An Analysis of Chart Review Methodologies within Five Major Neuropsychiatry Journals

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No Conflict of Interest. No funding was received for this study

Abstract

This study's objective is to assess the proportion of chart review studies in the specialty of neuropsychiatry which reported methodologies. Five journals were selected from the specialty of Neuropsychiatry through a process emphasizing both Journal Citation Index and Journal Impact Factor. Methodologic standards that were assessed were determined by conducting a literature review and interviews with faculty from the University of Colorado School of Medicine. Adherence to methodologic standards ranged between 2.6% and 100%. Despite being a common method of data collection, chart reviews are less common in the neuropsychiatry journals this study assessed. These chart reviews would be strengthened in both reliability and reproducibility by clarifying methodologies. Rigorous methodologies may increase the power and reproducibility of conclusions of chart review studies; as well, such changes would likely decrease the error of such conclusions.

Introduction

- Chart reviews are used often in both academic and non-academic settings to assess specific diagnoses, treatments, outcomes, or risk factors on specific patient populations.
- Chart review may be preferred due to their relative ease and minimal resources utilized.
- Chart review may be less preferred as they are often time-intensive and rely on chart data, which is not collected for research purposes but for patient care.
- Reliability and reproducibility of data produced in chart reviews may be limited by imprecise methodologies.
    - Interrater variability may decrease study precision.
    - Lack of clear methodology may decrease reproducibility.
    - Biases within hospital and EHR systems may make chart reviews difficult to replicate outside of the same health-care system.
    - Lack of standardization may exacerbate trends or inaccuracies within ICD codes, documented diagnoses, and chart procedures.
- Previous studies have largely focused on chart reviews within emergency medicine.
- Previous studies have identified eight methodologic criteria (Table 1).

Objectives

- To assess the proportion of chart review studies published in the subspecialty of neuropsychiatry.
- To assess the frequency of which methods (such as case selection, defining conventions, abstractor agreement, monitoring, blinding, and confirming interrater reliability) were reported in the subspecialty of neuropsychiatry.

Table 1: Methodologies to be assessed

Methodology	Description
Training	Describe the qualifications and training of abstractors, ideally prior to study initiation.
Case Selection	Explicit protocols for case inclusion and exclusion, with clearly defined criteria
Variable Definitions	Precisely define all variables of study
Standardized Abstraction Form	Creating of a standard which will guide data collection and decrease errors. There should be clearly defined protocols for data that is conflicting, ambiguous, or absent.
Meetings	Meetings with research team, including chart abstractors and coordinators, to resolve disputes and review previously defined protocols
Monitoring	Monitoring performance of chart abstractors; may be included as part of meetings
Blinding	Abstractor blinded to hypothesis or etiologic relation being assessed. If groups of patients are compared, abstractor should be blinded to patient's assignment
Interrater Reliability Testing	A second reviewer assigned to abstract prior collected data, blind to previous collection. Should be reported with kappa-statistic, intraclass coefficient, or other measure of agreement. In this study, we include both mentions of agreement testing and documented testing.

