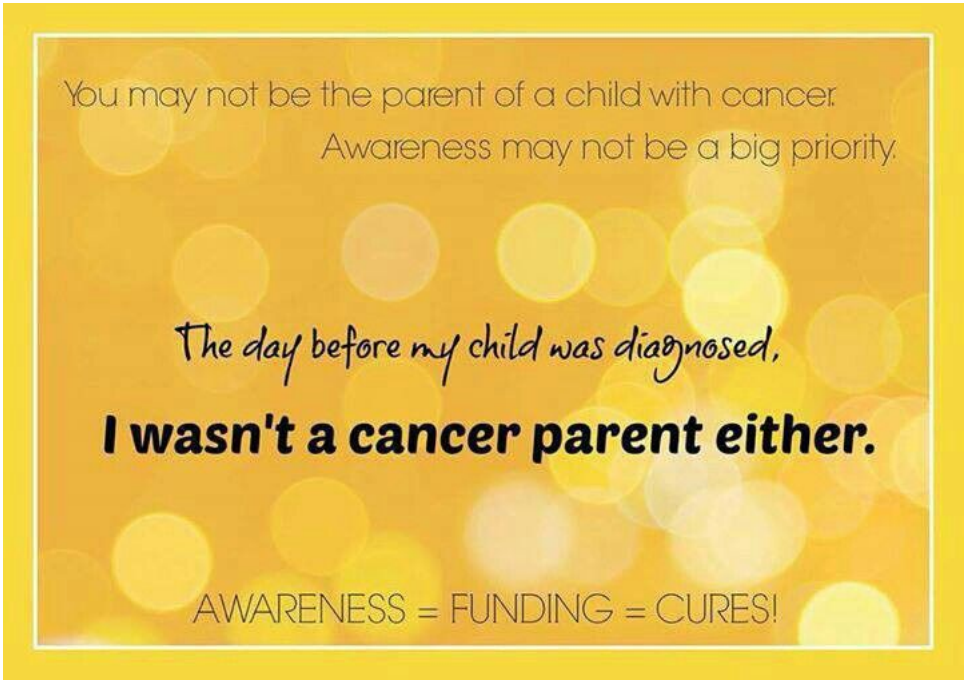
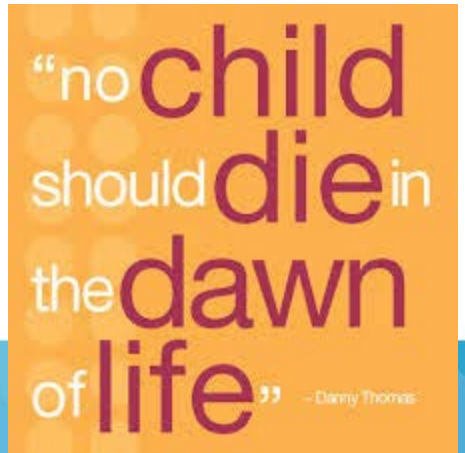
Aim of this very short session!

- Facts and figures relating to Childrens Cancers
- Aetiology
- Factors relevant in prevention
- Recognising Childrens Cancers
- Early Diagnosis

“Your child has cancer.”







Paediatric Malignancies

- 1% of all cancers

- 1,800 new cases of cancer in children each year in the UK in 2012-2014
- around 5 cases diagnosed every day
- Around 1 in 500 children in Great Britain will develop some form of cancer by 14 years of age.
- Throughout Europe, children's cancer incidence rates are lowest in the UK and highest in Northern Europe

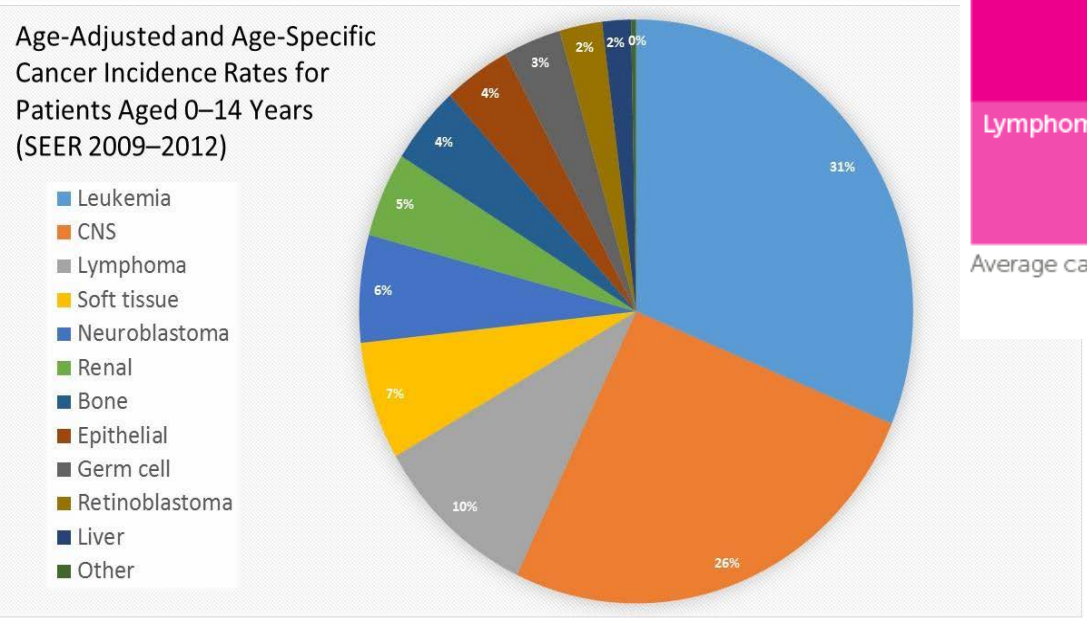
- Involve tissues of:

