Best Practices in Retrospective Chart Review

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New Workshops
Best Practices in Retrospective Chart Review | January 20
Focus Groups and Interviews | January 24

Library Services

Research Development

Research Study Database

Research Ethics

Evaluation

KTE Toolkit

Feedback
Objectives

1. Learn chart review concepts and applications of chart review in health research

2. Learn best practices in designing and conducting a retrospective chart review
Workshop Outline

9:00 – 9:30  → Chart Review Concepts

9:30 – 10:30  → Designing and Conducting Chart Reviews

10:30 – 10:45  → Break

10:45 – 12:00  → Designing and Conducting Chart Reviews
Utilizing data/information that was originally collected for a different original purposes (e.g. administrative, record-keeping)

- “secondary data”

Applications in:

- Research
- Evaluation
- Quality improvement / Practice audits
Chart Review Concepts
A Description of Surgical Procedures Among Patients with Rheumatoid Arthritis on Infliximab Treatment

John Kelsall 1, 4, Pamela Rogers 1, Mary de Vera 5, Griselda Salindao 1, Alice Klinkhoff 2, 3, 4
1 Providence Health Care, Vancouver, BC Canada, 2 University of British Columbia, 3 Arthritis Research Centre of Canada, 4 Mary Pack Arthritis Centre, Vancouver BC Canada

Introduction
Despite the growing use of biologics in rheumatoid arthritis (RA), there is limited information on outcomes of people having surgeries during treatment courses with these agents.

Objective
To characterize people with rheumatoid arthritis undergoing surgeries during treatment on infliximab (IFX) in a real world clinical setting.

Methods
Study design: We conducted a retrospective chart review of RA patients treated with IFX at the Mary Pack Arthritis Centre between 2000 and 2006.

Data collection: Clinical data abstracted included demographic information, RA disease characteristics, co-morbidities, medication history, and information over all infusions performed. A detailed history of all surgical procedures occurring after a first IFX infusion was collected.

Analysis: For each surgery, we calculated the elapsed period from a prior and subsequent IFX infusion. Descriptive statistics were used to characterize RA patients who underwent surgery during treatment course with IFX.

Results

Table 1. Baseline characteristics of patients

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No Surgery (N=53)</th>
<th>Surgery (N=39)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean (SD)</td>
<td>54.9 ± 14.6</td>
<td>55.2 ± 11.9</td>
<td>0.18</td>
</tr>
<tr>
<td>Female</td>
<td>75 (80.7)</td>
<td>25 (66.4)</td>
<td></td>
</tr>
<tr>
<td>RA duration (yrs), mean (SD)</td>
<td>10.4 ± 11.2</td>
<td>17.8 ± 11.3</td>
<td>0.92</td>
</tr>
<tr>
<td>Morning stiff(min), mean (SD)</td>
<td>222.9 ± 378.4</td>
<td>172.1 ± 325.9</td>
<td>0.31</td>
</tr>
<tr>
<td>ESR, mean (SD)</td>
<td>41.0 ± 27.1</td>
<td>39.0 ± 22.9</td>
<td>0.26</td>
</tr>
<tr>
<td>CRP, mean (SD)</td>
<td>35.9 ± 46.8</td>
<td>28.4 ± 42.1</td>
<td>0.68</td>
</tr>
<tr>
<td>No. tender joints, mean (SD)</td>
<td>19.9 ± 12.4</td>
<td>20.1 ± 12.7</td>
<td>0.82</td>
</tr>
<tr>
<td>No. swollen joints, mean (SD)</td>
<td>14.5 ± 10.5</td>
<td>15.8 ± 10.4</td>
<td>0.99</td>
</tr>
<tr>
<td>Patient global, mean (SD)</td>
<td>6.3 ± 2.5</td>
<td>6.0 ± 2.1</td>
<td>0.34</td>
</tr>
<tr>
<td>Patient pain, mean (SD)</td>
<td>6.2 ± 2.3</td>
<td>5.6 ± 2.1</td>
<td>0.68</td>
</tr>
<tr>
<td>Physician global, mean (SD)</td>
<td>6.7 ± 2.4</td>
<td>6.2 ± 2.6</td>
<td>0.53</td>
</tr>
<tr>
<td>Co-morbidities at baseline</td>
<td>60 (64.5)</td>
<td>25 (65.8)</td>
<td>0.89</td>
</tr>
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</table>

No. of previous DMARDs

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<th>No. of previous DMARDs</th>
<th>No Surgery</th>
<th>Surgery</th>
<th>P-value</th>
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<td>2</td>
<td>6 (6.5)</td>
<td>-</td>
<td>0.36</td>
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<tr>
<td>3</td>
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<td>8</td>
<td>3 (3.2)</td>
<td>1 (2.6)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3 (3.2)</td>
<td>-</td>
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<tr>
<td>Previous biologics</td>
<td>55 (59.1)</td>
<td>30 (78.9)</td>
<td>0.03</td>
</tr>
</tbody>
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*Values are number of patients (%), unless otherwise specified

Conclusion
Findings demonstrate that surgical patients did not differ from non-surgical patients across baseline disease characteristics and that orthopedic procedures represent the most common surgeries obtained by patients.