Methods

- Five journals were selected to represent the subspecialty of Neuropsychiatry: "Molecular Psychiatry", "Biological Psychiatry", "Journal of Neurology, Neurosurgery, and Psychiatry", "Brain, Behavior, and Immunology", and "Psychiatry and Clinical Neurosciences".
    - Journals were identified using the "Web of Science Master Journal List" and the search term "Neuropsychiatry".
    - Additional inclusion factors included English language publications and a documented 2024 Journal Impact Factor within the "Web of Science Master Journal List".
    - Journals that focused only on pharmacology, emphasized only one category (either only clinical neurology, only neuroscience, or only psychiatry), or emphasized only one type of research were excluded.
    - Journals were ranked by combining the JCI and JIF score.
    - The five journals meeting inclusion factors with the highest combined JCI and JIF were selected.
- Definitions for variables were described as follows:
    - "Chart review" was defined as a study which relies solely or mostly (>75%) on data from medical records to address the study objective
    - "Medical records" were defined as clinical reports including inpatient records, patient records collected for prior research, outpatient records, emergency records, pre-hospital care records, and nursing notes.
- From each journal:
    - Articles were assessed from the period of January 1, 2022, to December 31, 2024, excluding editorials, letters, symposium proceedings, literature reviews, and metanalyses from the search results.
    - Studies were excluded if:
        - They relied on animal or laboratory data.
        - They relied on any public records, such as death certificates or coroners' reports.
        - They did not utilize patient charts for >75% of data collected.
- Qualifying studies were then evaluated for the presence or absence of certain key methodologic standards (Table 1).
    - A rating of "present" was given for the standard if the authors mentioned the standard in the "Methods" section of the paper.
    - Further details were not necessary to receive a "present" rating.
    - If the standard was not mentioned, we assigned a rating of "absent".
    - For the "Standardized Abstraction Form" methodology, we gave a "present" rating if the abstraction form was described, including protocols to decrease error, regardless of whether the term "standardized abstraction form" was utilized.
- This study is not considered Human Subjects Research. For that reason, COMIRB approval was not required to complete this study.

Results

- During the period from January 1, 2022, to December 31, 2024, approximately 2,005 articles of all types were published by the journals specified above.
- Of these studies, we found 44 studies through the described search terms.
    - Of these 44 studies, five studies did not utilize patient charts for >75% of their data, and so were excluded. Thus, we assessed 39 charts.
- We found that chart reviews accounted for 1.95% of studies.
    - Of the studies assessed, 100% utilized electronic health records.

Table 2: Methodologic standard adherence

Methodology	Percent	95% CI
Case Selection	100.0%	± 0%
Variable Definitions	97.4%	± 5.0%
Standardized Abstraction Form	87.2%	±12.2%
Investigator Training	20.5%	± 12.8%
Meetings	2.6%	± 5.0%
Monitoring	2.6%	± 5.0%
Blinding	5.1%	± 7%
Interrater Reliability	7.7%	± 8.5%
Interrater Reliability Statistical Testing	2.6%	± 5.0%

- Methodology Assessment:
    - Case selection criteria were described in 39 studies (100%).
    - Variable definitions were described in 38 studies (97.4%).
    - Standardized abstraction forms were sufficiently addressed to meet this study's criteria in 34 studies (87.2%).
    - Abstractor training was reported in 8 studies (20.5%).
    - Periodic research meetings were reported in 1 study (2.6%).
    - Periodic abstractor monitoring was mentioned in 1 study (2.6%).
    - Abstractor blinding to study hypothesis was mentioned in 2 studies (5.1%).
    - Interrater reliability was mentioned in 3 studies (7.7%).
        - Interrater reliability was tested statistically in 1 study (2.6%).

Conclusions

- While chart reviews are a common form of research, they make up a small proportion of publications in several major Neuropsychiatric Journals.
- Many chart reviews are weakened by a lack of rigorous methodology.
- Reliability and reproducibility of chart reviews would be increased by clarifying methodologies.
- More rigorous methodologies may decrease errors within chart review studies.
- Understanding the methodologies of chart reviews may increase the ability of physicians to identify strengths, weaknesses, and generalizability in chart reviews they might utilize in clinical practice.
- Creating a framework for chart reviews that incorporates these methodologic standards and necessitates their consideration may improve the quality of chart reviews published within scientific journals.

Limitations

- This study is limited by the number of journals and articles analyzed.
    - This study only investigates chart reviews in the context of Neuropsychiatric journals. Because of this, it may not be generalizable to all specialties or interests.
- By utilizing the citation index to determine which journals the investigators assessed, there may be a bias towards journals with more focus on basic research.
    - Because of this, this study may inadequately reflect the methodologies of chart reviews at large.
- The reproducibility of this study is limited due to the number of investigators.
    - Having an additional investigator would allow for an assessment of interrater reliability.
    - An additional investigator to perform a blinded critical review would increase reliability and repeatability.