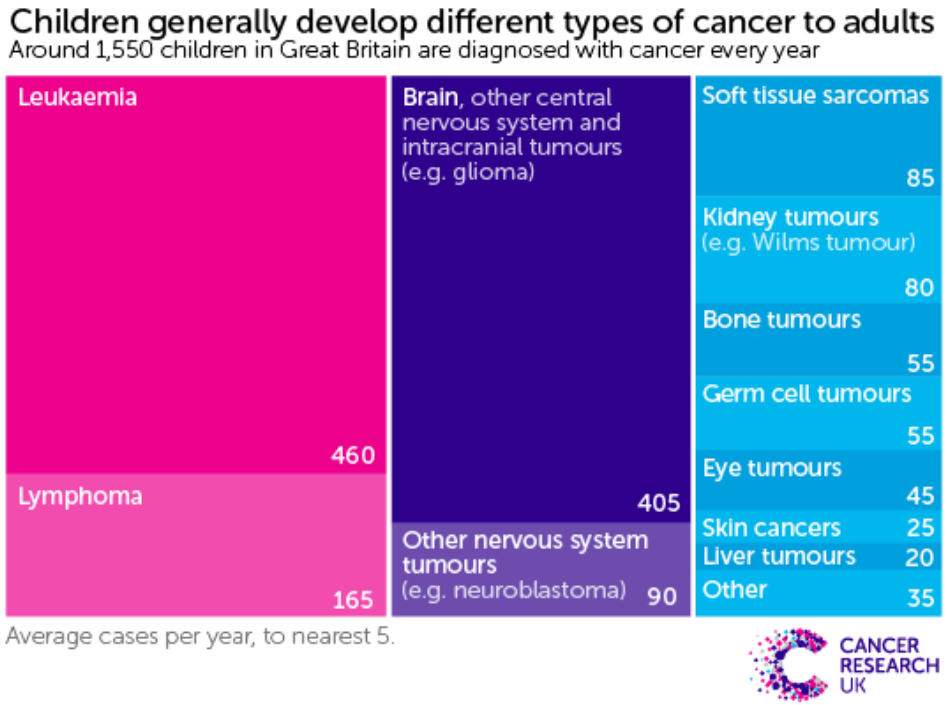
  CNS, bone, muscle, endothelial tissue

  Leukemia, Brain tumours, Neuroblastoma, Wilm’s tumour, Rhabdomyosarcoma, Retinoblastoma, Osteosarcoma ,Ewing’s sarcoma
- Grow in a short period of time

