Benefits and Challenges of Linking Electronic Medical Record and Claims Data for Perinatal Research

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Introduction

Mothers of medically fragile infants (MMFI) must recover from birth while attending to an infant in the neonatal intensive care unit (NICU). There is limited information on the postpartum health needs and access to services for MMFI.

Aim

To better understand postpartum health services received in the 90 days following delivery for mothers of medically fragile infants. By linking medical record data with insurance claims, we had a comprehensive view of health services and important clinical details.

Methods

- We conducted a retrospective cohort study of mothers of liveborn infants who delivered at North Carolina Women's Hospital between July 1, 2014 and June 30, 2016 (n=6,849).
- We linked data from the UNC Health System Epic Electronic Medical Record (EMR) to insurance claims from a commercial insurer to measure prevalent conditions, health care utilization, and receipt of recommended services among MMFI compared with mothers of well babies.
- A list of mothers' names and payor on the delivery account, birthdate, delivery date, procedure code for delivery, delivery location, subscriber ID, and billed provider was provided to an honest broker for matching.

Methods

- An honest broker identified a subset of members with a qualifying claim, defined as a childbirth-related procedure code.
- Context-based blocking and fuzzy matching on combinations of first and last name were applied.

Unique Mothers in EMR data with Commercial Insurer N=1,687

Unique members of Commercial Insurer who had at least 1 Qualifying Claim N=90,490

Match Mothers in EMR to Commercial Insurer Members N=1,642

Results

- A 97% match rate (n=1,642) was achieved
  - Exact match = 94%
  - Fuzzy match on combinations of first and last name = 3%
- Contributors to successful linkage
  - Having a finite time-period
  - Adding anesthesia procedure codes
- Challenges with linkage
  - Changes in the mother's medical record number (MRN) when querying EMR data on the same woman longitudinally
  - Data entry errors on the delivery record
  - Care for baby showing up on mother's claim

Lessons Learned

Dynamic nature of EMR data

- During the two-year study period, medical record numbers of study participants changed as they were merged and updated, resulting in missing data and changes in sample size.
- When errors such as wrong date of delivery were corrected in the analytic data set, date of delivery could not be used to merge additional EMR queries.

Multiple nested levels of granularity

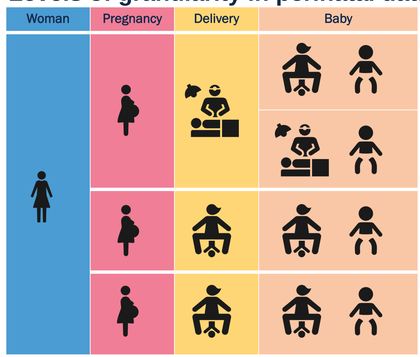
When querying the EMR for perinatal data, there are multiple levels of granularity.

- **Women** receiving care in a health system
  - **-> Pregnancies** in the lifetime of each woman
    - **-> Babies** born from the same pregnancy

Twins, triplets, etc. add complexity to linking records.

- Time of delivery will differ
- Mode of delivery may differ
- Birth outcome (liveborn, still birth, preterm) and date of delivery may differ for multiples

Levels of granularity in perinatal data



One woman may have multiple pregnancies, and an observation that is postpartum for one pregnancy is preconception for the next pregnancy.

EMR queries and claims data need to be linked to the pregnancy of interest.

A single pregnancy may result in more than one birth, with more than one mode of delivery. EMR queries at the baby level may result in duplicate documentation at the pregnancy level.

Lessons Learned

- Set up internal tracking of MRN changes so that data queried on the same participant could be accessed regardless of which MRN it was tied to.
- Hold regular meetings to walk through where data is in the clinic workflow with the EMR data analyst to more accurately specify requested data fields.
- Ensure women have a pregnancy and delivery episode (e.g. Emergency Department birth), otherwise EMR data could not be obtained.
- Budget extra time for receiving data that is the first time it is requested for research, which may require more time for accessing and cleaning.
- Conduct chart review to validate EMR findings as data quality varied (e.g. blood units transfused, time in NICU, etc.)
- Establish a unique, stable study ID for the pregnancy for the analysis of multiple pregnancies contributed by the same woman.

Conclusions

- Linking claims to EMR data can elucidate women's health utilization in the postpartum period by allowing ascertainment of encounters outside of the hospital.
- Our findings contributed to improved data quality initiatives in the hospital's EMR system and laid the groundwork for future studies using EMR data.

This study was supported by grant R40MC29455 Maternal and Child Health Research Program, Maternal and Child Health Bureau, (Title V, Social Security Act), Health Resources and Services Administration, Department of Health and Human Services. We acknowledge the editorial assistance of the NC Translational and Clinical Sciences (NC TraCS) Institute, which is supported by the National Center for Advancing Translational Sciences (NCATS), National Institutes of Health, through Grant Award Number UL1TR002489

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