Acknowledgements

- Dr. Steven R. Lowenstein, MD for his guidance, expertise, and encouragement. His insight has been foundational to the development and completion of this project. As my mentor, he has been instrumental in the creation of this project.
- Lori Hopper and Ryan Lowry, CIP, of the COMIRB team, who provided further insight on how to successfully apply to the Colorado Multiple Institutional Review Board
- Katherine Downton, MSLIS, a research informationalist with the University of Colorado Strauss Health Science Library; without her assistance, the identification and selection of studies would have been impossible.
- Dr. Cecilia Low Wang, MD and Dr. Sarah Rowan, MD, who are a part of the Mentored Scholarly Activity team, for offering tips, tricks, and common pitfalls of chart review studies.

References

Vassar M, Holzmann M. The retrospective chart review: important methodological considerations. J Educ Eval Health Prof. 2013 Nov 30;10:12. doi: 10.3352/jeehp.2013.10.12. PMID: 24324853; PMCID: PMC3853868.

Yin Z, Tong J, Chen Y, Hubbard RA, Tang CY. A cost-effective chart review sampling design to account for phenotyping error in electronic health records (EHR) data. J Am Med Inform Assoc. 2021 Dec 28;29(1):52-61. doi: 10.1093/jamia/ocab222. PMID: 34718618; PMCID: PMC8714286.

Evans RS. Electronic Health Records: Then, Now, and in the Future. Yearb Med Inform. 2016 May 20;Suppl 1(Suppl 1):S48-61. doi: 10.15265/IYS-2016-s006. PMID: 27199197; PMCID: PMC5171496.

Badcock D, Kelly AM, Kerr D, Reade T. The quality of medical record review studies in the international emergency medicine literature. Ann Emerg Med. 2005 Apr;45(4):444-7. doi: 10.1016/j.annemergmed.2004.11.011. PMID: 15795728.

Weiskopf NG, Cohen AM, Hannan J, Jarmon T, Dorr DA. Towards augmenting structured EHR data: a comparison of manual chart review and patient self-report. AMIA Annu Symp Proc. 2020 Mar 4;2019:903-912. PMID: 32308887; PMCID: PMC7153078.

Knake LA, Ahuja M, McDonald EL, Ryckman KK, Weathers N, Burstain T, Dagle JM, Murray JC, Nadkarni P. Quality of EHR data extractions for studies of preterm birth in a tertiary care center: guidelines for obtaining reliable data. BMC Pediatr. 2016 Apr 29;16:59. doi: 10.1186/s12887-016-0592-z. PMID: 27130217; PMCID: PMC4851819.

Singer AJ, Homan CS, Stark MJ, Werblud MC, Thode HC Jr, Hollander JE. Comparison of types of research articles published in emergency medicine and non-emergency medicine journals. Acad Emerg Med. 1997 Dec;4(12):1153-8. doi: 10.1111/j.1553-2712.1997.tb03699.x. PMID: 9408432

Blome C, Augustin M. Measuring change in quality of life: bias in prospective and retrospective evaluation. Value Health. 2015 Jan;18(1):110-5. doi: 10.1016/j.jval.2014.10.007. PMID: 25595241.

Talari K, Goyal M. Retrospective studies - utility and caveats. J R Coll Physicians Edinb. 2020 Dec;50(4):398-402. doi: 10.4997/JRCPE.2020.409. PMID: 33469615.

Larkins NG, Craig JC, Teixeira-Pinto A. A guide to missing data for the pediatric nephrologist. Pediatr Nephrol. 2019 Feb;34(2):223-231. doi: 10.1007/s00467-018-3932-4. Epub 2018 Mar 13. PMID: 29536258.

