2012 MSDA National Medicaid and CHIP Oral Health Symposium
June 24th – 26th, 2012

Session 7
Can Diagnostic Codes Work in Dentistry?

Elsbeth Kalenderian, DDS, MPH
Rachael Ramoni, DMD, DSc
Harvard University

Speaking the Language of Quality
Using a Dental Diagnostic Terminology

Elsbeth Kalenderian, DDS, MPH
Rachel Ramoni, DMD, ScD
We have all experienced miscommunication.

There are also communication breakdowns in clinical care.

You’ve got “patellofemoral pain syndrome.”

How’s that “chondralacia patellae” treating you?
Patient Centered Care Requires Communication


Designing Quality in High Definition

Need

“The nomenclature is of as much importance as weights and measures in the physical sciences, and should be settled without delay.”

William Farr (1839)
History of Documenting Diagnoses

François Boissier de la Croix de Sauvages
1706-1777

William Farr
1807-1883

Adolphe-Louis Jacques Bertillon
1851-1922

When definitions are not agreed-upon, words lose their meaning.

Quality in high definition requires high quality definitions.
The Triple Aim

Health of a Population

- Understanding how patient is doing with respect to population with same diagnosis
- Reporting data consistently
- Determining cost-effectiveness of treatments

Experience of Care

- Enhanced communication
- Tailoring care to diagnoses
- Administrative efficiencies

Per Capita Cost

How do we get there?
Dental Diagnostic Terms

2009

- Diagnostic codes not used by most dentists
- Need for Diagnosis to dictate Treatment
- 45 dental schools were already using axiUm
- Start of implementation of axiUm at HSDM
- Request to complete diagnostic code field
Guiding Principles

1. Incorporate and integrate oral health concepts in existing controlled terminologies
2. Conform to best practices of clinical terminology development
3. Facilitate retrieval by hierarchically structuring concepts into categories and subcategories
4. Evaluate and refine on a regular basis
5. Link diagnostic and procedure codes

EZcodes: a controlled dental diagnostic terminology

Term: Mulberry Molar
Definition: Shape alteration of tooth
Identifier: EZ840069
Synonym: Moon’s molar teeth

Term: Xerostomia
Definition: Dry mouth
Identifier: EZ494038
Synonym: Hyposalivation, Asialorrhea, Asalia
Distribution of EZcodes Sources

- Overlap Z code & Specific ICD 9/10 (139, 12%)
- Oral Health Related ICD 9/10 (479, 40%)
- Z codes (611, 51%)
- ABE Diagnoses (30, 3%)
- AAP Diagnoses (75, 6%)

R01: A Cognitive Approach to Refine and Enhance Use Of A Dental Diagnostic Terminology

**Harvard**
- Elsbeth Kalenderian DDS, MPH
- Rachel Ramoni DMD, ScD
- Bunmi Tokede DDS, MS

**UT-Houston**
- Muhammad Walji PhD
- Krishna Kookal, MS, PhD
- Vimla Patel, PhD DSc
- Duong Tran, DDS
- Vickie Nguyen, MS

**UCSF**
- Joel White DDS MS
- Ram Varderhobli BDS

**ACTA**
- Meta E. Schoonheim-Klein DDS PhD
- Maxim Lagerweij, DDS, PhD

**Creighton**
- Nici Kimmes DDS

**Tufts**
- Paul Stark ScD

**Exan Academic**
- Ted DeVries
- Ryan Brandon
**R01 Grant: Central Hypothesis**

*Enhancing* the dental diagnostic **terminology**, the EHR **workflow**, and the EHR **interface** in response to cognitive evaluations will:

- Increase dentist **satisfaction** with the diagnostic term entry process
- Increase **utilization** of diagnostic terms
- Reduce **error** rates in the entry of diagnostic terms

---

**What is Usability?**

Usability refers to how:

- **useful**,
- **usable**,
- **satisfying**

a system is for the intended users to accomplish goals in the work domain by performing certain sequences of tasks.

