A REVIEW OF STAGING INFORMATION COLLECTED BY THE NEW ZEALAND CHILDREN'S CANCER REGISTRY IN CONSIDERATION OF THE TORONTO PAEDIATRIC CANCER STAGING GUIDELINES

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BACKGROUND

Cancer staging is an essential process for determining prognosis and is crucial for comparing outcomes between groups and over time. However, until recently there has been no consistency in the collection of paediatric cancer staging by population based registries. This is due to the challenges that paediatric cancers present in terms of their rarity, diversity and the development of multiple disease-specific staging systems by individual clinical trial consortiums.

Following the assembly of a panel of experts, the Toronto Paediatric Cancer Stage Guidelines were published for 16 major childhood malignancies in 2016.[1] The guidelines feature a tiered approach – Tier 1 for resource-limited cancer registries, Tier 2 for highly-resourced registries and up to Tier 3 for some specified tumours. These guidelines now feature as a new chapter in the 2017 edition of the TNM Classification of Malignant Tumours.[2]

The New Zealand Children's Cancer Registry (NZCCR) records comprehensive diagnostic and treatment information for all children treated at New Zealand's two specialist paediatric cancer centres. As NZCCR data is transferred to the patient's Health Passport and used for planning patient follow-up care, it is vital that clinically relevant prognostic information is collected. Paediatric oncologists are consulted to determine the stage, grade, and risk information to be collected for each tumour group and the NZCCR standard operating procedures are regularly updated to ensure that these data fields are consistently and accurately completed by the Clinical Research Associates responsible for registering new patients.

Here we describe our efforts to synthesise the prognostic information collected by the NZCCR with the Toronto Paediatric Cancer Stage Guidelines through a review of paediatric cases treated at the Children's Haematology Oncology Centre (CHOC) unit at Christchurch Hospital between 2009 and 2016.

OBJECTIVES

- ✓ To improve the completeness and accuracy of staging information held by the NZCCR for future analyses
- ✓ To determine whether it is feasible for the NZCCR - and other similarly resourced registries - to adopt the Toronto Paediatric Cancer Stage Guidelines.

METHODS

The NZCCR was used to identify all children (0-14 years) diagnosed at CHOC between 2009 and 2016. Stage, grade and risk information was reviewed for each patient to ensure that it was recorded as outlined in the NZCCR standard operating procedures. Gaps were filled where necessary.

Medical records were reviewed to determine disease staging at time of diagnosis according to Tier 2 of the Toronto Guidelines.

Evaluation of feasibility of the Toronto Guidelines included;

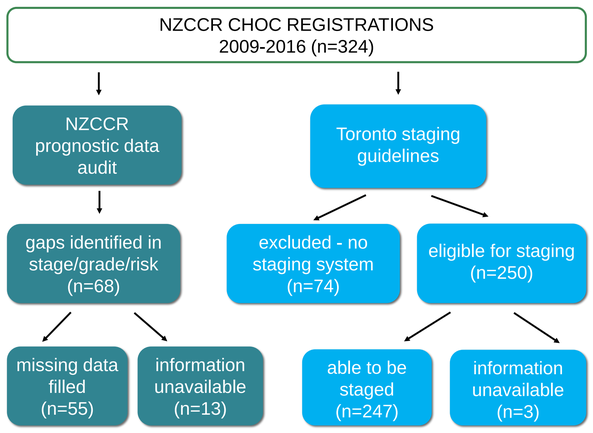
- ✓ the number of cases which could be staged
- ✓ Its compatibility with the NZCCR's current staging systems
- ✓ the ease of locating staging information in the medical records

RESULTS

Cases staged as per Toronto Guidelines

The 16 major childhood malignancies covered by the Toronto Staging Guidelines together comprise approximately 77% of the 324 cancers registered by CHOC in the time period. Only 3 cases were unable to be staged due to missing information in the patient's clinical records.

Astrocytomas (n=18) and Langerhan's Cell Histiocytosis (n=13) were the two most common cancers not covered by the Toronto Guidelines (astrocytomas were considered at the Toronto meeting but no relevant staging system was identified). Were these two additional groups included, 87% of all cases could have been staged.



Compatibility with the NZCCR's current staging systems

The staging systems used by the NZCCR were only compatible with Toronto Tier 2 staging system for 5 of the 16 tumour groups. In addition, the NZCCR was compatible with the Tier 3 recommendations for retinoblastoma and hepatoblastoma and the Tier 1 recommendations for ependymoma. Where the Toronto Guidelines and the NZCCR used the same staging system, there were no discrepancies between the staging obtained from the Toronto Guidelines and that held by the registry.

