ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

Reducing Bias in Emergency Medicine Chart Review Studies: Looking Through the Retrospectoscope

Dr. Manish Sabharwal[1]*, Dr. Shaik Salman Khan[2]

[1] Senior Consultant, Department of Emergency Medicine, Santosh Medical College, Santosh deemed to be university, Ghaziabad, Uttar Pradesh, India.

[2] Junior Resident, Department of Emergency Medicine, Santosh Medical College, Santosh deemed to be university, Ghaziabad, Uttar Pradesh, India.

Email- [1] manish.sabharwal@santosh.ac.in

ABSTRACT:

The purpose of this article is to: identify the various processes in chart review studies that can introduce bias; describe the steps an investigator may take when planning a chart review study to mitigate distortion and bias; and describe reporting techniques that maximise transparency so readers can anticipate the biases and the study's limitations. It is yet unknown how electronic medical records will ultimately affect retrospective research. By using boilerplates, copying and pasting information, using pre-checked boxes, and delaying time stamps in relation to actual care, new biases may be introduced. This article offers guidelines for conducting and documenting studies in which chart review is a method of data collecting. Our main reporting suggestion is to be honest and state precisely what was done and what was discovered for each subject discussed in articles. The scientific method's guiding principles, which stress the value of documenting a study in enough detail to allow replication, directly inform this advice.

Keywords: Retrospectoscope, Pitfalls, Abstractor, Ambulatory.

INTRODUCTION:

53% of emergency medical services publications and 25% of all scientific studies published in peer-reviewed emergency medicine journals1 are chart review studies that rely on pre-recorded data as their primary data source. [2] The widespread use of the chart review research design may be partially explained by the fact that the data have already been acquired, and the time-consuming process of prospective data collection has been omitted. The investigation of topics that are difficult or nearly impossible to evaluate in prospective trials, such as the effects of unusual or dangerous exposures to which patients cannot be randomly assigned for ethical reasons, is also made possible through chart review research.

“In their acknowledgement that a summary risk ratio from a systematic review may be many steps removed from the true risk ratio in the target population, Maclure and Schneeweiss3 described the bias or distortions in the lenses or filters of an epidemiologist's telescope”. Use the analogy of the kid-favorite game "telephone" or "whisper down the lane," in which

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

everyone passes a message from one player to the next. Due to "noise" (ambiguity) introduced during each transmission and the subsequent misinterpretation by listeners seeking meaning, the message's final version frequently differs greatly from the original.

Similarly, because abstracted data is far away from the patient, the stated effect estimate from a chart review study is vulnerable to multiple layers of possible bias. The patient must first disclose the information to the health care provider, who must then appropriately interpret it and record it in the medical file. The chart abstractor must then filter and analyse the data using a data gathering tool to locate each relevant variable, comprehend its significance, and accurately record it. However, not all circumstances surrounding a disease or accident are shared with the doctor. Furthermore, even if the patient reports the information, the doctor or nurse might not record it in the patient's medical record due to a perception of its relative insignificance, simple oversight, or diagnostic bias.

The inaccuracies and omissions in the medical record might be made worse by incorrect chart entry interpretation or incorrect data coding during data abstraction. As a result, systematic error is much more likely to occur than random error, and the process of conducting a chart review study has the potential to result in a conclusion that is inaccurate in representing the true effect estimate4, which emphasises the significance of identifying strategies to reduce bias in chart review studies. No criteria have been validated despite a variety of indications of the quality of chart review studies being proposed1, [2,4-17]. Furthermore, with the development of the usage of huge public databases and the electronic medical record, none of these criteria have been updated or combined.

In this article, "chart" refers to a paper or electronic record that contains largely patient-focused medical information, such as doctor and nursing notes, reports from outside the hospital, and results of diagnostic tests from the radiology and laboratory departments. [4,5] Consequently, a chart review is any type of investigation that uses information from the patient file.

“Three goals are achieved by this article: A chart review study should: (1) identify the various processes that can introduce bias; (2) describe the steps an investigator can take when planning a chart review study to mitigate distortion and bias; and (3) describe reporting techniques that maximise transparency so readers can anticipate the biases and the study's limitations. The 10 potential levels of bias are represented by the "retrospectoscope", which we based on the epidemiologic telescope of Maclure and Schneeweiss3”.

