Identifying and harmonising data on **presence and location of metastasis** across three diverse European hospitals to **improve care quality**

Defining international approaches for the detection of emergent metastasis and the classification of location of metastasis from hospital EHR

Background: A multi-centre, European DigiONE study, investigating treatment and outcomes in metastatic non-small cell lung cancer (mNSCLC), required the identification of metastatic locations at diagnosis and at relapse to define clinical groups of importance for statistical analysis. We leveraged OMOP databases across three centres to identify locations of metastases and devise a common classification system within the OMOP framework.

Table 1. Summary of approaches to detect emergent metastasis.

	OUH	LTHT	MUMC+
Changes to underlying ICD-10 codes	Yes	No	No
Formal M=1 on staging at re-biopsy	No	No	No
Pathology reports after 1st presentation with location of metastasis coded	Presence but no location	Yes	Partially
Imaging notes or reports with mention of likely (new) metastasis	No	Yes	Yes
Clinical letters	No	Yes	Yes

Table 2. Final hospital OMOP coding of location of metastasis.

		OUH	LTHT	MUMC+
Local coding system for metastasis location		ICD-10	EHR-specific drop-down options	Structured output from NLP software, validated by a human
OMOP concept ID used to denote metastasis location	**Brain**	35225775	36768862	36768862
	Leptomeninges		4235348	35226096
	Lung	36770283	36770283	36770283
		254591		
	Pleura	35226258	35226258	35226258
		72266		
	Bone	36769301	36769301	36769301
	Bone Marrow	35226074	35226074	35226074
	Liver	36770544	36770544	36770544
	Adrenal glands	35225568	36769180	35225568
		193144		

Key:
Green: similarities in coding across centres
Red: differences in coding across centres

Methods & Results

1 Detection of emergent metastases

i. Oslo University Hospital (OUH):

- Only non-curated source data included in the local OMOP database.
- Metastasis events captured in three ways: (1) a hospital cancer episode in the EHR system with a metastasis diagnosis in the form of an ICD-10 code, (2) a recording of TNM staging with M1, or (3) a pathology result specifying malignant histology originating from a metastatic location.

ii. Leeds Teaching Hospitals NHS Trust (LTHT):

- Staging data and location of metastases for each site-specific cancer diagnosis and recurrence event available in in-house built EHR system.
- NSCLC staging data was manually curated from source data by clinical review of relevant imaging reports, pathology reports and clinical letters.

iii. Maastricht University Medical Centre+ (MUMC+):

- Implemented Natural Language Processing (NLP) for data structuring with manual validation by an oncology nurse.
- NLP performed on clinical notes using CTCue.
- NLP output included presence, date and location of metastasis.

2 Classification of metastasis location data

- Metastatic locations categorised by medical oncologists into six groups: brain, liver, adrenal glands, bone, lung, and "other" anatomical structures.
- Variations identified in coding systems across centres were:

(1) brain and leptomeningeal metastases grouped at OUH but reported separately at LTHT,

(2) bone and bone marrow metastases grouped at OUH but reported separately at LTHT, and

(3) adrenal metastases specified at OUH but classed as "other" at LTHT.

- Common coding was agreed to harmonise LTHT and OUH data.
- MUMC+ altered NLP rules to capture metastasis location with the highest granularity.

DigiCore

SCAN ME

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