

How to Read a Case Report (or Teaching Case of the Month)

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Introduction

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Case reports are of minor importance in evidence-based medicine but can nonetheless make meaningful contributions to both knowledge and education. Although many traditional medical journals publish fewer case reports in this era of space constraints and preoccupation with Impact Factors, new Internet-based journals are appearing that focus exclusively on reports of individual cases. Given the variability of documentation, objectivity, and interpretation among the case reports now accessible by clinicians and trainees, it is important to be able to read them critically and to use the information they contain appropriately. This article discusses factors to consider in evaluating individual case reports, and provides a practical semi-quantitative scheme for assessing their potential validity and educational value. Key words: case reports, publishing, medical writing, conflict of interest, medical education, research, critical thinking, evidence-based medicine. [Respir Care 2009; 54(10):1372–1378. © 2009 Daedalus Enterprises]

Introduction

Case reports constitute a small segment of the medical literature—about 7% of the articles published in general medical and family practice journals, according to one study.¹ RESPIRATORY CARE publishes, on average, about one per month. In terms of their role in establishing the efficacy of therapies and guiding clinical practice, reports of individual cases are also at the bottom of the list when it comes to evidence-based medicine.² Nonetheless, case reports have an established role in the advance of medical knowledge and in health care education, and knowing how

to read them critically is important for trainees, practitioners, and researchers alike.

The purposes of this paper are to review the types and uses of case reports, to describe characteristics and attributes that may affect the scientific validity and clinical value of an individual report, and to provide a practical approach for reading them critically. Further discussions of how case reports fit into the medical literature, and practical guidelines on how to write them, have previously been published in this journal³⁻⁵ and elsewhere.⁶⁻²¹

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The Importance of Individual Cases in Education and Clinical Practice

For clinicians, the routine of daily work revolves around interactions with individual patients dealt with one at a time, as with work rounds, morning report, and shift-change handoffs. The information transmitted at such times must be complete and accurate, and the press of work load requires that the process be efficient. This is why so much emphasis is placed on structured presentations and standardized procedures for documentation and information transfer among clinicians.

Much of medical education is built on exposure to individual cases. General concepts must be grasped, but experience with specific patients is important for imprinting these concepts in learners' minds and demonstrating their relevance. Case-based conferences, which begin with a description of one patient's presentation and findings and then expand the discussion to broader considerations of pathophysiology and management, are cornerstones of continuing education and quality-improvement activities in hospitals and other health-care settings. The format is equally applicable for professional societies, as with the American Association for Respiratory Care (AARC) Professor's Rounds. About 8% of each year's OPEN FORUM abstracts, presented as poster displays and discussed at mini-symposia during the AARC annual meeting, describe and discuss an individual case.

Individual cases are also used by industry in promotional activities and marketing. Such uses range from testimonials in media advertising to more detailed case vignettes presented as illustrations of the benefits of a particular diagnostic or therapeutic device. In the past, some OPEN FORUM abstracts—and even published case reports—have proven to be thinly-disguised examples of the latter, providing a good example of the need for critical assessment skills on the part of both conference attendees and journal readers.

Reports of Individual Cases in the Medical Literature and on the World Wide Web

Throughout their publication history most medical journals have featured case reports along with reports of original research, review articles, and editorials. However, with the rise of evidence-based medicine and increasing constraints on the number of editorial pages in each issue, many journals publish fewer case reports than in the past; some no longer accept them at all. An additional element is the Impact Factor, which assesses the number of times a journal's articles are referred to in subsequent articles, expressed as a citation rate per article published by the particular journal. Case reports receive few citations, and despite the fact that the Impact Factor has been widely

criticized for imprecision, inapplicability, and unfairness,²²⁻²⁴ its popularity has probably contributed to a reluctance on the part of journals—including those dealing with respiratory care^{25,26}—to accept traditional case reports.

