NQF Measure Incubator™
Innovation Challenge

January 11, 2017
NQF Measure Incubator™ Innovation Challenge

- NQF is hosting a series of webinars to explore innovative solutions to improve measure development and address areas that have too few or no meaningful measures, as part of initial steps to the launch of the NQF Measure Incubator Learning Collaborative.

- The featured speakers on today’s webinar are winning recipients of the recently announced the NQF Innovation Challenge.

- Visit our website to see a recording of our past Innovation Challenge presentations [http://www.qualityforum.org/Measure_Incubator_Webinar_Series.aspx](http://www.qualityforum.org/Measure_Incubator_Webinar_Series.aspx)

Today’s Speakers

**Charlotta Lindvall, MD, Dana-Farber Cancer Institute**
Proposes using natural language processing to develop quality measures in palliative surgery using electronic health record (EHR) data

**Tracy Spinks, MD Anderson Cancer Center**
Outlines a new, streamlined, standardized approach to implementing PRO measure sets in EHRs

*Moderated by Ed Septimus, MD, medical director, Infection Prevention and Epidemiology, Hospital Corporation of America*
Using natural language processing to develop quality measures in palliative surgery through the use of electronic health record data

Charlotta Lindvall, MD, PhD

Our Team

<table>
<thead>
<tr>
<th>DFCI – Palliative Care</th>
<th>BWH - Surgery</th>
<th>MIT – Computer Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charlotta Lindvall, MD, PhD</td>
<td>Elizabeth Lilley, MD, MPH</td>
<td>Alex Forsyth</td>
</tr>
<tr>
<td>James Tulsky, MD</td>
<td>Zara Cooper, MD</td>
<td>Regina Barzilay, PhD</td>
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</table>

- We aim to develop scalable quality measures that can be implemented in serious illness including palliative surgery
Why is it important to measure quality in palliative surgery?

- Invasive procedures are increasingly relevant near the end of life
- Up to 20% of surgical procedures for patients with cancer have a palliative indication
- Current metrics do not reflect high-quality care processes or treatment outcomes

Quality measures are used to achieve better outcomes

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Surgery</th>
<th>Indication</th>
<th>Desired outcome</th>
<th>Current outcome measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain with swallowing</td>
<td>G-tube</td>
<td>Feeding</td>
<td>Nutritional support during treatment</td>
<td>30-day mortality</td>
</tr>
<tr>
<td>Refractory vomiting</td>
<td>G-tube</td>
<td>Venting</td>
<td>Symptom control at the end of life</td>
<td>30-day mortality</td>
</tr>
</tbody>
</table>

- Completion of advance care planning may be a more relevant quality measure in patients receiving venting G-tube
Novel approaches are needed to efficiently and effectively assess patient-centered outcomes

- Clinical notes contain troves of relevant data
  - quality of communication
  - symptom management
  - illness severity

- Manual chart review is not scalable

- Natural language processing (NLP) holds the promise of extracting meaningful non-categorical data from Electronic Health Records

NLP addresses three major barriers to implementing quality measures in serious illness

1. Identify specific patient populations within the EHR
   - cancer patients receiving palliative surgery

2. Identify processes of care embedded in the medical note
   - documentation of advance care planning

3. Identify relevant treatment outcomes embedded in the medical note
   - documentation of targeted symptoms
We used NLP to assess outcomes associated with venting G-tube

Study objective

1. Identify patients who had G-tube placed for palliative indication (venting)
2. Characterize the quality of end-of-life care processes (advance care planning)
3. Characterize outcomes of treatment (symptom management)

Sample

- 305 cancer patients who had a G-tube procedure were identified using ICD9-CM billing codes
- 75,626 electronic text documents

Methods

- Manual coding was performed by two clinicians
- NLP algorithms were written in Python

NLP code label notes containing the key word “venting”
Rapid chart review of NLP output

Our NLP program allows for review at the note or patient level

Diagnosis: yo F metastatic adenocA s/p ex-lap, omentectomy, w venting g-tube placed presents after g-tube fell out at nursing cards following, and a prolonged ileus. She has a venting g-tube with significant pain at g-tube site, she is on RN. Chart reviewed, pt initiated TPN s/p placement of venting g-tube on and transferred from amenable to bypass. Since patient has been initiated on TPN, venting g placed this week. I discussed these findings today with carcinomatosis (appendicular carcinoma, s/p multiple resections, HIPEC). Gastrostomy requested for venting.

- Our NLP program allows for review at the note or patient level

NLP correctly identified patients who received venting G-tube

<table>
<thead>
<tr>
<th></th>
<th>Manual coding n=305</th>
<th>NLP n=305</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Palliative indication</strong></td>
<td>75 (24.6%)</td>
<td>72 (23.6%)</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>28 hours</td>
<td>2 hours</td>
</tr>
<tr>
<td><strong>Sensitivity</strong></td>
<td>95.8%</td>
<td>97.4%</td>
</tr>
<tr>
<td><strong>Specificity</strong></td>
<td>97.4%</td>
<td>92.0%</td>
</tr>
<tr>
<td><strong>PPV</strong></td>
<td>92.0%</td>
<td>98.7%</td>
</tr>
<tr>
<td><strong>NPV</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Key words that are used in manual chart review are not necessarily “NLP ready”
We have validated key words that identify documentation of advance care planning

1. **Goals of care.** Patient clearly expressing preference for comfort-oriented **goals of care** at this time, given her clinical situation and prolonged hospitalization. Patient wants to go home and wants assistance in communicating this to her husband. We will assist with

We would like to ensure that the patient’s code status is consistent with the **goals of care.** Per the resident, Dr., the patient has elected full code status when asked in the past. Given her preference for comfort and acknowledgment of the seriousness of her illness, I am concerned that full code status in the event of cardiopulmonary arrest would not be helpful toward achieving her goal to return home. We will address this issue tomorrow during the family meeting.