LAYER 1: CHART REVIEW APPROPRIATE FOR THE RESEARCH QUESTION

For the purpose of addressing the suggested research topic, the chart review must be a suitable method of data gathering. This means that the available charts must have documentation of the relevant study items and must be representative of the patient group of

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

interest. Chart documentation is kept for a variety of purposes, including billing, administrative record-keeping, legal concerns, and as a record of the actual medical care that was provided. This final presumption, which is crucial to chart review research but frequently lacking in evidence, The comprehensiveness and quality of the data may be insufficient because it was not collected for research purposes. 4 For instance, a researcher looking into the link between eating meat and getting appendicitis could not use a chart review because the amount of meat consumed is not typically recorded in a patient's medical history. If a recognised and trustworthy method of asking the question was not employed, the dietary history would be incorrect.

LAYER 2: TRANSPARENCY OF INVESTIGATOR BIAS

Additionally, it's critical to comprehend and recognise any biases and potential conflicts of interest, whether they be philosophical or pecuniary. Unknowingly, the researcher may have created a study question or a method for gathering data that is predisposed to favour supporting the projected hypothesis.

Solution: “Prior to starting a study, the researchers must disclose any potential conflicts of interest, get institutional review board approval, and create (and ideally pilot test) a data collection form. The article should cover each of these topics. Also included as an appendix should be the data collection forms and coding definitions”.

LAYER 3: STUDY AND TARGET POPULATION

The base population may not comprise a sample representative of the patient population of interest, which is a common shortcoming of chart review research. Internal validity may not exist in studies that do not make use of all or a representative sample of the available charts. Furthermore, if charts were selected from a place with an unusual population or practise style, external validity would be damaged even if sampled charts were representative of all charts.

Solution: “Make sure the research settings are representative of the target patient group, and, whenever practical, make sure that all eligible charts are included in the pool and have an equal chance of being chosen. 1,2 The use of several chart identification techniques, such as the principal complaint and International Classification of Diseases codes, may assist identify all charts that are appropriate for inclusion while reducing selection bias. Prior to gathering and analysing data, inclusion and exclusion criteria should be established”.

LAYER 4: VARIABLES TO BE COLLECTED

The phase of data collection represents the following potential source of bias. There could be several entries that conflict. While the attending physician or consultant who may have access to imaging results collected later in the emergency department course may document the presence of soreness or a mass, the triage nurse and resident doctor may note the existence of a soft abdomen. Also possible is inconsistent categorization of the data. Be aware that if there

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

is any disagreement or misunderstanding between the clinician and the patient, there are several potentials for misclassification. For instance, the patient can misunderstand the inquiry due to health literacy issues, or the practitioner might record what fits the overall picture rather than what was actually said. Additionally, it is possible that the abstractor will perceive the written material incorrectly. [9,10]

Solution: "A code guide for abstractors should be created that details the variables to be collected from the chart as well as how they are defined. [6,7,11,12] The coding guidelines for each abstracted element should be included when the methods are reported. Additionally, the code manual needs to be made available as an appendix wherever possible".

LAYER 5: SYSTEMATIC DATA COLLECTION

Misclassification bias could result from an unsystematic data collection process. Use a standardised data gathering instrument that has been pilot tested, categorised, and sorted in a manner similar to that in which the information may be found in the actual chart. This will help to improve objective data collection. [1,2,11,12,17] Data should, if possible, be entered directly into a computer programme with real-time error checking because each data transformation creates an extra possibility for errors. This reduces the number of entries that are missed, unreadable, or mistranscribed. A common case record form should be produced and kept, though, if paper records are going to be used. [10]

LAYER 6: MISSING AND CONFLICTING DATA

Conclusions could be wrong if there are a lot of missing or conflicting data. Missing data can be viewed as a type of selection bias, and depending on the variable, context, and subject matter, the degree to which selection bias might impair validity can vary. As a result, it is impossible to establish a suitable level of missing data. [5,10]

Solution: The investigators should assess the percentage of missing data and whether missing data jeopardise validity when deciding which variables to research. A sensitivity analysis that takes into account various hypotheses to explain for the missing data might be considered. If a crucial variable is frequently absent, for instance, one may examine the data using a variety of hypotheses, such as the variable is absent at random, the variable is always "present" while missing, or some other reasonable scenario. 10 Readers can comprehend the potential extremes in the effect estimates by using a sensitivity analysis. If the missingness systematically varies with regard to the predictor or outcome status, the problem of missing data may get worse.