Acknowledgements: This research was supported by an unrestricted grant from Schering-Plough (now part of Merck).
Evaluation of Stat Orders in a Teaching Hospital
A Chart Review

Fanak Fahimi,1,2 Zahra Sahraei1 and Shahteh Amini3
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2 Pharmaceutical Care Department, Chronic Respiratory Disease Research Center, NRILTD, Masih Daneshvari Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3 Clinical Pharmacy Department, School of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

Abstract

**Background:** Physicians frequently prescribe ‘stat’ orders that need to be actioned immediately or within a limited time frame. This process can be time consuming and expensive. Stat medications are reserved for the highest priority orders and life-threatening situations that need to be dealt with immediately or within a limited time frame.

**Objectives:** The goals of this study were to evaluate whether stat medications in a teaching hospital were ordered appropriately and to assess the rationale for the stat order.

**Methods:** The study was carried out between July and August 2009 in Masih Daneshvari Hospital. All newly admitted patients’ charts were reviewed and the records of all inpatients who received at least one stat order were included in the study. Detailed analyses were undertaken to examine the stat use of agents and the rationale for their prescription. Several different guidelines were used to evaluate the rationale for the prescriptions.

**Results:** Charts for 175 patients were reviewed. Of these, 109 (62.3%) patients received a total of 220 stat orders. The mean number of stat orders on each chart of patients who received stat orders was 2.0. Stat orders were divided into two categories: 146 (66.4%) that were administered only once and 74 (33.6%) that were reordered. The internal medicine ward accounted for the most stat medications (35%). The major reasons for stat medication orders were: prophylaxis or management of emesis (22.3%), control of dyspnoea (15.9%), preoperative medications (8.2%) and treatment of exacerbations of chronic obstructive pulmonary disease (7.2%). Hydrocortisone (14.1%), dexamethasone (11.3%), granisetron (9.5%), ceftriaxone (8.6%) and morphine (6.8%) accounted for the most common stat orders. Analysis showed that 133 of the total 220 stat orders (60.5%) were prescribed appropriately; the rationale for 19 orders (8.6%) could not be evaluated.
Research Method

- Chart review
- Survey / questionnaires
- Prospective data collection
  - Clinical data
- Use of databases
Experimental studies

Non-randomised controlled trial

Randomised controlled trial

Observational studies

Descriptive study

Ecological study

Case series

Cross-sectional study

Analytical study

Cohort study

Case-control study

Comparison group

Exposure ↓ Outcome

Exposure ↑ Outcome

Random allocation

Yes

No
Why Chart Reviews?

- **Ethical considerations**
  - Minimal risk → delegated review
  - No consent required

- **Cost (at FHA Health Records)**
  - Funded studies: $5 per chart
  - Unfunded studies: “Ask nicely/beg”

- **Research study feasibility**
  - Readily available data
  - Avoid lag time in waiting for health outcomes to occur
  - Access to rare cases or occurrences
Limitations of Chart Reviews

- Internal Validity
  - Selection bias
  - Researcher bias
  - Confounding

- External Validity
  - Generalizability of results

"We (the journal) are dubious about the integrity of retrospective chart review studies and therefore cannot accept your manuscript for publication."

Authors report in a retrospective way about perfusion reactions on infliximab. The retrospective nature of this work has its flaws.

Methodology does not outline how the retrospective chart review was standardized. Is having a single rheumatologist evaluating the charts and, more particularly, the relation of the adverse event to the infliximab infusion sufficient? This is suboptimal methodology.
Limitations of Chart Reviews

- **Internal Validity**
  - Selection bias
  - Researcher bias
  - Confounding

- **External Validity**
  - Generalizability of results

Designing your research
Collecting appropriate data, appropriate analysis
Discussion section (of manuscript)
# Chart Reviews in Health Research

## Medline Search, February 23, 2011

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Chart Reviews in Health Research

- Efficacy and cost-effectiveness of a blood salvage system in primary total knee arthroplasty—*a retrospective match-controlled chart review*.

