Paediatric Cancer Incidence and Required Histopathology: An Audit of Patient Cases at the Uganda Cancer Institute

Maria Izmirlieva[1], Tadeusz Ciecierski-Holmes[1],
Joyce Kambugu[2], Veronica Nyakato[2], Claire Trayers[3], Denise Williams[4]

mai34@cam.ac.uk, tsc38@cam.ac.uk

1. University of Cambridge, School of Clinical Medicine, Cambridge, UK 2. Uganda Cancer Institute, Department of Paediatric Oncology, Kampala, Uganda 3. Addenbrooke's Hospital, Department of Pathology, Cambridge, UK 4. Addenbrooke's Hospital, Department of Paediatric Oncology, Cambridge, UK

We Audited Histopathology Samples at UCI

The Uganda Cancer Institute (UCI) is the national centre for paediatric cancer care in Uganda, serving patients from all over Uganda, as well as neighbouring countries, such as the Democratic Republic of Congo and South Sudan. As a result, UCI receives a high volume of paediatric solid tumour cases, which require histopathology reporting on biopsied masses in order to provide definitive diagnoses. This process may include the use of immunohistochemistry (IHC), which provide stains that are specific to particular cancers, in order to aid diagnosis.

UCI clinicians wanted to audit their patient load, including their histopathology processes and use of IHCs, in order to better understand 1) their paediatric solid tumour patient population, and 2) how their pathology reporting processes could be improved.

We identified the incidences of solid tumour cancers in the patient population who first presented to UCI between January and December 2023, and identified the types of IHC stains used in diagnoses, and provided descriptive statistics of the time taken to provide pathology reporting.

We Extracted Data from 2023 Paediatric Records

We manually extracted data from **paper-based patient records** while on-site in June 2024.

We created an extraction sheet to gather:

1) Basic information about patients, including:
- Date of initial presentation to UCI
- Demographics (sex and age)
- Initial clinical diagnoses

2) Biopsy and histopathology data, including:
- Dates biopsies were requested and received
- Biopsy sites
- Morphological and IHC diagnoses
- Whether a sample was non-diagnostic

Criteria	Inclusion	Exclusion
Tumour type	Cancers presenting with solid masses, requiring histopathology	Cancers presenting without a solid mass, or neurological tumours
Age	<18	>=18
Time period	2023	before 2022, 2024-present

Table 1: Sample inclusion and exclusion criteria

Results

	# of Patients	Gender Ratio (M:F)	Average Age (years)	# of Histopathology Samples
Sample	99	49:50	8	118

Table 2: Sample descriptive statistics

i) The Most Common Final Diagnoses Included Renal and Soft Tissue Cancers

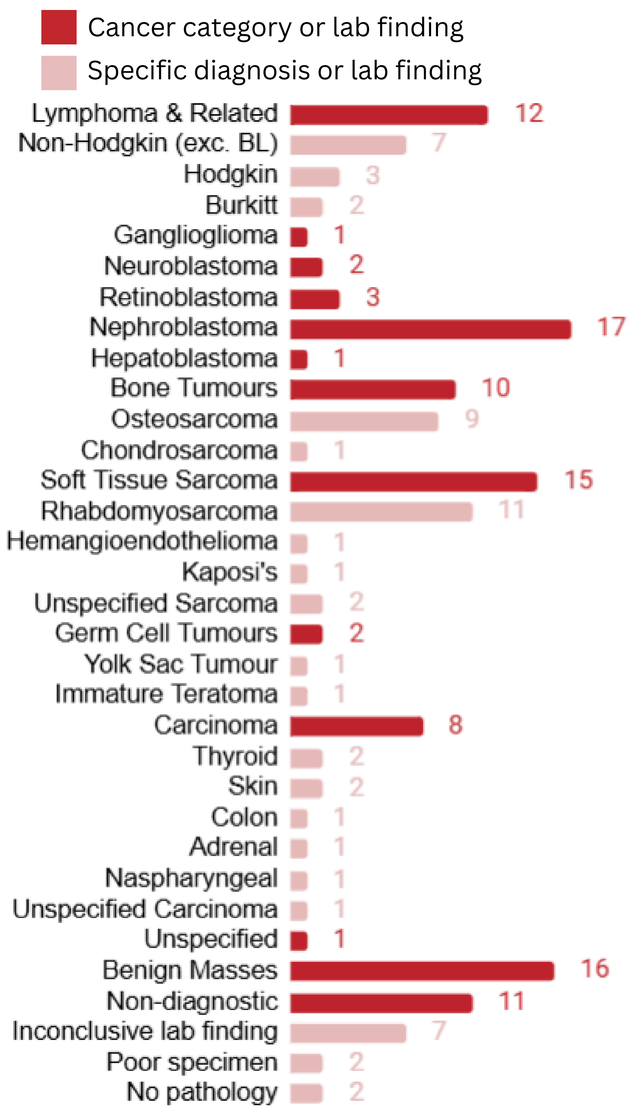

Figure 1: Frequency of different cancer diagnoses or lab findings

Paediatric patients with solid masses presenting to UCI most commonly had **renal tumours**, **soft tissue sarcomas, lymphomas,** and **bone cancers.**

Within these overarching categories, significant specific diagnoses included **nephroblastoma (Wilms), rhabdomyosarcoma** and **osteosarcoma**.

