Using Electronic Databases vs Manual Health Record Audit: 
the false allure of electronic health record research

DR DAVID W JOHNSON
NOVEMBER 2022
Outline

1. Manual health record audit vs. electronic health record extraction
2. Calgary health records: current and future
3. Why extracting data from electronic health records is not easy
4. An example
5. How to do health record audit?
6. Need my permission to do project using health administrative data sets
“Manual” health record audit

1. Classic resident research project

2. Good projects have:
   a. Clear patient population with inclusion & exclusion criteria, that target limited numbers
   b. Outcomes which use data that can be reliably extracted

3. How its done
   a. Health record staff pull potential patient charts using ICD classification codes
   b. Study investigators develop data abstract form
      i. Does patient meet inclusion/exclusion criteria?
      ii. Study data elements are abstracted, with key focus on study outcomes
   c. Chart auditor does pilot test to ensure form is well-developed
The allure of electronic health record research

1. A good type of resident project?

2. The myths:
   a. Can use standard methods for health record audit
   b. Data is more objective and much easier to find
   c. Health records are easily accessed & linked
   d. The computer does all the work
## Past & current status of paper & digital health records

### PAST STATE [UNTIL MAY 2022]

Mixed paper & electronic records

1. In ED and Inpatient Units, admission & daily charting are on paper
2. Physician orders & completion of these orders is electronically charted
3. PICU & NICU admission and daily charting are electronic
4. Laboratory tests and diagnostic imaging is captured in electronic data sets
5. There were number of different electronic data systems (e.g. Sunrise Clinical Manager, eCritical, etc)

### CURRENT STATE [STARTED JUNE 2022]

Virtually all health records are captured within Epic

1. Patient tracking systems
2. Physician orders & medication tracking
3. Physician admission and daily charting
4. Nursing flowsheets
5. Lab and DI reports
6. Allied health reports
7. Speciality consultations
8. Surgical reports
Why extracting data from electronic health records is not easy?
Types of electronic health data sets?

- **Health administrative data sets**
  - Inpatient admissions (DAD [Discharge Abstract Database])
    - Dates/times, Unique identifiers, ICD10 codes for diagnoses & major procedures
  - ED visits and Day Surgery (NACRS [National Ambulatory Care Reporting System])
    - Dates/times, Facility, patient identifiers, ICD10 codes for diagnoses & major procedures
  - Physician claims
    - Dates, physician type, patient identifiers, shortened ICD9 code for diagnoses

- **Miscellaneous data sets**
  - Laboratory results – time and names of labs, results
  - Diagnostic tests – time and names of DI studies
  - PIN – pharmacy dispensing of medications, date, drug type

- **Electronic Health Records -- Epic [Connect Care], SCM, eCritical**
The problem with using EHRs for resident research projects

Clinicians → EMR

Free text vs Numbers/categories

EMR → Enterprise Data Warehouse

Data Analysts
Health Care Analysts
Is Hyperchloremia associate with Acute Kidney Injury in Critically Sick Children

Study Setting
This study will take place in the Pediatric Intensive Care Unit (PICU) at Alberta Children’s Hospital (ACH) in Calgary, Alberta, and the PICU and Pediatric Cardiac Critical Care Unit (PCICU) at Stollery Children’s Hospital, Edmonton, Alberta.

Study Population
Eligibility Criteria

**Inclusion criteria:**
- children admitted to the PICU
- age < 18 years
- received IV fluids on admission or in hospital
- had a hospital stay longer than 24 hours

**Exclusion criteria:**
- Patients who have a primary diagnosis of renal disease, on renal replacement therapy (RRT) on admission or within 6 hours of admission for any reason (because their underlying disease state will obscure the effects of chloride)
- Patients on intermittent hemodialysis (IHD) before or at time of admission (because these interventions perform the role of a kidney in filtering the blood, so we cannot control for the effects that chloride might have on the kidney).

Sample Size
Our sample size calculation is based on a conservative estimate of incidences of AKI in the pediatric population of 10% (10). Using a sample size calculation for unmatched case control studies, and accounting for rarity of the outcome, and an alpha level 0.05, we will need a minimum sample size of 911 patients in both the hyperchloremic and non-hyperchloremic groups (total n = 1822) to ensure 80% power and to detect a minimally clinically relevant Odds Ratio of 1.5.
How to choose between?

MANUAL HEALTH RECORD AUDIT

- Use good methodology
- Screening strategy must be simple
  - Use DAD or NACRS
  - Use demographics, health facility, ICD codes to narrow target population of health records
  - Apply thru AHS Analytics portal for generated list of eligible health records
- Chose question that targets reasonable sample size to review
  - <100 health records

ELECTRONIC HEALTH RESEARCH

- Need my permission
- Needs to involve straightforward use of DAD, NACRS, CLAIMS or miscellaneous other data sets
- Analyst time to extract data from EMRs is prohibitive