- Factors determining the persistence or recurrence of well-differentiated thyroid cancer treated by thyroidectomy and/or radioiodine in the Boston Massachusetts are: *a retrospective chart review*.

- Nurse practitioner management of chronic musculoskeletal pain: *a chart review*.
...Designing and Conducting Doing a Chart Review
Are you ready for a plate of spaghetti?
### Framework(s) for Chart Reviews

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<td>8. Ethics</td>
<td>8. Collect and analyze data</td>
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A Methodology for Conducting Retrospective Chart Review Research in Child and Adolescent Psychiatry

Robin E. Gearing PhD, MSW; Irfan A. Mian MD, FRCPC\textsuperscript{2,3}; Jim Barber PhD\textsuperscript{4}; Abel Ickowicz MD, FRCPC\textsuperscript{2,3}

Abstract
Introduction: Retrospective research has become largely undervalued and underutilized in child and adolescent psychiatry with the increasing singular focus on randomized control trials, despite the wealth of clinically relevant data available in historical medical records. In this paper a systematic and scientific approach to chart review research methodology for psychiatry is described. Method: Informed by available literature, a methodological stepwise approach for retrospective chart review was developed. Results: A nine step method aimed at maximizing benefits and minimizing limitations is discussed. Conclusions: Retrospective chart review is an important methodology with distinct advantages and has the potential to provide psychiatry with valuable research opportunities. This method of study should not be lost in the field of psychiatry.

Key words: methodology, retrospective chart review, health record, medical record, archival data, research

Résumé

Mots-clés: méthodologie, analyse rétrospective, dossiers médicaux, données d’archive, recherche
1. Generate Research Idea

- Clinical observation, curiosity
- Operationalize into research question
  - PICO Method
    - Translate clinical problem (or population/public health problem) into a structured question and identify the key concepts
    - Elements
      - **Patient**: Who are you studying?
      - **Intervention**: What intervention are you studying?
      - **Comparison**: What will the intervention be compared to?
      - **Outcome**: What outcome(s) are you interested in?
Group Discussion 1

- What are your research questions that may be addressed using chart reviews?
1. Generate Research Idea

- Consider feasibility issues
  - Availability of data
    - Is the information you are seeking available from the medical record and is the chart information likely to be useful in answering your question?
    - This step is often overlooked or not thoroughly undertaken.

- Consult with peers and experts

- Preliminary review (1-3 charts)
2. Conduct Literature Review

- **Identify available evidence**
  - How is the patient population defined?
  - What interventions have been studied?
  - What have been used as comparators?
  - What are reported outcome measures?
  - What methodologies have been used?

- **Takes time but...**
  - Very important step in the research process.
  - You have resources and support
    - DERS – formulating research question
    - FH librarians – executing literature search
3. Refine Research Question

**FINER Criteria for a Good Research Question**

(from *Designing Clinical Research*, by Stephen Hulley and Steven Cummings, 1988)

**Feasible** - Adequate number of subjects.
- Adequate technical expertise.
- Affordable in time and money.
- Manageable in scope.

**Interesting** - To the investigators.

**Novel** - Confirms or refutes previous findings.
- Extends previous findings.
- Provides new findings.

**Ethical**

**Relevant** - To scientific knowledge.
- To clinical and health policy.
- To future research directions.

Confirmed through literature search and review
Thank you for not doing research that has already been done.
4. Plan Research Methodology

A. Study sample → How many? How?
B. Data abstraction instrument organization
C. Abstraction protocols and guidelines
D. Data abstraction
E. Dataset considerations
F. Analysis
How many charts will you to look at?

Descriptive study
- Consider
  - Sampling methods
  - “Bounds of your study”

Analytic study
- Consider
  - Statistical test, outcome
- Consult with your friendly DERS epidemiologist

How will you sample the charts?

3 commonly used sampling methods
- Convenience
- Quota
- Systematic
4A. Study Sample

- **Convenience sampling**
  - Charts selected over specific time frame
  - If rare disease, all pertaining charts

- **Quota sampling**
  - Predetermined number of charts from each site, diagnostic determinant

- **Systematic sampling**
  - Every $n^{th}$ chart (by date of diagnosis, by ordered patient list)
4B. Abstraction Protocols & Guidelines

- What charts will you review
  - Outpatient charts, hospital charts

- Who will review charts/abstract data
  - Research assistant/coordinator
  - Study investigators
  - *Do they need clinical background?*
4B. Abstraction Protocols & Guidelines

- What information will you collect?
  - List data (should have identified when preparing your protocol)
  - Where to find in the chart

