

ELECTIVE (SSC5b) REPORT (1200 words)

A report that addresses the above four objectives should be written below. Your Elective supervisor will assess this.

What are the most common causes of paediatric deaths in England and Wales today? How consistent are these deaths with central London?

According to the Office of National Statistics, the most common cause of paediatric deaths in England and Wales relates to cancer. This represents 21% of childhood deaths within the population, aged between 28 days and 15 years [1]. Closely followed to cancer lie disorders of the nervous system (such as cerebral palsy, polio and meningitis) and external causes relating to accidental injuries, at 14.2% respectively [2].

Table 1: Percentage of childhood deaths by underlying cause, England and Wales, 2015

Neoplasms	21.0
Nervous system disorders	14.2
External factors	14.2
Respiratory system	11.1
Congenital malformations / chromosomal abnormalities	9.5

Source: Office of National Statistics

It is fair to say that mortality rates from infectious causes and cardio-respiratory issues have been declining over the past 50 years with the onset of improved nutrition, better public health measures, preventative medicine (such as vaccinations) and advances in medical technology. However, studies undertaken by Cancer Research UK indicate that the onset of neoplasms have risen, so much so that our “lifetime risk” of developing the disease has increased from 1 in 3 to 1 in 2 [3].

According to Cancer Research UK, the type of cancers that affect children mainly relate to leukemias and tumours of the central nervous system. These account for approximately 57% of childhood cancers diagnosed in 2013 [4]. The remaining cancers are lymphomas, soft tissue tumours, neuroblastomas, and numerous other neoplasms (as represented in Table 2). Statistics also indicate that 57.9% of all neoplasms affect boys, as opposed to only 42.1% affecting girls. This ratio is standardized across all cancer types, except for lymphomas wherein the male to female ratio is increased to 2:1 [5].

Table 2: Relative contributions of childhood cancers to overall incidence, UK, 2013

Source: Cancer Research UK

The above mentioned statistics are quite representative of all populations throughout the UK today. However, as per the Office of National Statistics, there is a slight geographical variation in cancer rates

throughout health authorities in the UK. The incidence of cancer is 11.5% higher for the North West England in comparison with the metropolis, London [6].

Presently the cure for cancer remains elusive, and the trend in childhood cancer related deaths seems to be growing with cancer incidence rates increasing by 38% from 1966 to 2000 [7]. However, breakthroughs in cancer research are improving the outlook for children, as the 5 year survival rate now stands at 82% [8].

How is Great Ormond Street Hospital using therapeutic radiology in the treatment of paediatric cancers? How consistent, or different, are these services to what is being offered throughout the rest of the UK?

Therapeutic radiology (aka radiation oncology) involves using radiation to diagnose and treat cancers. The amount of radiation used may aim to eradicate the cancer in its entirety, reduce the size of the cancer for control purposes, or reduce the severity of cancer-related symptoms via palliative care. Radiotherapy may be given as a standalone treatment or it may be given in combination with chemotherapy and surgery.

Wilhelm Röntgen discovered x-rays in 1895 and received the Nobel Prize in physics in 1901 when it became apparent that radiation could cure cancer. However, it wasn't until 1922 that medical radiotherapy became a clinical specialty that was offered as a treatment to the general populous [9]. Since then, the use of high-energy x-rays has been used in the treatment of many different cancers, due to its ability to damage the DNA of rapidly dividing cancer cells. Although, approximately 50% of all cancer patients receive radiotherapy, it proves to be a challenging treatment for children mainly because radiation exposure can affect the healthy growth and development of younger children. Radiotherapy can also lead to fertility issues and can cause secondary tumours (such as increasing the risk of breast cancer for treatment of Hodgkin's lymphoma).