Paradoxically, at a time when competition for space and citation pressure are constraining the publication of traditional case reports in mainstream journals, several new Internet-based journals and blogs devoted exclusively to case reports are appearing. *BMJ Case Reports*²⁷ “aims to publish a high volume of cases in all disciplines so that health-care professionals, researchers and others can easily find clinically important information on common and rare conditions.” Its editor notes that case reports remain important even in the era of evidence-based medicine, citing the example that “decisions to withdraw drugs from the market because of harm are usually made on scientific evidence coming from spontaneous case reports (or case series) rather than randomized controlled trials.”²⁸ Aimed especially at general practitioners, *BMJ Case Reports* solicits submissions even if the cases represent nothing new or unique but contain well-documented clinical descriptions.

Two other new case reports journals based in the United Kingdom, the *Journal of Medical Case Reports* (<http://jmedicalcasereports.com/jmedicalcasereports>) and *Cases Journal* (<http://casesjournal.com/casesjournal>) are a project of Cases Network (<http://casesnetwork.com>), an arm of the Web-based physicians' networking site <http://www.Doctors.net.uk>. The *Journal of Medical Case Reports* seeks to publish “original case reports that expand medical knowledge,” whereas *Cases Journal* has as its stated goal the publication of “any case that is ethical and understandable.”²⁹ Richard Smith, editor of *Cases Journal* and former editor of the *BMJ*, encourages every general practitioner to submit case reports, noting that “they don't have to be ‘original and important’ because we believe that every interaction with a patient is unique and that every case offers an opportunity to learn.”³⁰ An eventual goal of *Cases Journal* is to assemble a searchable database of thousands of cases that subscribers could turn to for education and help in managing their own patients.³⁰ Cases Network journals are advertised as open-access and indexed in PubMed.

A fourth entrant in this new arena of Web-based journals is *International Medical Case Reports Journal*, published by Dove Press (<http://www.dovepress.com/international-medical-case-reports-journal-journal>). According to its Web site, this is “an international, peer-reviewed, open-access, online journal publishing original case reports from all medical specialties. Previously unpublished medical posters are also accepted relating to any area of clinical or preclinical science.”³¹ As with the other 3 journals, this is a proprietary, subscription service.

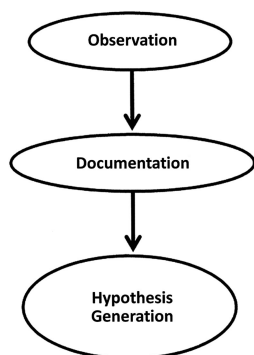


Fig. 1. Schematic diagram of the way in which a case report contributes to scientific knowledge. Careful documentation of what happened in the case in question can lead to the generation of a hypothesis about causation or appropriate intervention, which in turn can be investigated using the scientific method.

In addition to these sources, and farther still from the traditional medical journal at the periphery of scholarly publishing, are blogs inviting clinicians to post patient case histories, supporting images, and other data. At least one of these is operated as a “guess the diagnosis” quiz. Such sites are operated by individuals, tend not to be affiliated with professional organizations or academic institutions, and generally mention neither peer review nor informed consent. The proliferation of these sites as well as other new publications, both on the Internet and elsewhere, emphasizes the importance of critical reading on the part of anyone who accesses them.

The Case Report as a Vehicle for Documenting New Knowledge

A well-documented account of something not previously reported in the literature can be a useful contribution.³ In his monograph on writing and publishing in the health sciences, Huth³² lists 4 types of cases that may constitute worthwhile contributions to the medical literature:

- A unique case that may represent a previously unknown syndrome or disease
- A case with the previously unreported association of 2 distinct diseases, suggesting a possible relationship between them
- An “outlier” with features strikingly outside the realm of what is usually seen with a particular disease
- An unexpected response or course suggesting a previously unrecognized therapeutic or adverse effect of intervention

To the above, for the purposes of RESPIRATORY CARE, might be added documentation of³:

