

# PAEDIATRIC CANCERS

Olga Buckley

Paediatric Oncology Outreach Nurse Specialist

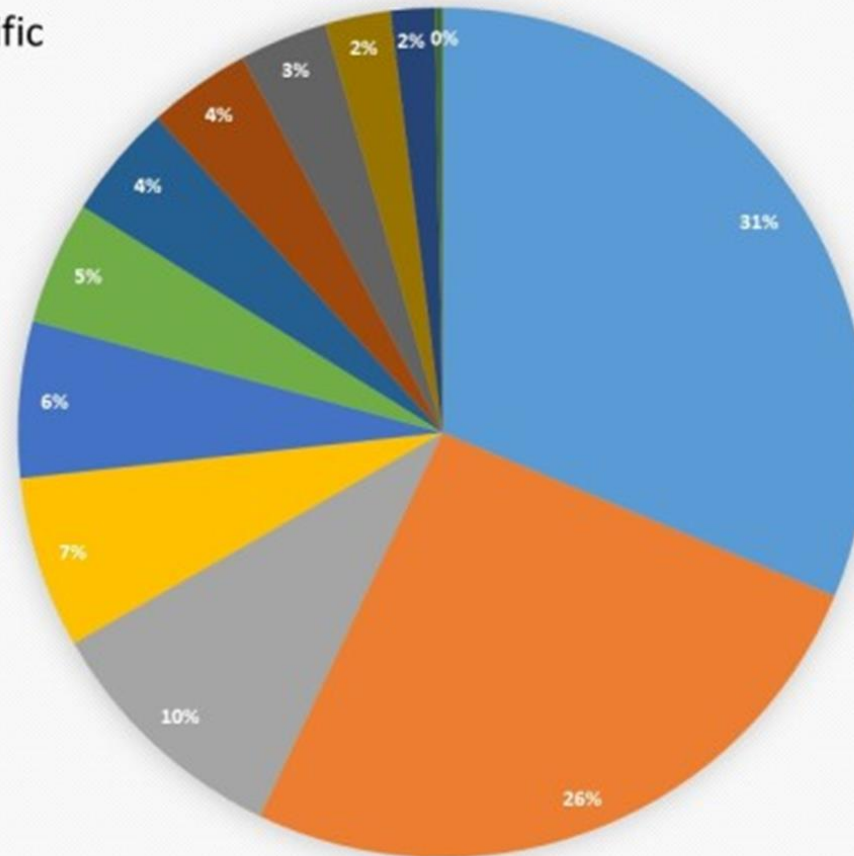
Mercy University Hospital, Cork

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# Overview of Paediatric Cancers

Age-Adjusted and Age-Specific  
Cancer Incidence Rates for  
Patients Aged 0–14 Years  
(SEER 2009–2012)

- Leukemia
- CNS
- Lymphoma
- Soft tissue
- Neuroblastoma
- Renal
- Bone
- Epithelial
- Germ cell
- Retinoblastoma
- Liver
- Other





# Overview of Paediatric Cancers

- Very rare - 0.25 - 0.4% of overall cancer diagnosis
- Leukaemias most common followed by brain tumours, lymphomas, neuroblastoma
- 80% cure rate in developed countries, 20% cure in middle and low income countries
- Generally cannot be prevented or screened for
- Treatments include conventional chemotherapy, radiotherapy, surgery and now immunotherapy
- Enhance outcomes with early detection and diagnosis

# Irish Perspective

- Approximately, 163 children diagnosed with cancer yearly in Ireland (0-14yrs)
- Cancer rates have increased
- Death rates have decreased and are among the lowest in Europe
- 1960's approximately 60 deaths yearly, now 15 deaths yearly
- 81 % cure rates, main improvements pre 1994
- Survivorship is a major challenge especially late effects of treatment

# Neutropenia

- Abnormally low number of neutrophils in the circulating blood
- Absolute neutrophil count (ANC)  $< 0.5$
- Severe risk of infection when ANC  $< 0.2$
- Life span of a neutrophil 7-8 hours

# Causes of Neutropenia

- Disease: Leukaemia, Aplastic Anaemia, Myelodysplastic Syndromes
- Treatment: Radiotherapy, Chemotherapy, Bone marrow transplant

# Signs and Symptoms

- No signs and symptoms
- Absence of inflammatory symptoms
- Fever is the most reliable indicator,  $38^{\circ}\text{C}$  x 2 or  $38.5^{\circ}\text{C}$  x 1
- Unexplained clinical deterioration including pain, chills, rigor, non weight bearing