Gilbert EH, Lowenstein SR, Koziol-McLain J, Barta DC, Steiner J. Chart reviews in emergency medicine research: Where are the methods? Ann Emerg Med. 1996 Mar;27(3):305-8. doi: 10.1016/s0196-0644(96)70264-0. PMID: 8599488.

Connolly A, Kirwan M, Matthews A. A scoping review of the methodological approaches used in retrospective chart reviews to validate adverse event rates in administrative data. Int J Qual Health Care. 2024 May 10;36(2):mzae037. doi: 10.1093/intqhc/mzae037. PMID: 38662407; PMCID: PMC11086704.

Stange, Kurt C. MD, PhD*; Zyzanski, Stephen J. PhD*; Smith, Tracy Fedirko PhD; Kelly, Robert MD, MS*; Langa, Doreen M. BA*; Flocke, Susan A. PhD; Jaén, Carlos R. MD, PhD. How Valid Are Medical Records and Patient Questionnaires for Physician Profiling and Health Services Research? A Comparison With Direct Observation of Patient Visits. Medical Care 36(6):p 851-867, June 1998.

Burnum JF. The misinformation era: the fall of the medical record. Ann Intern Med. 1989 Mar 15;110(6):482-4. doi: 10.7326/0003-4819-110-6-482. PMID: 2919852.

Lowenstein SR. Medical record reviews in emergency medicine: the blessing and the curse. Ann Emerg Med. 2005 Apr;45(4):452-5. doi: 10.1016/j.annemergmed.2005.01.032. PMID: 15795730.

Westhoff CL. Epidemiologic studies: pitfalls in interpretation. Dialogues Contracept. 1995 Winter;4(5):5-6, 8. PMID: 12288680.

Gearing RE, Mian IA, Barber J, Ickowicz A. A methodology for conducting retrospective chart review research in child and adolescent psychiatry. J Can Acad Child Adolesc Psychiatry. 2006 Aug;15(3):126-34. PMID: 18392182; PMCID: PMC2277255.

Eldredge JD. Evidence-based librarianship: an overview. Bull Med Libr Assoc. 2000 Oct;88(4):289-302. PMID: 11055296; PMCID: PMC35250.

Worster A, Haines T. Advanced statistics: understanding medical record review (MRR) studies. Acad Emerg Med. 2004 Feb;11(2):187-92. PMID: 14759964.

Salpekar, Jay A et al. "Neuropsychiatry as a Paradigm Propelling Neurology and Psychiatry into the Future." BJPsych open 11.2 (2025): n. pag. Web.

Lennox BR. The clinical experience and potential of brain imaging in patients with mental illness. Front Hum Neurosci. 2009 Dec 23;3:46. doi: 10.3389/neuro.09.046.2009. PMID: 20087443; PMCID: PMC2808113.

Willis LD. Formulating the Research Question and Framing the Hypothesis. Respir Care. 2023 Aug;68(8):1180-1185. doi: 10.4187/respcare.10975. Epub 2023 Apr 11. PMID: 37041024; PMCID: PMC10353175.

Banks NJ. Designing medical record abstraction forms. Int J Qual Health Care. 1998 Apr;10(2):163-7. doi: 10.1093/intqhc/10.2.163. PMID: 9690890.

Use a streamlined approach for medical record abstraction. Qual Lett Healthc Lead. 1998 Jun;10(6):14-5. PMID: 10180626.

Findley TW, Daum MC. Research in physical medicine and rehabilitation. III. The chart review or how to use clinical data for exploratory retrospective studies. Am J Phys Med Rehabil. 1989 Jun;68(3):150-7. PMID: 2730784.

Tsou AY, Lehmann CU, Michel J, Solomon R, Possanza L, Gandhi T. Safe Practices for Copy and Paste in the EHR. Systematic Review, Recommendations, and Novel Model for Health IT Collaboration. Appl Clin Inform. 2017 Jan 11;8(1):12-34. doi: 10.4338/ACI-2016-09-R-0150. PMID: 28074211; PMCID: PMC5373750.