Despite the risks of radiotherapy, the children at Great Ormond Street Hospital are offered life-saving treatment at the partner hospital of University College London Hospital (UCLH). They are either transferred as outpatients under the radiotherapy department, or are they are admitted directly as inpatients onto the ward. Each treatment plan is individualised to meet the patient's needs and is initiated by the radiation oncologists after investigating the cancer type, location and size. The various types of radiotherapy, used by UCLH, are as followed [10]:

- **Conformational radiotherapy**
- **Intensity modulated radiotherapy**
- **Volumetric modulated arc radiotherapy**
- **Image guided radiotherapy**
- **Four dimensional radiotherapy**
- **Total body irradiation**
- **Brachytherapy**

There are eighteen paediatric centres that deal with radiotherapy across the UK. Of these, the UCLH department happens to be the largest and it is the national centre for internal radiotherapy – namely brachytherapy. UCLH utilises six Varian True Beam machines, which are advanced technological systems offering radiotherapy with such precision that increments are measured in less than one millimeter [11]. Although the treatment of paediatric cancers is quite standardised across the eighteen centres in the UK, it is important to note that UCLH will be able to offer proton beam therapy as a future treatment, rather than the standard photon therapy currently being used. The Department of Health is currently building a proton centre at UCLH which will open in 2020. This will be the third centre to open in the UK after the photon beam centre at The Christie Hospital in Manchester (due to open in 2018) and the Clatterbridge Cancer Hospital in Liverpool (which has been using the photon beam to treat ocular tumors since 1989) [12].

Although this government initiative is costing the National Health Services approximately £250 million pounds, it will allow 1,500 critically ill patients to be treated with life-saving technology. Currently, these patients are sent to the United States for therapy, if they fulfill the criteria for successful treatment. Although this particular type of radiotherapy has the beneficial effect of damaging less surrounding tissues and thus lowers the number of side-effects, it can often provide unwanted stress for families as they have to relocate abroad. It is fair to say that UCLH, will be at the forefront of technological advancement and this is a huge milestone in radiotherapy for the NHS and the children of central London today.

References

[1] and [2] Office of National Statistics. 2015. People Population and Community. [ONLINE] Available at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/childhoodinfantandperinatalmortalityinenglandandwales/2015#main-points>

[3] Cancer Research UK. 2015. Why are Cancer Rates Increasing? [ONLINE]. Available at: <http://scienceblog.cancerresearchuk.org/2015/02/04/why-are-cancer-rates-increasing/>

[4] and [5] Cancer Research UK. 2017. Cancer is Happening Right Now. [ONLINE]. Available at: https://www.cancerresearchuk.org/?gclid=CMO3rZCNldQCFYk_Gwodv-QBSA&dclid=CKGax5CNldQCFYXgGwodFlwA7Q

[6] Office of National Statistics. 2016. Geographical Patterns in Cancer. [ONLINE]. Available at: <https://www.ons.gov.uk/.../cancer.../cancer.../chapter-2--geographical-patterns-in-cancer-in-t...byNCooper> - Related articles

[7] and [8] Children with Cancer. 2017. Facts and Figures. [ONLINE]. Available at: <http://www.childrenwithcancer.org.uk/facts-and-figures>

[9] British Institute of Radiology. 2017. Origins of Radiology. [ONLINE] Available at: <http://www.bir.org.uk/patients-public/history-of-radiology/origins-of-radiology/>

[10] UCLH Radiotherapy. 2017. Radiotherapy Information Leaflets. [ONLINE] Available at: <https://www.uclh.nhs.uk/OurServices/ServiceAZ/Cancer/RADIO/Pages/Radiotherapyinformationleaflets.aspx>

[11] UCLA Health. 2016. Explore UCLA Radiation Oncology. [ONLINE] Available at: <http://radonc.ucla.edu/truebeam-faqs>

[12] UCLH Radiotherapy. 2017. UCLH to Provide World Leading Radiotherapy for Cancer Patients. [ONLINE]. Available at: <https://www.uclh.nhs.uk/News/Pages/UCLHtoprovideworld-leadingradiotherapyforcancerpatients.aspx>