- Quality of documentation can be scored using a Likert scale

NLP results can be used for internal quality improvement and external oversight

<table>
<thead>
<tr>
<th></th>
<th>Before procedure</th>
<th>After procedure</th>
<th>Never documented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any EOLC planning</td>
<td>61.2%</td>
<td>8.6%</td>
<td>30.2%</td>
</tr>
<tr>
<td>Palliative care</td>
<td>33.3%</td>
<td>8.6%</td>
<td>58.1%</td>
</tr>
<tr>
<td>Goals of care</td>
<td>31.8%</td>
<td>13.3%</td>
<td>54.9%</td>
</tr>
<tr>
<td>Code status</td>
<td>20.9%</td>
<td>9.3%</td>
<td>69.8%</td>
</tr>
<tr>
<td>Hospice</td>
<td>13.9%</td>
<td>11.2%</td>
<td>74.9%</td>
</tr>
</tbody>
</table>
We are validating key words that identify symptoms

- Machine learning may facilitate this process

In summary

- NLP provides novel opportunities to develop patient centered quality measures in palliative surgery and beyond
- We are looking for collaborations and partnership to scale these efforts
- Thank you for the opportunity to present our work

We look forward to speaking to you!
Charlotta_Lindwall@DFCI.harvard.edu
NQF Measure Incubator Challenge™

Implementing Patient-Reported Outcome Measures Sets in EHRs

January 11, 2017

Tracy Spinks, Program Director, Cancer Care Delivery
The University of Texas MD Anderson Cancer Center

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• MD Anderson Cancer Center: Clinical Operations, Institute for Cancer Care Innovation, Division of Surgery, Division of Radiation Oncology, Division of Cancer Medicine, Information Services, Thoracic Center
• International Consortium for Health Outcomes Measurement
• Institute for Strategy and Competitiveness
BACKGROUND

Rationale for PROs as Standard of Care

Clinical Care Tools
- Inform treatment decisions
- Enhance patient care
  - Monitor symptoms
  - Overly aggressive care
- Frame patient-provider interactions

Longitudinal Benefits
- Longitudinal functional status/quality of life
- Outcomes measurement/benchmarking
- Structured data for research
Our Approach

• Adopt condition-specific outcome sets for cancer, including PROs
• Disease-specific PROs as patient care tools in new Epic EHR
• Prepare for next evolution of patient care
  – Functional status/quality of life become longitudinal “vital signs” for all patients

Measurement Challenge

• Large gaps in cancer-specific outcomes, esp. PRO measures
• Unknown impact on clinical workflow
• Automated PROs an emerging application of EHR technology
• Few examples of successful EHR-based PROs w/ automation, structured reporting
TEST CASE: LUNG CANCER

Project Plan

- Convene multi-stakeholder team
- Configure Epic to administer PROs
- Develop clinic workflow, robust reporting

Epic Go-Live
March 2016
Step 1: Convene Multi-Stakeholder Team

- Clinical, operational, EHR representatives to guide lung cancer outcomes
- International Consortium for Health Outcomes Measurement (ICHOM)'s lung cancer outcomes as a starting point
  - Patients represented throughout ICHOM's process
- ICHOM-recommended PRO tool: EORTC-QLQ-C30/ EORTC QLQ-LC13

Step 2: Configure Epic to Administer PROs

- Utilize Epic’s built-in PRO functionality
  - Patients receive PROs via patient portal
  - Complete at home or in clinic
  - Responses viewable in EHR
  - Stored as structured data
  - Reporting via “Universe”
Step 3: Develop Clinic Workflow, Robust Reporting

- Reconvene multi-stakeholder team
- Leverage ICHOM's experience
- Engage patients
- Key tasks
  - Integration in clinical workflow
  - Meaningful internal reporting
  - Share implementation experience
  - Enterprise reporting with complementary data
  - Patient-focused reporting

Implementation Questions

- How do we...
  - Optimize clinical workflow?
  - Minimize burden to patients, staff?
  - Enhance patient/provider interactions?
  - Represent broad patient perspectives?
  - Support longitudinal outcomes measurement?
  - Use PROs for valid comparisons?
  - Aggregate PROs, other data for value measurement, research, patient decision-making?
Broader, Long-Term Questions

- Replicable, scalable model for PROs as standard of care
- Minimized “survey fatigue”
- Overlap w/ existing tools
- Longitudinal view of PROs
- Enhanced EHR, stand-alone technology
- Validated performance measures
- PROs in quality/payment programs

Thank You

Contact Information

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Questions

Thank you