LAYER 7: ABSTRACTOR BIAS

The data abstractor is one of the most likely places for bias, as would be predicted. When determining the values for variables, abstractors may be prejudiced if they are not blinded to the study's objectives and main hypothesis. For some variables, such as the patient's gender,

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

this might not be a problem, but for other variables, there might be several contradictory entries in the chart (for instance, one doctor might write that there is rebound tenderness, another might write "no rebound," and a third might write nothing). If the abstractors are aware of the desired value, they may record that value while unconsciously ignoring contradicting information. The abstractor might also be driven to carefully scan the graph in pursuit of one variable's status while conducting a superficial search for another.

Solution: The optimum solution is for the researchers to hire and train abstractors who are unaware of the study's hypothesis. If this isn't practicable, another option is to give several abstractors the task of abstracting various sets of variables. It may be less likely to be biassed, for instance, if one abstractor is in charge of abstracting results while another is in charge of abstracting independent variables. The authors of a chart review should expressly specify whether and how the chart abstractors were kept blind to the study's goals and principal hypothesis when reporting the procedures. The lack of blinding needs to be highlighted as a drawback.

LAYER 8: ABSTRACTOR TRAINING

Training is necessary for both entering and coding data as well as interpreting chart entries. 1,2,4-6 Many “National Hospital Ambulatory Medical Care Survey (NHAMCS)” data collectors only have a high school education and no medical training, despite the fact that the majority of chart readers are professionals with medical training (such as doctors, nurses, and medical students). Non-medically qualified abstractors might not understand medical language or interpret test results incorrectly, leading to inaccurate entries. 19 They could also be unsure of when or where to look in different chart areas in order to obtain a specific piece of information. Additionally, internal discrepancies in the medical record may be challenging for abstractors who are not medical professionals. In multicenter research, consistency of training is extremely beneficial. Sadly, less than 20% of research on chart reviews describe abstractor training.[1]

Solution: To accurately select the data, investigators should employ data gatherers with adequate training. Particularly in multicenter research, training should be uniform, and refresher training should be provided for large investigations. The educational background of the chart reviewers in medicine should be discussed in the methods section along with the kind of training the abstractors received, whether it was standardised training, and whether routine refresher training was offered. If there wasn't standardised training, that ought to be brought up as a drawback.

LAYER 9: ABSTRACTOR MONITORING

Data collection forms should be routinely verified with the actual medical record charts for studies including a protracted data gathering phase since, with time, there may be a decline in recording accuracy or a change in coding methods.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

Solution: "Meetings with the abstractors should be scheduled since they may be helpful in resolving conflicts or going over coding regulations [1,7,8,11] There is no evidence-based standard for the proper frequency of monitoring abstractor performance, despite the fact that one study [7] recommended using three points throughout the chart audit phase for quality monitoring. Only 9% of a group of chart review studies in a recent study reported such monitoring. [2] The procedures should specify who monitored the abstractors, how often they were monitored, and if they were monitored at all".

LAYER 10: ABSTRACTOR INTERRATER RELIABILITY

To identify and address disparities, it is ideal that two abstractors independently examine each chart. However, because doing so takes time and money, it is rarely done. The alternative is to prove the abstractions' inter-rater reliability so that the outcomes of a single abstraction of each graphic may be relied upon.

Assessments of interrater dependability are especially crucial when there are various groups of abstractors, as in a multicenter study. Without comparing the abstractions created by other groups, it is impossible to determine whether variations between sites are brought on by variations in the data or variations in the abstractions.

Solution: The best course of action is to conduct a formal interrater reliability evaluation, discuss the process in the methods section, and give the findings in the results section. Such interrater reliability should be routinely reevaluated for investigations that last a long duration.

CONCLUSION:

This article offers advice on how to conduct and report studies that use chart review as a technique of data collection. Our main advice for reporting is to be open and honest, detailing exactly what was done and what was discovered for each topic covered in articles. This advice is directly derived from the guiding principles of the scientific method, which highlight the significance of reporting a study in enough detail to allow replication. 23 Despite being prepared with full understanding of the few evidence available, our recommendations on how to conduct chart review studies are largely personal opinions. There is also no assurance that following any or all of the suggestions will result in an article that is less prejudiced.

