

The Value of Case Reports for Graduate Medical Education

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Introduction

Traditionally, health professionals have relied on case reports to share important new medical information. Yet over the past several decades, case reports as a proportion of all medical publications have decreased, even as the number of journals focusing on case studies have increased.¹ We believe the strengths of individual case reports greatly outweigh the weaknesses associated with studying a single patient, and they continue to supply valuable information to residents and fellows who deliver patient care, while also strengthening the trajectory of evidence-based medicine.^{2,3}

Notable Single Case Reports

Single case reports have led to 2 Nobel Prize awards: the 1956 prize for the discovery of cardiac catheterization⁴ and the 2005 prize for the discovery of the link between *H. pylori* and gastroduodenal Crohn's disease.^{5,6} Other examples of notable single case reports include the discovery of Kawasaki disease,⁷ Joseph Lister's revolutionary treatment of a compound leg fracture with carbolic acid rather than amputation,⁸ and Eric Jacobsen's discovery of the beneficial effects of disulfiram for managing alcoholism.⁹

Lessons From COVID-19

In early March 2020, clinicians in Washington State identified a patient with SARS-CoV-2.¹⁰ This widely cited case report alerted health professionals to a novel highly transmissible infectious disease. Subsequent case reports have described unusual findings linked to COVID-19, including thromboembolic complications,¹¹ transmission of the disease from an asymptomatic carrier,¹² and recurrent infection.¹³

Drug Discovery, Development, and Post-Marketing Complications

Another role for case reports concerns their use in drug discovery. In the early 18th century, well before

clinical trials had been developed, individual case reports alerted health practitioners to the value of cinchona as an antipyretic.¹⁴ Now, the World Health Organization Model List of Essential Medicines includes quinine, the active ingredient of cinchona.

Patients with rare genetic diseases, often called "orphan diseases," sometimes benefit from drugs discovered to be beneficial in a single patient. Findings in a single young patient with Batten disease, a condition that causes vision loss along with neurological symptoms, led to the discovery of a splicing defect on the CLN7 gene and then to the rapid development of a treatment option.¹⁵

Post-marketing drug complications often appear as single case reports. Drug approval requires large expensive clinical trials to establish safety, but even the largest trial cannot exclude a rare, potentially serious complication. Published case reports can warn pharmaceutical companies, clinicians, and patients about an unsuspected and dangerous side effect.¹⁶

N-of-1 Trials: A Special Type of Case Report

Because each patient has a unique social, environmental, and genetic background, responses to the same drug will be heterogeneous. Thus, N-of-1 trials, in which a single patient is the entire trial, can provide valuable patient-specific treatment options.^{17,18} N-of-1 trials are more complex than simple case reports because they incorporate some randomized controlled trial (RCT) elements.¹⁹ Although results obtained from RCTs provide stronger support for findings than N-of-1 trials, with careful design, clinicians can collect valuable information from a single patient.^{20,21}

To ensure scientific rigor, the Consolidated Standards of Reporting Trials (CONSORT) extension for N-of-1 trials supplies the standardized method for reporting them.²² If performed in a standard, well-defined way, a single N-of-1 report can be combined with similar studies in other patients. For example, Basilisco and colleagues combined data from individual case reports to examine patient satisfaction with

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therapy for chronic constipation.²³ As pointed out in the revised CONSORT description, N-of-1 trials offer a practical approach for research based on single patients who might be reluctant to enter a conventional RCT.

Case Reports as Educational Tools

Although Accreditation Council for Graduate Medical Education (ACGME) Common Program Requirements vary by specialty, a common requirement is that residents and fellows must participate in scholarship.²⁴ As one of the possible scholarly activities for fellows in surgical critical care and ophthalmology, the ACGME specifically mentions publication or presentation of case reports.^{25,26} This requirement is intended to enhance critical thinking, a major educational goal for postgraduate education.²⁷

Collecting information for a case report is the first step in preparing the material to be published. Key additional steps include a literature search, selecting coauthors, obtaining the patient's approval, selecting an appropriate journal, and writing a concise paper that will benefit other health professionals. Many resident and fellowship programs are affiliated with an educational institution where there is a dedicated librarian to help prepare a literature review and offer guidance for selecting an appropriate journal. Utilizing such a service can speed the preparation process. Several full-text reports are available to assist in preparing an interesting and valuable case report.²⁸⁻³² The BOX presents a summary of ideas about how to prepare a case report.

For more than 60 years, the Case Records of the Massachusetts General Hospital, published in the *New England Journal of Medicine*, has presented case reports on diverse topics. When carefully prepared and critically analyzed, case reports add value to the process of medical education.³³

Discussion

In the age of big data, we believe case reports are still valuable. Their weaknesses include the inability to generalize results or to assess causality, 2 valuable features of larger studies.

However, as outlined above, small studies offer several advantages.

A major part of resident and fellow training is preparing future physicians to practice evidence-based medicine, often based on information obtained from large trials or from meta-analytic studies. Since evidence from these sources comes from groups of patients, supplemental N-of-1 data obtained by

BOX Tips for Publishing a Case Report

- If available, make use of a reference librarian.
- Review recent issues of your target journal using their author guidelines.
- Check with your institutional review board, though a case report is not usually considered research.
- To comply with HIPPA regulations, obtain patient permission.
- Use “We believe . . .” instead of “This is the first report . . .”
- Provide key references but not an extensive literature review.
- Keep your report focused on the main points.
- Work closely with the physicians and other health care professionals responsible for the patient's care.

residents or fellows from individual patients adds additional value.^{34,35}

With proper training and mentorship, residents, fellows, and practicing physicians can collect and publish valuable information yielding new insights about disease management from their own firsthand unique patient experiences. Publishing a case report requires only permission from a subject able to provide informed consent.³⁶ A major advantage for a trainee whose time is limited is that a case report is not usually considered research and thus avoids the need for time-consuming evaluation by an institutional review board. Case reports provide detailed qualitative and quantitative clinical information on individual patients, traditionally not available from experimental studies. Program directors should encourage trainees to write case reports as part of the process of learning about medical discovery and research. Since clinical vignettes are popular features at regional and national meetings, program directors can help trainees select and prepare appropriate examples for publication.

Conclusions

In addition to educating residents, fellows, and other health care professionals, case reports facilitate descriptions of dangerous new diseases and are vital for discovery of post-marketing drug-related complications and detecting patient-specific disease variation. When combined with findings from other types of studies, case reports add evidence to advance our scientific understanding of diseases processes. For these reasons, residents and fellows should consider writing case reports as part of graduate medical education scholarship and should be actively encouraged to transform the cases they see into disseminatable work.

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