Office for National Statistics, June 2016

Incidence 0-14

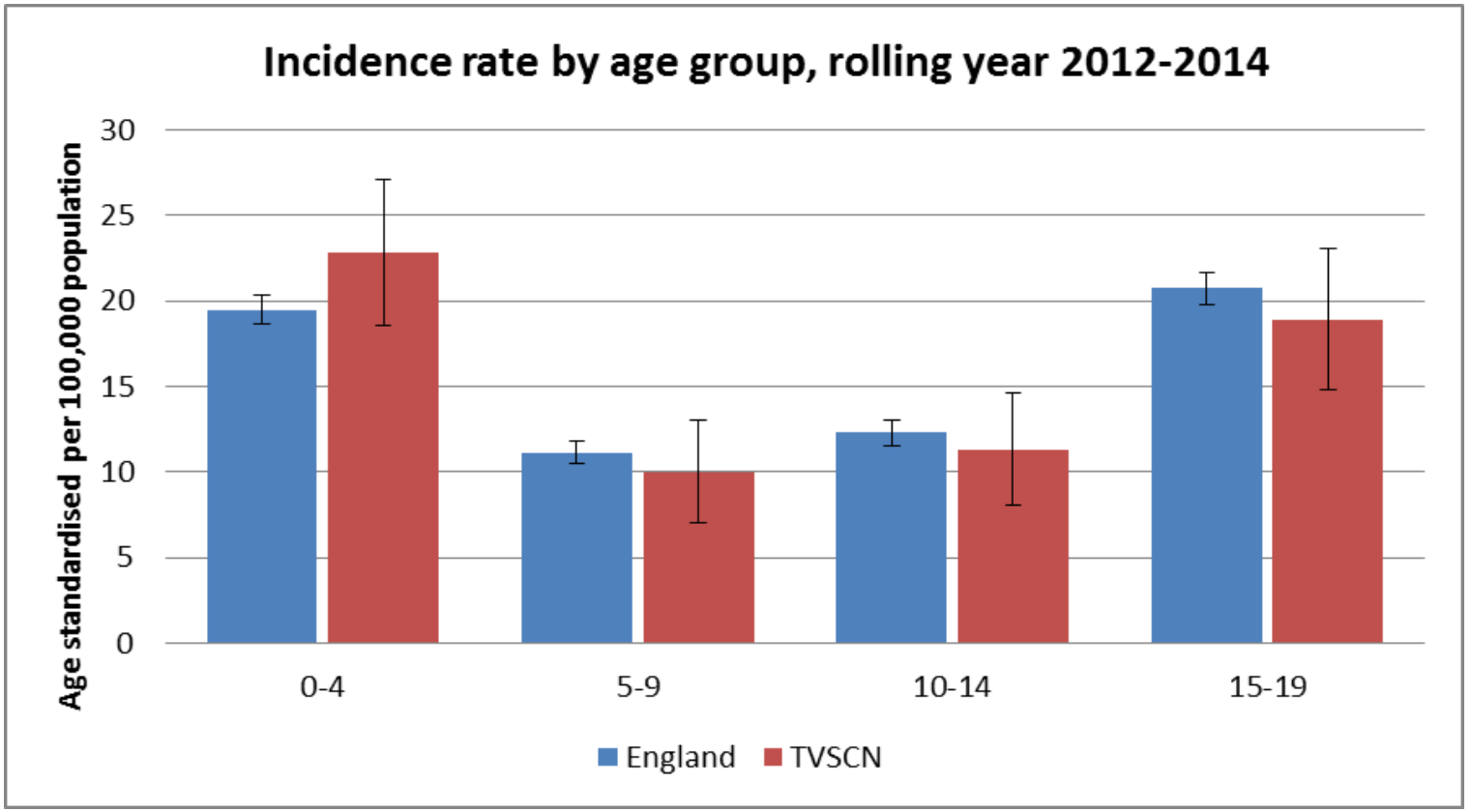




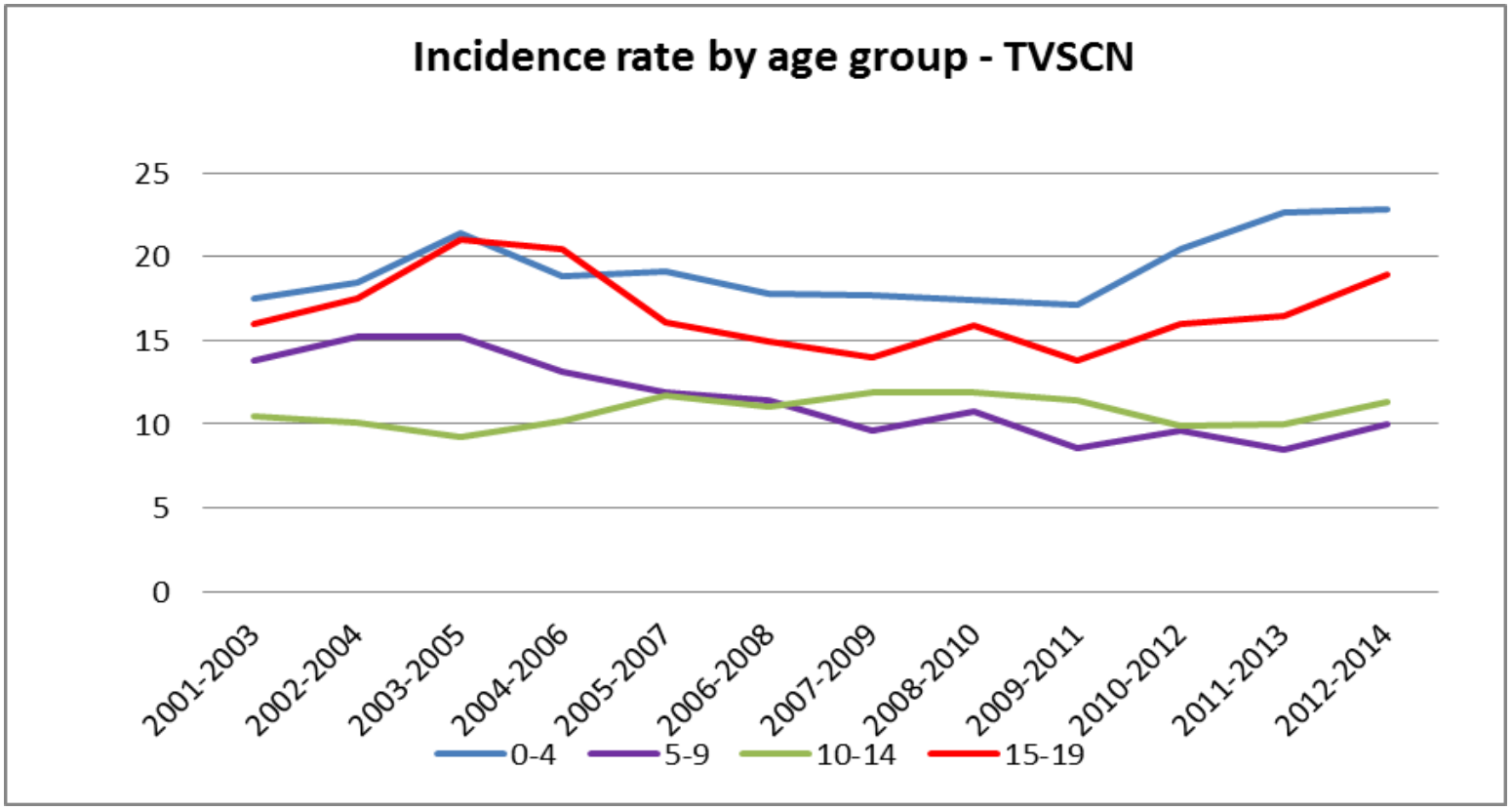
Incidence and age

- The highest incidence rates for all children's cancers combined are in the under-fives for both sexes,
- with almost half (48%) of all cases in children being diagnosed in this age group (UK, 2012-2014)

- This pattern varies greatly by cancer type



Source: CancerStats (National Cancer Registration & Analysis Service, Public Health England)



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CHILDHOOD CANCERS BY AGE

SITE	0-5 YR	5-10 YR	10-15 YR
Leukaemia	39.6*	35.7	22.1
Lymphoma	03.7	13.3	16.4*
CNS	15.0	27.1*	18.9
Wilms Tumor	09.2*	06.1	02.0
Neuroblastoma	13.0*	02.2	00.5
Retinoblastoma	06.4*	01.3	00.0
Bone	00.6	05.0	10.5*
Other	08.8	05.8	23.6