It is yet unknown how electronic medical records will ultimately affect retrospective research. By using boilerplates, copying and pasting information, using pre-checked boxes, and delaying time stamps in relation to actual care, new biases may be introduced.

Therefore, the following overview and the checklist that is attached (Figure 2) are a compilation of the best practises from the literature. We think writers of studies that use chart

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

reviews should list every one of these details, and if they don't, they should state why in the limitations section.

REFERENCES:

1. Gilbert EH, Lowenstein SR, Koziol-McLain J, et al. Chart reviews in emergency medicine research: where are the methods? Ann Emerg Med. 1996;27:305-308.
2. Worster A, Bledsoe RD, Cleve P, et al. Reassessing the methods of medical record review studies in emergency medicine research. Ann Emerg Med. 2005;45:448-451.
3. Maclure M, Schneeweiss S. Causation of bias: the episcope. Epidemiology. 2001;12:114-122.
4. Lowenstein SR. Medical record reviews in emergency medicine: the blessing and the curse. Ann Emerg Med. 2005;45:452-455.
5. Worster A, Haines T. Advanced statistics: understanding medical record review studies. Acad Emerg Med. 2004;11:187-192.
6. Badcock D, Kelly A, Kerr A, et al. The quality of medical record review studies in the international emergency medicine literature. Ann Emerg Med. 2005;45:444-447.
7. Liddy C, Wiens M, Hogg W. Methods to achieve higher inter-rater reliability in data collection from primary care medical records. Ann Fam Med. 2011;9:57-62.
8. Allison JJ, Wall TC, Spettell CM, et al. The art and science of chart review. Jt Comm J Qual Improv. 2000;16:115-136.
9. Luck J, Peabody JW, Dresselhaus TR, et al. How well does chart abstraction measure quality? a prospective comparison of standardized patients with the medical record. Am J Med. 2000;108:642-649.
10. Jansen ACM, van Aalst-Cohen ES, Hutten BA, et al. Guidelines were developed for data collection from medical records for use in retrospective analyses. J Clin Epidemiol. 2005;58:269-274.
11. Gregory KE, Radovinsky L. Research strategies that result in optimal data collection from the patient medical record. Appl Nurs Res. 2012;25:108-116.
12. Eder C, Fullerton J, Benroth R, et al. Pragmatic strategies that enhance the reliability of data abstracted from medical records. Appl Nurs Res. 2005;18:50-54.
13. To T, Estrabillo E, Wang C, et al. Examining intra-rater and inter-rater response agreement: a medical chart abstraction study of a community based asthma care program. BMC Med Res Methodol. 2008;8:29.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

14. Engel L, Henderson C, Fergenbaum J, et al. A medical record review conduction model for improving inter-rater reliability of abstracting medical-related information. Eval Health Prof. 2009;32:281-296.

15. Lash TL, Fox MP, Thwin SS, et al. Using probabilistic corrections to account for abstractor agreement in medical record reviews. Am J Epidemiol. 2007;165:1454-1461.

16. Reisch LM, Fosse JS, Beverly K, et al. Training, quality assurance, and assessment of medical record abstraction in a multisite study. Am J Epidemiol. 2003;157:546-551.

17. Yawn BP, Wollan P. Inter-rater reliability: completing the methods description in medical records review studies. Am J Epidemiol. 2005;161:974-977.

18. Greenland S. Bayesian perspectives for epidemiologic research: III. Bias analysis via missing-data methods. Int J Epidemiol. 2009;38:1662-1673.

19. Cooper RJ. Journal Club: the NHAMCS database, chart review methods, and more on regression modeling. Ann Emerg Med. 2010;55:458-459.

20. Day FC, Schriger DL. A consideration of the measurement and reporting of interrater reliability: answers to the July 2009 Journal Club questions. Ann Emerg Med. 2009;54:845-853.

21. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33:159-174.

22. Cooper RJ. NHAMCS: does it hold up to scrutiny? Ann Emerg Med. 2012;60:722-725.

23. Ziman JM. Reliable Knowledge: An Exploration of the Grounds for Belief in Science. Cambridge, England: Cambridge University Press; 1978:6-7.