# Risk Factors

- Sources of infection
- Underlying disease
- Intensive treatments
- Invasive procedures/surgery
- Age
- Nutritional Status
- Length of neutropenia



# Febrile Neutropenia

- Febrile: One temperature reading  $\geq 38.5^{\circ}\text{C}$  or two readings  $38-38.4^{\circ}\text{C}$  one hour apart within 24hrs
- Neutropenia:  $\text{ANC} < 0.5 \times 10^9/\text{L}$

# Management of Febrile Neutropenia

- Education of parents
- Education of multidisciplinary team
- Strict adherence to OLCH Shared Care Manual & guidelines
- Direct ward access with no delay, ideally antibiotics within one hour
- Co-trimazole prophylaxis
- Use of filgrastim to stimulate the production of granulocytes
- DAY 10 FBC counts

# Neutropenia types of infections

- Bacteria – gram positive – staphylococcal, streptococcal  
- gram negative – E. coli, Pseudomonas
- Viral – varicella, CMV, RSV, Herpes
- Fungal – candida albicans, aspergillus
- Protozoal – Pneumocystis carinii pneumonia

# Immune Compromised Patient

- No defence against infection
- Septic Shock
- Organ failure & death

## **THINK**

- Sepsis 6
- PEWS


# Febrile Neutropenia Guidelines

- If ANC  $\geq 1.0 \times 10^9/L$  child is considered 'not neutropenic' however if child develops fever:
- Clinical assessment and judgement must be used to determine whether the child requires treatment with IV antibiotics.

# Febrile Neutropenia Guidelines

- If child is febrile and ANC  $\geq 0.5 \times 10^9/L$  and  $\leq 1.0 \times 10^9/L$ , expecting ANC to drop i.e. nadir not reached (normally day 7-10)
- Treatment with IV antibiotics as per guidelines should be initiated.
- If child is febrile and ANC  $\geq 0.5 \times 10^9/L$  and  $\leq 1.0 \times 10^9/L$ , nadir has been reached and child is well, there is no need for antibiotic treatment unless clinically indicated

# Febrile Neutropenia Guidelines

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- If child is unwell and temperature drops below normal, they should be medically reviewed

# Mandatory Investigations

- History: Last chemo dose
- Assessment: Physical exam including hickman site, mouth, perianal area
- Blood Cultures (Aerobic & Anaerobic) CVAD & Peripheral cultures, repeat 48 hourly
- Full blood count and differential to determine ANC
- U&E's, LFT'S, CRP
- Urine culture & urinalysis, urine biochemistry



# Additional Investigations


- Only if clinically indicated
- Chest xray, ct sinus, abdominal u/s
- Swabs of any infected site including hickman site
- Throat/nasopharyngeal swab
- Stool analysis
- Viral serology including flu swab in flu season
- NPA for respiratory
- Lactate

# Febrile Neutropenia Guidelines

Antibiotic treatment is initiated if child:

- Has fever and neutropenia
- < 6 months post allogeneic bone marrow transplant & febrile regardless of the ANC count
- Following allogeneic BMT while still receiving immunosuppressive therapy regardless of ANC

# Antibiotics

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- Broad Spectrum Antibiotics: gram + and gram – infections
  - Tazocin & gentamicin
  - Cephalosprins for children on high risk NBL & hepatoblastoma protocol
  - Check culture and change antibiotics with culture sensitivity or if condition deteriorates
  - Duration of antibiotics depends on response, neutrophil count and type of infection


# Additional Antibiotics


- Teicoplanin – if clinical suspicion of cellulitis or hickman culture positive
- If haemodynamically unstable, change antibiotics to meropenem, amikacin, teicoplanin
- Be aware of microbiology history: VRE, C diff, ESBL, MRSA etc
- Hickman line infections – antibiotic locks

# Nursing Care

- Prompt recognition and initiation of treatment ideally within one hour of pyrexia
- Hand washing
- Single room
- Cultures 48 hourly when febrile
- Evaluate clinically and reassessment, report any deterioration immediately
- Supportive care such as GCSF, RCC transfusion, platelet transfusion
- Education

# If in doubt.....

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- Contact Haematology/ Oncology Consultant/team in OLCH, Crumlin
  - Commence IV antibiotics
  - Stop chemotherapy



Thank you to Dr Clodagh Ryan & Grainne Langan, CNS, OLCH

Information for Febrile Neutropenia from:

Paediatric Haematology & Oncology  
Supportive Care Guidelines  
Vol 1 Chap 1-13 Ver 3 Nov 2013