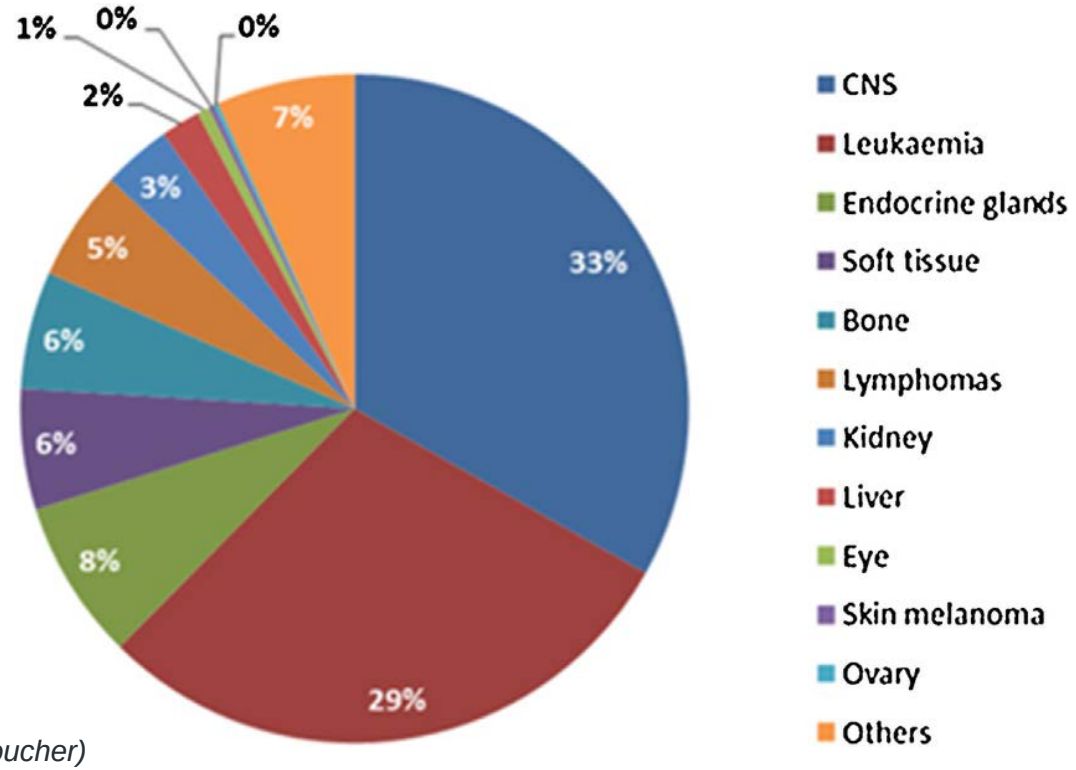
*Peak Incidence

Charles Stiller/Childhood Cancer Research Group

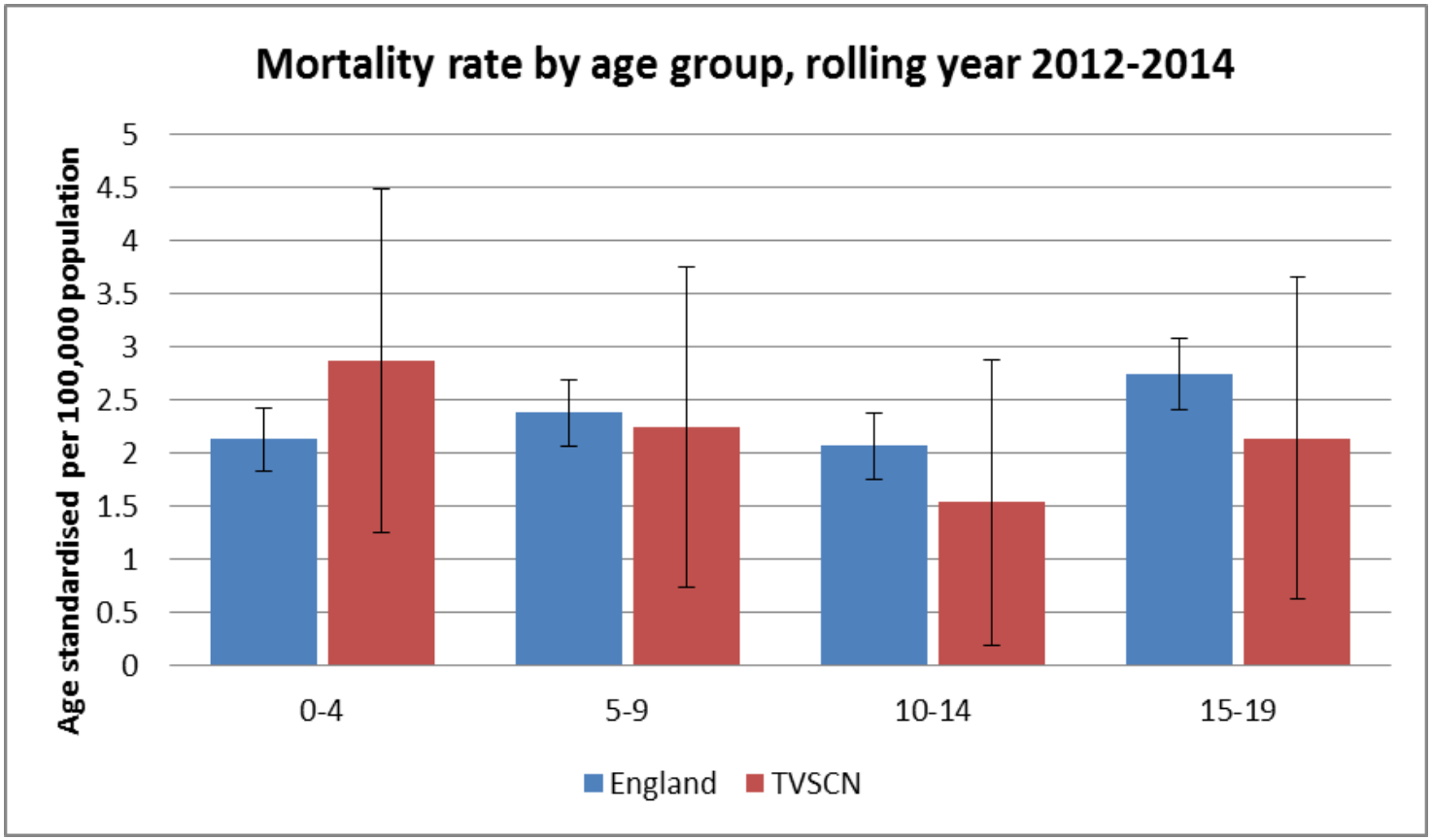
Cause of death

- CNS tumours (33%),
- leukaemias (29%) and
- neuroblastoma (8%)

Responsible for <u>60%</u>
of cancer deaths aged 0 to 14 years.