There were expected differences in age groups, where the most common diagnosis in **patients under 12** was **nephroblastoma,** while **soft tissue** and **bone sarcomas** were more common in **adolescent** patients.

Compared to the WHO Cancer Registry for Uganda (1996-2013), UCI sees relatively more cases of nephroblastoma, and relatively fewer soft tissue cancers.

Age Group	N	Most Common Diagnoses
0-4	35	1) Nephroblastoma 2) Retinoblastoma 3) Neuroblastoma
5-12	39	1) Nephroblastoma 2) Rhabdomyosarcoma 3) Osteosarcoma
13-18	25	1) Osteosarcoma 2) Rhabdomyosarcoma 3) Non-Hodgkin's Lymphoma

Table 2 : Three most common final diagnoses by age group

ii) We Identified the IHC Stains Most Commonly Required

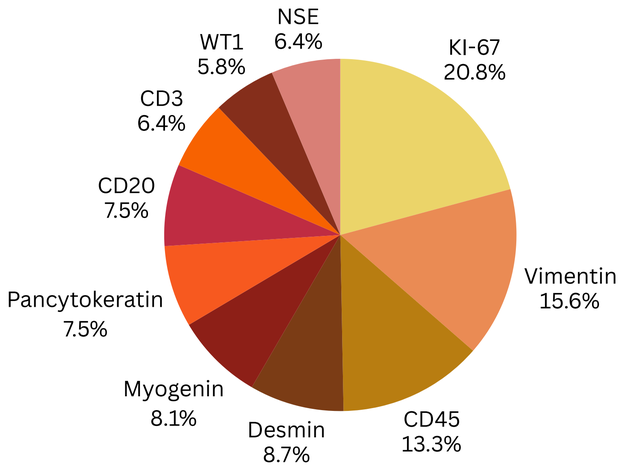

Figure 2: 10 Most Common IHC Used by UCI In 2023

Taking a biopsy and performing a histopathological analysis is important, and accounted for changes between clinical diagnosis and final diagnosis in **46%** of solid tumour cases.

Immunohistochemistry changed **12.7%** of morphological diagnoses, and increased confidence in tissue diagnoses.

In 2023, **ten IHC stains** were used in solid cancer diagnosis in over ten occasions.

iii) Biopsy Turnaround Times are Satisfactory

We identified two main areas for delays in tissue diagnosis: i) between presentation and request, ii) between requesting and performing biopsy.

i) Time Between Presentation and Biopsy Request is Minimal

Most patients have a biopsy requested on arrival (53%), with few outliers more than two weeks after admission.

ii) Time Between Requesting and Performing Biopsy

The median time between requesting and performing a biopsy was 12 days. More than 80% of biopsies performed within 4 weeks *(Fig. 3)*.

Some patients take longer while:
- waiting for surgical review
- waiting for chemotherapy to finish
- waiting for patient to stabilise

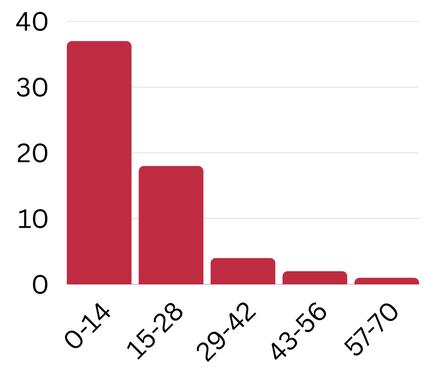

Figure 3: Wait times (days) between requesting and performing a biopsy

We Identified Three Main Areas To Target

1) Integrate Audit Cycle into Clinical Education

Results from this audit should be reviewed by UCI clinicians as they demonstrate which tumours presenting with solid masses currently have the highest incidence.

Certain cancers were more straightforward to diagnose, whereas others were more frequently initially misdiagnosed. Awareness of this may lead to greater caution when faced with similar presentations.

Integrating this into a feedback cycle, along with adopting an online system at UCI to record patient data over the next year, can create a cycle of continuous education and improvement.

2) Prioritise Which IHC Stains to Order

Ten IHC stains were used only once for tissue analysis in 2023 by UCI. Given that antibodies are expensive and have a short shelf life, we recommend questioning de-prioritising these to make judicious use of limited resources at UCI.

It is important to check whether any IHC stains were ordered and not used at all in the time period, as this is beyond our project scope.

3) Introduce Standardised IHC Panels

Certain IHCs are specific to particular cancers. In cases where a particular cancer is suspected, sets of IHC can be selected.

IHC panels are already in place for some adult cancers, and this could be extended to paediatric cancers to ensure consistency, and facilitate biopsy requests.