16 Major Childhood Malignancies	Toronto Tier 2 Staging System	NZCCR Staging	No. of cases (%)	Ease of staging as per Toronto guidelines	Compat-ibility of the two staging systems
Acute lymphoblastic leukaemia	CNS 1, 2 or 3	No staging recorded Risk: as per COG risk stratification	116 (35.8%)	☒	N/A
Acute myeloid leukaemia	CNS-, CNS+	No staging recorded Risk: as per COG risk stratification	15 (4.6%)	☑	N/A
Hodgkin lymphoma	Ann Arbor: Stage IA/B – IVA/B	Cotswold Revision of Ann Arbor: Stage also appended with E if applicable Risk: as per Euronet protocol	12 (3.7%)	☑	☑
Non-Hodgkin lymphoma	St Jude/Murphy: Stage I – IV	IPNHLSS: Stage I-IV	8 (2.5%)	☑	☒
Ependymoma	M0 – M4 (localised/metastatic is a Tier 1 option)	Metastatic / Non-metastatic Grade: WHO CNS tumour grade	4 (1.2%)	☑	☒ ☑* *Toronto tier 1
Medulloblastoma & embryonal tumours	M0-M4	No staging recorded Grade: WHO CNS tumour grade	18 (5.6%)	☑	N/A
Neuroblastoma	INRGSS: L1, L2, M, MS	INSS: 1, 2A, 2B, 3, 4, 4S Risk: as per the Neuroblastoma Risk Group Pre-treatment Classification	15 (4.6%)	☒	☒
Retinoblastoma	IRSS stage 0 – IV (IRSS Stage 0 Group A-E is a Tier 3 recommendation)	International Classification for Intraocular retinoblastoma Group A–E Risk: standard / high risk histology	7 (2.2.%)	☑	☒ ☑* *Toronto tier 3
Wilms' tumour	Stage 1/y-stage 1 – Stage IV	COG Wilms' Staging System (I-V) Risk: as per COG / SIOP protocol	18 (5.6%)	☒	☑
Hepatoblastoma	Localised / Metastatic (PRETEXT s a Tier 3 recommendation)	SIOPEL pre-surgical-based PRETEXT staging system (Pretext I-IV) Risk: as per SIOPEL criteria	5 (1.5%)	☑	☒ ☑* *Toronto tier 3
Osteosarcoma	Localised / Metastatic	Localised / Metastatic / Isolated pulmonary metastases Grade: High / Low	6 (1.9%)	☑	☑
Ewing's sarcoma	Localised / Metastatic	Localised / Metastatic / Isolated pulmonary metastases	7 (2.2%)	☑	☑
Rhabdo-myosarcoma	TNM stage 1-4	IRS-modified TNM staging for rhabdomyosarcoma (Stage 1-4) Risk: as per COG protocol	13 (4.0%)	☑	☑
Other soft-tissue sarcomas	TNM stage 1-4	No staging recorded (except for PNET & soft tissue Ewing tumours: localised / metastatic)	3 (0.9%)	☑	☒
Germ cell: testicular	TNM stage I-III	COG Germ Cell Tumour Clinical Staging System (I-IV)	2 (0.6%)	☑	☒
Germ cell: ovarian	FIGO Stage I – IV	COG Germ Cell Tumour Clinical Staging System (I-IV)	1 (0.3%)	☑	☒

CNS=Central Nervous System; COG=Children's Oncology Group; IPNHLSS=International Pediatric Non-Hodgkin Lymphoma Staging System; INRGSS=International Neuroblastoma Risk Group Staging System; INSS=International Neuroblastoma Staging System; IRSS=International Retinoblastoma Staging System; SIOPEL=International Childhood Liver Tumors Strategy Group; IRS=Intergroup Rhabdomyosarcoma Study Group; FIGO=International Federation of Gynaecological Oncologists.

RESULTS

Ease of locating staging information

CHOC oncologists produce comprehensive clinical summaries and most of the diagnostic information required for staging according to the Toronto Guidelines was contained within these summaries.

An exception was acute lymphoblastic leukaemia cases which were initially unable to be staged due to the lack of reporting of red blood cell counts on the clinical summaries. Retrieving this information required access to additional laboratory records.

Staging according to the Toronto Guidelines does require a relatively high degree of knowledge of anatomy and medical terminology.

Most cases took between 5-10 minutes to stage using the online staging application, except for neuroblastoma and Wilms' tumour which took up to 20-30 minutes per case.

NZCCR audit results

The accuracy of prognostic recording within the NZCCR was high. Missing prognostic data was able to be filled from the patient's electronic records for all but 13 data items.

CONCLUSION

Application of the Toronto Paediatric Cancer Stage Guidelines appears to be feasible in New Zealand; 77% of the cancers diagnosed in the period had a staging system specified in the guidelines and most of the required information was readily accessible in the patient's electronic records.

For the NZCCR, the adoption of the Toronto Guidelines will be in addition to, rather than in replacement of, the collection of clinical staging and other prognostic information that is collected for clinical care and New Zealand research purposes.

Complete paediatric staging information allows stratified comparison of outcomes between groups and over time and the identification of trends in late presentation. Through participation in the staging pilot study, this project has contributed to an international initiative to provide much-needed consistency and clarity in the collection of paediatric cancer staging data.

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