Charting a New Course:
Transforming Oncology Documentation to Enhance mCODE-Compatible Structured Data Capture

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Digital Transformation of Health Records

- Digital Transformation of Health Records
  - Phase 1: Converting paper to electronic records
  - Phase 2: Converting electronic records to data

- The Curse of Plain Text (Reports!):
  - Provider documentation (notes)
  - Radiology reports
  - Pathology reports (plain text generated from structured data)
  - Scanned reports
  - Scanned records from other facilities (Interoperability issues)
Structured Data in Oncology: Major Challenges

Privacy and security
Data governance

Data volume and fragmentation
Longitudinal data and data silos
Data aggregation and integration (structured and un-structured)
Scalability
Impact of emerging technology

Clinical workflow integration
Data entry burden

Standardization and Interoperability
Data Quality and Validation

Patient generated data
Patient reported outcomes
Accessibility
Analytics and decision support
Research
Minimal Common Oncology Data Elements (mCODE)
Data Structure: Patient, Problem, and Encounter Level

Patient level

Problem 1
- Encounter 1
  - Note a
  - Note b

Problem 2
- Encounter 2
  - Note c
- Encounter 1
  - Note d
Data Structure: Patient, Problem, and Encounter Level

- Problem level data:
  - Date of diagnosis
  - Stage
  - Problem overview
  - mCODE disease status
Common Clinical Workflows

- Documentation centered clinician workflow
- Office visit notes are used for:
  - Patient care documentation and treatment planning
  - Communication with other members of the healthcare team and the patient
  - Billing and reimbursement
  - Legal and Ethical records
  - Audits and compliance
  - Quality improvement and research
Human vs Machine Readable Information

• Human-Readable Information:
  • Natural language text (plain text)
  • Easy to understand for human

• Machine-Readable Information:
  • Structured, follows rules, compact
  • Lack of ambiguity
  • Examples: ICD code, Metadata, QR code, Binary data
The Curse of Plain Text (Reports!)

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  - Provider documentation (notes)
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Structured Data; Multi-modality Approach

- **Close Visit Validation project:**
  - Accurate malignant diagnosis in the Problem List
  - Discrete cancer staging data

- **Oncology-specific note template with embedded forms (NoteWriter Project):**
  - **Patient specific data:**
    - Performance status
  - **Disease specific data**
    - Metastatic disease status and sites of metastasis
  - **Treatment response data**
    - Treatment setting and intent
    - Response to treatment
    - Change in treatment and the reason for change
Project 1:
Close Visit Validation
Close Visit Validation Project

At the time of closing the encounter, the system will check for:
- Provider Note
- LOS
- Malignant Diagnosis
- Staging

Challenges:

1. Not every encounter occurs for malignant diagnosis.
   Solution: Obtain the information from the provider:

2. Staging is not always possible.
   Solution: Bypass checklist

3. Multiple primary malignancies or duplicate diagnosis might be present in the problem list.
   * A gentle push for problem list clean up.*
   Solution:
   - Remove duplicate diagnosis
   - Mark as stage “Not needed” in the problem list
   - Use the bypass checklist

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CVV Project: Cancer Diagnosis & Staging
CVV Project: Cancer Staging

- Between January 1, 2019, and December 21, 2022
- 64971 encounters involving 7619 unique patients
CVV Project: Use of Bypass Checklist

- Bypass checklist was used in 5895 of the 64971 encounters (9%).
Project 2: Cancer Specific Note Template
Medical Documentation; Digital Transformation!

Paper The Great! (Image source)

Dictated, typed, or templated notes

Notes with integrated structured data
Challenges in Using Documentation-Centered Workflow

- Provider preferences:
  - Oncology History
  - Labs, Tumor markers, Imaging reports
  - Narrative vs tabular format

- Variable documentation methods:
  - Dictation over the phone
  - Typing the full note
  - Personal note templates
  - Partial dictation
    - Voice to text microphone
    - Dictation over the phone

- Disease specific nuances
Cancer Specific Note Template

**Templated note:**

- **Benefits:**
  - Standard formatting
  - Pull Forward compatible (improved efficiency)
  - Reduced cognitive burden for the reader
  - Reduce dependency on user’s memory
  - Reduced maintenance if used system wide

- **Challenges:**
  - Provider preference
  - Variable documentation methods
  - Disease-specific nuances
  - Voluntary use (not mandatory)
Cancer Specific NoteWriter Template (V 1.0)

- Using NoteWriter:
  - SmartForm
  - SmartBlock
  - SmartText
  - SmartLink

The image shows an example of an Oncology Progress Note using NoteWriter. The note includes fields for patient information, cancer staging, and phase of treatment, among others. The note is used to document the patient's condition and medical history.
NoteWriter Template

