Harmonization of the EHR

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Data harmonization in a nutshell

- Define structure of the target data model

- *Decide how to map source to target*
Most harmonization efforts to date

• Focus on domains common across EHRs
  – Easy:
    • Diagnoses
    • Procedures
    • Demographics
  – Hard:
    • Encounter details
    • Laboratory results
    • Medication orders
What’s so hard about encounter details?

• PCORnet CDM – treat inpatient and ED visits as separate encounters
  – CCHMC – ED visits that lead to inpatient stay are part of the same encounter
  – How do we separate - based on timestamp of admission?
    • When separating encounter data, which timestamp is used?
    • What about ED-placed orders that result after admission?

• PEDSnet patient definition – all patients with at least one face-to-face encounter with a clinician (inpatient or outpatient)
  – CCHMC – over 100 different encounter types
  – Who decides what constitutes face-to-face?
What about everything else?

- EHR contains much more than diagnoses, labs, meds and procedures

- Stats from CCHMC*
  - Encounters: ~27M
  - Medication orders: ~13M
  - Lab / procedure orders: ~49M
  - Notes: ~435M
  - Flowsheets: ~860M (80K measures)
    - Blood Glucose History
    - Criteria for Mitochondrial Disease
    - Fall Risk Assessment
    - PedsQL
    - Treadmill Testing

- How do we go after these elements?

*Includes canceled visits / orders
Harmonization of less common elements

Challenge #1: Finding the data

- Many different ways to document same piece of information

- Workflow used to collect data often dictates where those elements are stored in reporting database

- Most researchers lack understanding of these workflows

- Quality of results then depend on how question is asked, skill of analyst
  - All patients with a liver transplant vs. all patients with liver transplant recorded in their surgical history vs. all patients with a procedure for liver transplant
To make matters worse…

Challenge #2: EHRs are constantly evolving

- New functionality is released & workflows change over time
  - Clinician-entered
  - Patient entry via welcome kiosk
  - Patient entry via web-based questionnaire

- These workflows are typically additive, not substitutive
  - Need to remember this history
  - Will otherwise result in gaps in population

- Every EHR is different, requiring site-specific modifications to an extraction process
  - However: depending on data collection strategy, this effort can be minimized
Has a HEALTH RELATED QUALITY OF LIFE (QOL) ASSESSMENT been documented?

- Check Locations:
  - Flowsheet RHE PEDS QL #129, Measure RHE PARENT #3757
  - Flowsheet RHE PEDS QL #129, Measure RHE PATIENT #1799
  - Flowsheet RHE PEDS QL #129, Measure GEN PATIENT #3758
  - Flowsheet RHE PEDS QL #129, Measure GEN PARENT #3759
  - Questionnaire RHE PEDSQL 13-18 TEEN REPORT #20702, Question: RHE PEDSQL 13-18 CHILD TOTAL SCORE #400411
  - Questionnaire RHE PEDSQL 13-18 PARENT REPORT FOR TEENS #20703, Question: RHE PEDSQL 13-18 PARENT TOTAL SCORE #20544
  - Questionnaire RHE PEDSQL 2-4 PARENT REPORT FOR TODDLERS #20699, Question: RHE PEDSQL 2-4 PARENT TOTAL SCORE #400415
  - Questionnaire RHE PEDSQL 5-7 PARENT REPORT FOR YOUNG CHILDREN #20700, Question: RHE PEDSQL 5-7 PARENT TOTAL SCORE #400421
  - Questionnaire RHE PEDSQL 5-7 YOUNG CHILD REPORT #20701, Question: RHE PEDSQL 5-7 CHILD TOTAL SCORE #400427
  - Questionnaire RHE PEDSQL 8-12 PARENT REPORT FOR CHILDREN #20706, Question: RHE PEDSQL 8-12 PARENT TOTAL SCORE #400439
  - Questionnaire RHE PEDSQL 8-12 CHILD REPORT #20705, Question: RHE PEDSQL 8-12 CHILD TOTAL SCORE #400433
  - Questionnaire PEDSQL GENERIC 1-12MOS PARENT REPORT FOR INFANTS #20758, Question: PEDSQL 1-12MOS TOTAL SCORE #400280
  - Questionnaire PEDSQL GENERIC 13-18 TEEN REPORT #20745, Question: PEDSQL 13-18C TOTAL SCORE #400163
  - Questionnaire PEDSQL GENERIC 13-18 PARENT REPORT FOR TEENS #20686, Question: PEDSQL 13-18P TOTAL SCORE #400158
  - Questionnaire PEDSQL GENERIC 13-24MOS PARENT REPORT FOR INFANTS #20759, Question: PEDSQL 13-24MOS TOTAL SCORE #100857
  - Questionnaire PEDSQL GENERIC 18-25 YOUNG ADULT REPORT #20684, Question: PEDSQL 18-25C TOTAL SCORE #400183
  - Questionnaire PEDSQL GENERIC 2-4 PARENT REPORT FOR TODDLERS #20688, Question: PEDSQL 2-4P TOTAL SCORE #400188
  - Questionnaire PEDSQL GENERIC 5-7 PARENT REPORT FOR YOUNG CHILDREN #20689, Question: PEDSQL 5-7P TOTAL SCORE #400153
  - Questionnaire PEDSQL GENERIC 5-7 YOUNG CHILD REPORT #20683, Question: PEDSQL 5-7C TOTAL SCORE #400178
  - Questionnaire PEDSQL GENERIC 8-12 PARENT REPORT FOR CHILDREN #20687, Question: PEDSQL 8-12P TOTAL SCORE #400173
  - Questionnaire PEDSQL GENERIC 8-12 CHILD REPORT #20685, Question: PEDSQL 8-12C TOTAL SCORE #400168
Are there any solutions? (1)

- Quality checks / Data characterization
  - Should help identify if there is a problem
  - But not necessarily where to look for the solution

- Engagement with operational reporting groups / data stewards
  - Often serve as source of truth for a given area
  - Deal with much higher request volume
  - CCHMC data extracts (Feb. – Dec. 2014)
    - Research ~ 200
    - Non-research ~ 1600
Are there any solutions? (2)

- Engage clinicians to change documentation practices
  - Elements needed for research often needed for clinical care, quality improvement
  - It is possible to reach consensus!

- Work with vendors to implement data collection forms
  - Pro: ensure consistent(-ish) workflows across centers
  - Con: Still requires work with each vendor
EHR-based data collection

- Capture registry data directly in EHR during visit
- Responses stored as discrete elements
- Pull responses into progress note or referral letter
- Extract data from EHR as flat files
Network EDT Metrics

Network EHR Vendors

- Epic: 59%
- Cerner: 17%
- Allscripts: 4%
- eClinicalWorks: 7%
- Centricity: 13%
- None: 4%
- Other: 0%

Epic Centers

- Using SmartForm: 88%
- Data Into Progress Note: 58%
- Electronic Data Transfer: 55%
- Non-use: 15%
- Non-use: 100%
Number Patients sending Visits Electronically
DQ Measure: % Visits with all critical data recorded (Network Number)
DQ Measure: % Visits with all critical data recorded (Small Multiples for 6 EDT Centers)
DQ Measure: % Visits entered within 30 days of visit date (Network Number)
DQ Measure: % Visits entered within 30 days (Small Multiples for 6 EDT Centers)