---

Year 1 - Data Collection

- Validation of the Terminology
- Cognitive assessments to:
  - Determine how dentists arrive at a diagnosis
  - Assess diagnostic workflow
  - Evaluate the diagnostic module interface
- Annual and periodic weekly satisfaction surveys
Measuring Usability

Methods
• Observations
• Semi-Structured Interviews
• User Testing

Analysis
• Task analysis (of user testing)
• Data analysis (of user testing)
• Qualitative analysis

Results
Accuracy of DX Term Entry

- Assess validity of diagnostic term and procedure code pairs at three dental schools
- Over 12 month period
  - 12% utilization rate (29,965 diagnostic terms and 249,411 procedure codes)
  - 60.5% of diagnostic terms entered were valid
  - More than 1000 of the available 1321 diagnostic terms were not used

Data Analysis – Task 1

• Optimal task time (Expert time) – 54.423 secs
• Average task time at School 1 (11 users) – 261 secs
• Average task time at School 2 (14 users) – 320 secs
• Task Success

System Usability Scale Results

Muhammad Walji, PhD
**Qualitative Analysis Field Study**

**Observations, Interviews & Recordings:**
- Errors committed by users
- Usability issues
- User needs

**Categorization of Findings:**
- Diagnostic terminology
- User interface
- External issues
- Issues related to other modules

---

**User Interface Issues**

<table>
<thead>
<tr>
<th>Usability Problem</th>
<th>Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illogical ordering of Terms</td>
<td>Terms are ordered based on numeric code rather than alphabetically</td>
</tr>
<tr>
<td>Time consuming to enter a diagnosis</td>
<td>User must navigate several screens and scroll through a long list to find and select a diagnosis</td>
</tr>
<tr>
<td>Inconsistent naming and placement of user interface widgets</td>
<td>To add a new diagnosis, a user must click a button labeled “Update”</td>
</tr>
<tr>
<td>Search results do not match users expectations</td>
<td>A search for “pericoronitis” retrieves 3 concepts with the same name but a different numerical code</td>
</tr>
</tbody>
</table>
## Terminology Issues

<table>
<thead>
<tr>
<th>Usability Problem</th>
<th>Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some concepts appear missing / not included</td>
<td>Examples of missing concepts according to users: missing tooth, arrested caries, and attritional teeth</td>
</tr>
<tr>
<td>Abbreviations not recognized by users</td>
<td>Example: F/U, NOS, VDO</td>
</tr>
<tr>
<td>Visibility of the numeric code for a diagnostic term</td>
<td>Although the numeric code is a meaningless identifier, users had an expectation that the identifier should provide some meaning</td>
</tr>
</tbody>
</table>

## Work Domain Issues

<table>
<thead>
<tr>
<th>Usability Problem</th>
<th>Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free text option can be used circumvent structured data entry</td>
<td>Instead of selecting a structured term, some users free text the name of the diagnosis</td>
</tr>
<tr>
<td>Knowledge level of diagnostic term concepts and how to enter in EHR limited</td>
<td>Users appear to have had little concerted education and training either by institution or vendor</td>
</tr>
<tr>
<td>Only one diagnosis can be entered for each treatment</td>
<td>Endodontic discipline require that treatments are justified using both a pulpal and periapical diagnosis</td>
</tr>
<tr>
<td>No decision support to help suggest appropriate diagnoses, or alert if inappropriate ones are selected</td>
<td></td>
</tr>
</tbody>
</table>
Annual Survey Results

Design Recommendations

• Phased approach to address the 24 Usability Themes Identified
  – Immediate
  – Within 6 months
  – Within 1 year
  – Within 2 years

• Collaboration with Vendor

• Iterative development of prototypes
Implementation

ACTA
Creighton
HSDM
Indiana University
OHSU
Temple
UCSF
U. of Illinois, Chicago
University of Michigan
U. of Minnesota

U. of Oklahoma
U. of Tennessee
UT Houston
University of Kentucky
Willamette Dental Gr.
CHMC, Boston
Midwestern U.

1,663,744 Patient visits
3,286 Providers

EZcodes Updates - Annually

- EZcodes 2012
  ✓ Concept IDs removed
  ✓ Logical ordering of terms
  ✓ 13 → 15 Categories
  ✓ 80 → 90 Sub-categories
  ✓ 1219 → 1358 Terms
Benefits of a Dx terminology

A standardized dental diagnostic terminology influences:
• The quality of care
• Patient communication
• Tracking of clinical outcomes
• Reporting of community oral health status
• Identification and tracking of high need groups
• Identification and tracking of best practices


Next Steps

- EZCodes
  • Implementation of recommendations
  • 2nd round cognitive evaluations
  • 2013 Revision

- Dissemination
  • Ongoing implementation throughout COHRI
  • Implementation discussions at large practices
  • Accepting pilot sites for Medicaid partnership