Cause of death by different cancer (Eva Steliarova-Foucher)



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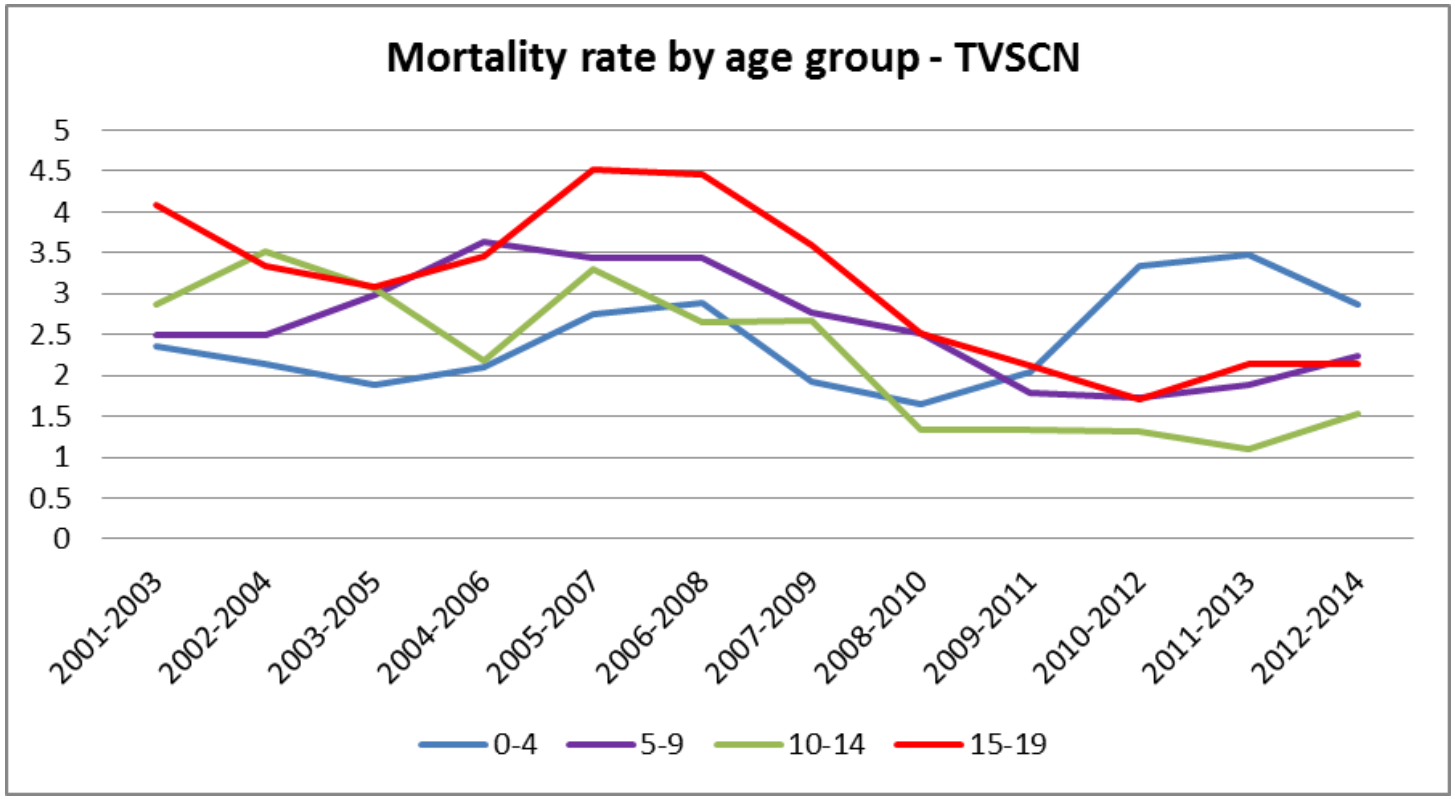
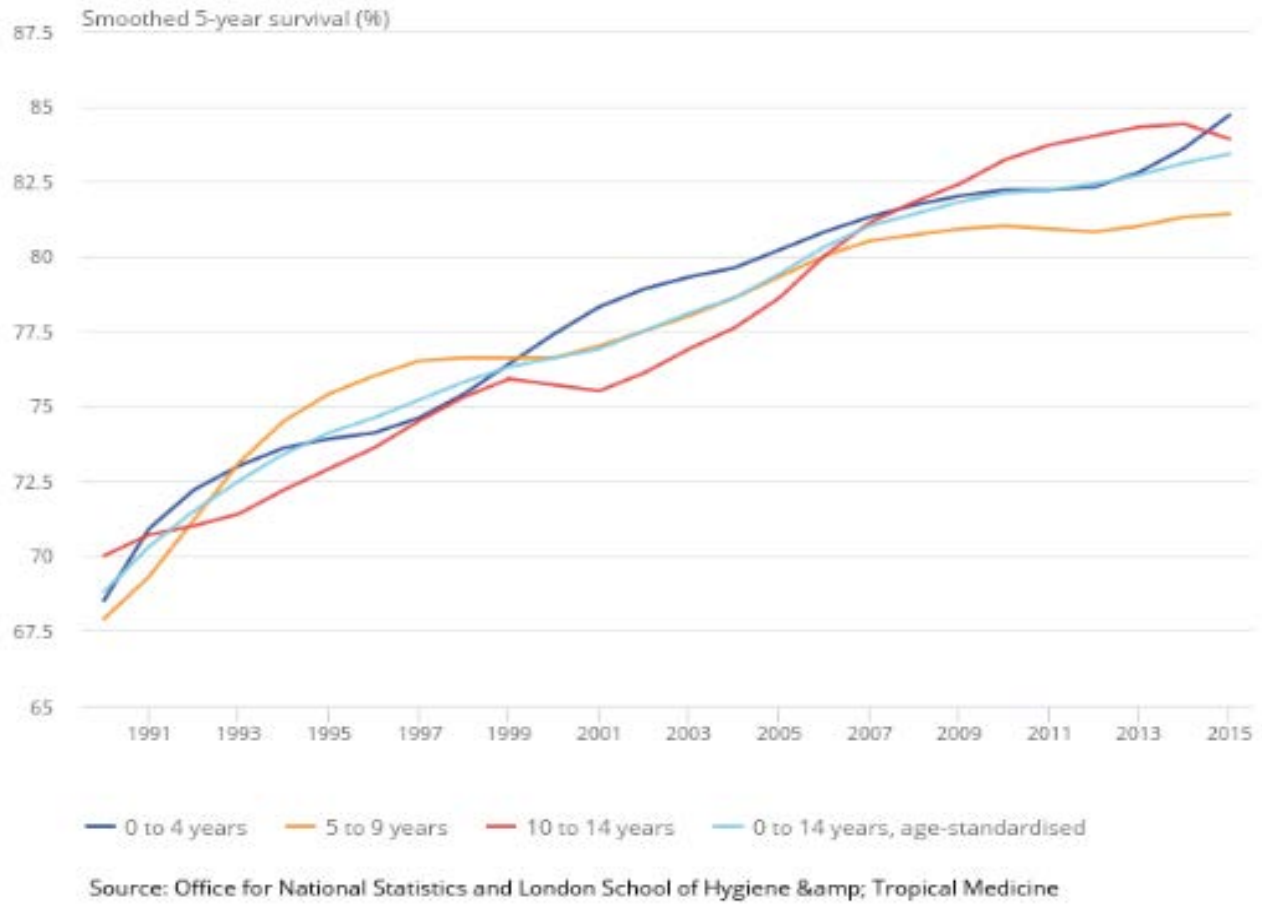