- SmartList for note header
- Four SmartBlocks
  - Treatment Status
  - Review of Systems
  - Physical Exam
  - Attestations (MDM coding)
- SmartLinks to specific parts of the chart
- Only two sections will need typing
**Cancer Specific NoteWriter Template (V 1.0)**

<table>
<thead>
<tr>
<th><strong>NoteWriter</strong></th>
<th><strong>Oncology Progress Note</strong></th>
</tr>
</thead>
</table>
| **Staging Link** | **Patient:** Shelly ZtestDFM, 71 year old  
**MRN:** 2959127  
**Date of Birth:** 8/10/1949 |
| **Treatment Status** | **Cancer Staging**  
Metastatic renal cell carcinoma, left  
Staging form: Kidney, AJCC 8th Edition  
- Clinical stage from 3/28/2021: Stage IV (cTX, cN1, pM1) - Signed by Hamid Emamekhoo, MD on 3/28/2021 |
| **Primary Reason for Visit** | **Phase of Treatment:** Palliative  
**Intent of Treatment:** Slow the progression of disease  
**Current Disease Status:** Responding  
**Distant Metastatic Disease Ever:** Yes  
**Site:** Bone, Liver and Other  
**ECOG Performance Status:** 1 |
| **Phase of Treatment** | **Heme Onc History**  
Metastatic renal cell carcinoma, left  
3/28/2021  
**Initial Diagnosis**  
Metastatic renal cell carcinoma, left  
3/28/2021  
**Cancer Staging**  
Staging form: Kidney, AJCC 8th Edition  
- Clinical stage from 3/28/2021: Stage IV (cTX, cN1, pM1) - Signed by Hamid Emamekhoo, MD on 3/28/2021  
Histopathologic type: Clear cell adenocarcinoma, NOS  
Stage prefix: Initial diagnosis  
Laterality: Left  
**Sites of metastasis:** Liver, Bone, Distant lymph nodes, NOS |
| **Intent of Treatment** | **Histologic sub-type:** Clear cell  
**Interval history:** Ms. Shelly ZtestDFM was seen at the University of Wisconsin Hematology-Oncology Clinics for follow-up. *** |
| **Current Disease Status** | **Other site of metastases:** RP Lymph Nodes  
**ECOG Performance Status:** 0 1 2 3 |
| **Distant Metastatic Disease Ever** | **Karnofsky Performance Status:** 100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0% |
| **Yes** | **Location of metastases:** Bone, Brain, Liver, Lung, Other |
| **No** | **N/A (hematologic malignancy)** |
| **Other site of metastases** | **RP Lymph Nodes** |

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NoteWriter Treatment Status: Challenges!

- What if a patient has more than one primary malignancy?
- Can we use available mCODE Structured Data Elements (SDE)?
- Can we add disease specific data elements?
- Can we expand the use to non-solid tumor oncology encounters?
- Can we do something about date of diagnosis?
NoteWriter Template (V 2.0)

Major Improvements in version 2.0:
1. Primary reason for the visit → driving rules to change the rest of form
2. Information is associate with a primary cancer diagnosis
3. Option to add a second primary cancer diagnosis
4. Current response/disease status and the source of information
5. Change in treatment and the reason for this change
6. Using mCODE SDEs

The whole form can be reconfigured based on the “primary reason for visit”. Expanding to malignant hematology.

Disease specific data elements can be added.
NoteWriter Template (V 2.0)

- Disease specific data elements can be added.
Longitudinal Data Display in Synopsis
NoteWriter Template Implementation

Percentage of encounters/month where NoteWriter template was used for documentation in solid tumor oncology clinics.

NoteWriter use among all solid tumor oncology providers at UWH (34 providers)

NoteWriter use among providers that use NoteWriter regularly (21 providers)
Project Impact & the Next Steps

- Clinical Decision Support (CDS) tools
  - “Few problems are more challenging than development of effective techniques for capturing patient data accurately, completely, and effectively.” [Biomedical Informatics, Shortliffe]
  - Accurate malignant diagnosis, stage, disease specific data
  - Delivered at the right time (e.g. Disease progression, development of bone met, …)

- Clinical Trial recommender
  - Main challenge is to recommend an appropriate trial at the time of PD when treatment change is considered

- Extract data for registries and reports
  - CIBMTR, Survivorship programs, etc.

- Dashboards and reports for operational purposes
  - How many patients with a specific disease are being treated annually
  - More accurate estimation of current drug utilization to ensure an adequate supply is secured.
Insights from Implementation & Future Implications

- Provider engagement and buy-in
- Ease of use and clinical workflow integration
- Integration into EHR
- Interoperability
- Agile design which can adapt to upcoming novel technologies such as generative AI