- How will data be collected / stored?
  - Data Abstraction Tool
    - Paper?
    - Electronic?
4B. Abstraction Protocols & Guidelines

- Goal is to be able to address:
  - How will methods be standardized?
Data Abstraction Tool (DAT)

Best practices

- Have list of data that you want to collect
- Develop DAT along with protocol
- Keep DAT items and instructions clear and concise
- Design DAT to follow the data flow from the perspective of the person completing it, taking into account the flow and organization of data in the chart
  - Keep chart handy while developing DAT
- Design DAT with the primary measures of interest in mind as the main goal of data collection.
DAT Design Considerations

- **Know your charts**
  - DAT should be designed keeping in mind chart
  - Keep chart handy

- **DAT features**
  - Feasible
    - Capable of being completed
  - Acceptable
    - Resulting data is useful
  - Reliable
    - Information abstracted is consistent
Know your Charts!

- **Static Data**
  - Snapshot in time
  - Demographic
  - Medical history

- **Evolving Data**
  - Information is collected over time
  - Repeated measurement
  - Vital signs
  - Daily Medication orders

- **Cumulative Data**
  - Collected over time, but not linked to specific points in time
  - Medication errors

- Single record - single page
- Series of single records/pages per time interval
- Single page cumulative log linked with time interval
- Single page cumulative log
DAT: Feasible

- Have logical order of items in DAT
  - Match with order and type of information in the chart

- Consider ‘modules’ to match chart information
  - Lab values, pharmacy

Goal is to facilitate data entry into DAT and minimize errors
DAT: Acceptable

- Pre-screen charts for availability of information

- Have detailed instructions for recording potentially ambiguous information

- Distinguish between missing information, not appropriate information, or not done

Goal is to minimize and manage of missing information
DAT: Acceptable

- Minimize error
  - Limit manual entry of numbers or text
    - “Force” entry
  - Standardize response options
    - Use boxes/shapes to enter information
    - Be consistent
    - Choose ONE OF
      - circled items
      - checkmarks
      - X
    - Ensure DAT is easy to read
    - Ensure sufficient space
What would you use?

LDL cholesterol value ______

LDL cholesterol value ______mg/dL

LDL cholesterol value ______mg/dL or ______mmol/L

LDL cholesterol value ______ mg/dL

unit if different ______
Standardizing DAT Responses

- Make good use of instructions, cues, and examples

  - Text
    - Site of injury (e.g. left shoulder)

  - Numeric
    - Age [___] yrs

  - Date
    - __ / ____ / ___
    - dd  mmm  yy (e.g. 02/may/05)
Standardizing DAT Responses

- For categorical variables specify whether it is single response, multiple response or coded response

  - Single response (Check *only* one)
    - O Yes  O No

  - Multiple-response (May circle more than one)
    - Diabetes  Arthritis  Cancer  Hypertension

  - Coded Response (Enter corresponding number)
    - ¹ O Mild  ² O Moderate  ³ O Severe  [ ]
DAT: Reliable

- **Test-retest reliability**
  - Assess consistency within the same person
    - To assess drift over time
    - To assess errors during learning phase

- **Inter-rater reliability**
  - Do any two data abstractors record the same information?
    - Test data abstractors against each other
    - Test data abstractors against gold standard example
Consider looking at a few charts

- See what is documented
  - Will tell you what you can capture

- Get an idea of what the hurdles are?
  - E.g. details of when antibiotic reached the ward were not available

- Find out where the information actually is
  - i.e. what section of the chart
  - This helps in planning time to complete the work
DAT Pilot Testing → For Validity

- Once DAT is designed and Codebook is in place – test out the data abstraction and coding process on a few charts:
  - Are key pieces of information missing?
  - Does the information translate easily from chart to DAT?
  - Are there classifications, codes or other information that need refining?

- A formal pilot study to test the feasibility, reliability and validity of the data abstraction process is recommended.
  - Sample size of up to 10 percent of the intended sample
Group Exercise

- Critique the DAT
Paper vs. Electronic DATs

- Consider pros and cons of each approach
4C. Abstraction Protocols & Guidelines

- Reference manual
  - Clear instructions for how to collect the required information
  - Listing of each variable, location in chart, method for transcribing from chart to DAT
4D. Data Abstraction
4E. Dataset Considerations
4F. Analysis
More Spaghetti?
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7. Apply for Ethics Approval

- Need to complete Department Agreement for Providing Research-Related Services (DAR) form
  - Health records department
8. Collect and Analyze Data
9. Draw Conclusions & Relate Findings
Happy Charting