Source: CancerStats (National Cancer Registration & Analysis Service, Public Health England)

Survival

Figure 1: Smoothed trends in 5-year survival (%) for children (aged 0 to 14 years) diagnosed with cancer in England between 1990 and 2015



Source: Office for National Statistics and London School of Hygiene & Tropical Medicine

“Why does my child have Cancer ?”

ETIOLOGY

- Largely unknown
- Most likely - complex interactions of both genetic and environmental factors – Ecogentics

- estimated that 4-8% of paediatric cancers occur within a known genetic predisposition and more than 100 genetic syndromes with a risk of cancer in childhood are known
- Some studies already suggest that up to one in four children and adolescents with a history of cancer may have a genetic predisposition condition

Am Soc Clin Oncol Educ Book. 2012

HOST FACTORS

- Immunodeficiency States – 25% increased risk, either congenital or acquired

- Specific Congenital Anomalies - Down Syndrome (10-18 times greater risk of developing Leukaemia)
- Single Gene Defects - 150 associated with development of Cancer (Fanconi Anemia & Bloom Syndrome)
- Familial Tendencies - Sibling with Leukemia (4 times greater chance), Monozygous Twins (almost 100% chance)

Cancer in children with primary or secondary immunodeficiencies. J Pediatr (1996)

RISK FACTORS

1) Known

a) Genetic risks factors associated with childhood cancer

Familial neoplastic syndromes

SYNDROME	GENE	CHILDHOOD CANCER
Familial retinoblastoma	RB1	Retinoblastoma, osteosarcoma
Familial Wilms' tumour	FWT1/2	Wilms' tumour
Li-Traumeni syndrome	TP53/CHK2/SNF5	Adrenocortical carcinoma/ Soft-tissue sarcoma/ Osteosarcoma, CNS tumor
Hereditary nonpolyposis colon cancer	MSH2/MLH1/PMS2	Glioma
Familial adenomatous polyposis	APC	Medulloblastoma, hepatoblastoma

Inherited immunodeficiency and bone marrow failure syndromes

SYNDROME	GENE	CHILDHOOD CANCER
Ataxia telangiectasia	ATM	Lymphoma, leukaemia
Wiskott-Aldrich syndrome	WAS	Non Hodgkin's Lymphoma
Blood syndrome	BLM	Non Hodgkin's Lymphoma, Wilms' tumour, osteosarcoma
IgA deficiency	IGAD1	Lymphoma
Fanconi anaemia	FANCA	Acute myeloid leukaemia, hepatoma

Based on Stiller CA. Oncogene, 2004, 23:6429–6444

ENVIRONMENTAL FACTORS

- Chemical and Physical Agents - 1) DES 2) Chloramphenicol, 3) Benzene, 4) Asbestos
- Perinatal smoking, alcohol/Anabolic Androgenic Steroids/Cytotoxic Agents/Immunosuppressive Agents:
  - Leukaemias, Non-Hodgkin's lymphoma
- Infections:
  - HIV/AIDS: Kaposi's sarcoma
  - Malaria and Epstein Barr virus: Burkett's lymphoma
- Ionizing Radiation
  - Diagnostic x-ray in-utero: leukaemia
  - Radiation therapy: malignant bone tumours, leukaemia

PROGNOSIS

- 70% will be cured
- Children are more responsive to tx and better able to tolerate immediate side effects of surgery

Cardinal Signs of Cancer

- Unusual mass or swelling, painless large glands
- Unexplained pallor and loss of energy
- Spontaneous bruising
- Prolonged, unexplained fever, night-sweats
- Headaches in morning
- Sudden eye or vision changes
- Excessive – rapid weight loss.

LEUKAEMIA

- Definition - “White Blood”, Involves blood forming tissues of the bone marrow, spleen, and lymph nodes
- Outstanding Characteristic - Abnormal uncontrolled proliferation of one type of wbc
- 80-85% of childhood Leukaemias are Acute Lymphocytic Leukemia (ALL)

Leukaemia

4 per 100,000 children per year

- Peak Incidence - Between 2-6 years
- Twice as common in white children as non-white
- More common in males

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CLINICAL MANIFESTATIONS

- Onset - Abrupt or Insidious
- Common Symptoms Reflect Bone Marrow Failure - Decreased rbcs, decreased platelets, and changes in wbcs
- Pallor, fatigue, myalgia, petechiae, purpura, bleeding and fever
- WBC Count of less than 10,000/mm3
- Renal failure – due to high uric acid

PROGNOSIS

- ALL IS CURABLE
- Overall - 60-70%
- ALL1, Pre- B Cell, CALLA Positive - 90%

BRAIN TUMORS

- 2nd most common cancer
- Incidence - 2.4 per 100,000
- Cause Unknown
- CLASSIFICATION - Most arise from glial tissue, the supportive tissue of the brain
- 60% are INFRATENTORIAL - Occur in the posterior third of the brain
- Generally 65% live more than 5 years

- Symptoms – usual
  - Headaches
  - Vomiting (usually morning)
  - Visual changes
  - Irritability
  - Personality changes
  - Drowsiness
  - Depression and mood swings
  - Seizures
  - Clumsy, incoordination, gait abnormality, paralysis

Management of Cancer

- Patient / family education
  - Begins at time of diagnosis
  - Continues through treatment phases
  - Maintained in post-survival years
  - Support if death of child
  - Empower parents to have control – informed decision-making and communication with child/ren
- Don’t forget siblings!
- High quality communication essential!

“Your child has cancer.”

Possible strategies for earlier diagnoses?

- Training:
  - Primary Care practitioners: GPs, Pharmacists, Health Visitors, School Nurses, Practice Nurses, Mid-wives, Learning-disability teams, Child-safeguarding teams
  - Secondary Care teams: A&E, Obs & Gynae, Paediatrics
  - Public: New-parents, nurseries
- Access to health professionals i.e. GP appointments
- Paediatric advice lines, develop GP Paediatricians?
- Regular health check reviews of high risk groups
  - Eg Immunodeficiency, Down's, Genetic hx, affected twin hx, HIV
- Review of urgent suspected process:
  - Urgent diagnostics pathways
  - ? Rather than 2 week wait, consider same-day or 48 hour assessment

Thank You

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