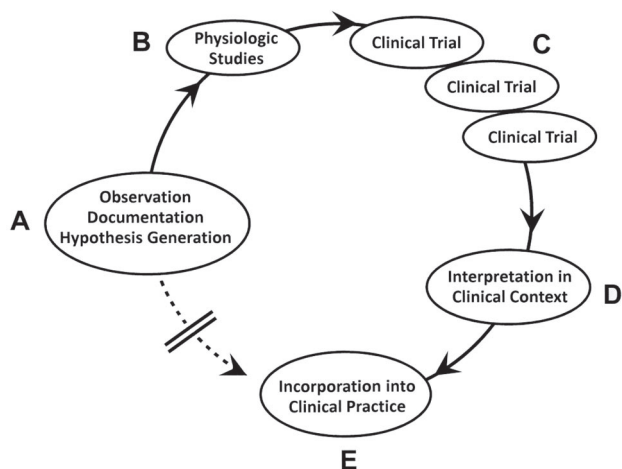


Fig. 2. How the observation and documentation of an individual case can lead ultimately to changes in practice. Although it is possible to speculate about mechanisms and the potential for broader application of what happened in a single case, justification for changing the future care of patients requires many more steps and substantially higher levels of evidence than can be derived from that one experience.

- A previously unreported finding in a rare condition that suggests a possible pathogenetic mechanism
- Demonstration in a patient of a phenomenon or response to intervention that was previously demonstrated only in animal models
- A new manifestation or finding, or clearer demonstration of a known feature of a disease, using a new technology or method
- Demonstration, by means of modern technology, of known physiologic principles through the findings in a patient with a rare condition
- A clinically important hazard or potential problem associated with the use of a diagnostic or therapeutic device

Case reports are well suited for hypothesis generation (Fig. 1). That is, careful documentation of a previously unrecognized phenomenon, association, or event can guide an investigator in designing further research to determine whether that single observation can be generalized to other circumstances or used in patient management. However, recalling that anecdotal observation, particularly of a single case, constitutes the lowest level of evidence in the hierarchy of evidence-based medicine,² case reports should not be used as justification for introducing or changing therapy. That demands higher levels of evidence,³ which may start with bench or physiologic studies but generally requires one or more clinical trials, as well as assessment of their applicability to the specific clinical setting (Fig. 2).

HOW TO READ A CASE REPORT (OR TEACHING CASE OF THE MONTH)

Table 1. Evaluating the Validity and Educational Value of a Case Report

General

- Does the diagnosis satisfy accepted criteria, and are sufficient data provided to assure this?
- If the report emphasizes a new observation, manifestation, intervention, or outcome, is sufficient information provided to convince the reader that it has not previously been reported?
- Is a convincing case made that the features or events described were actually due to the condition or intervention under discussion?
- Is enough detail provided so that the reader would be able to recognize and diagnose a similar case?

Title

- Is it clear and easy to understand?
- Does it accurately represent the report's contents and focus?

Abstract

- Does it provide an accurate capsule of what was unique or especially instructive about the case and why it was published?
- Does it agree completely with the body of the text?
- Is everything in the abstract included in the report itself?

Introduction*

- Does it indicate specifically what the report is about and why it is important?
- Does it adequately define and describe the entities to be discussed?
- Does it make the temporal, geographic, and clinical context of the report clear?
- Are all acronyms or new terms defined?
- Is it focused and concise?

Case Description

- Does it provide a clear picture of the patient's presentation and condition?
- Are the clinical setting, practice context, and other background information sufficiently complete so that the case's relevance to the reader's own practice can be determined?
- If appropriate, is it clear that informed consent was obtained from the patient?
- If the report describes new, experimental, or unapproved interventions, is there evidence of appropriate institutional notification and approval?
- Are the events and findings described in strict chronological order?
- Were the reported observations and measurements recorded at the time of the events described rather than on retrospective chart review?
- Are the nature and results of procedures and test results clear and appropriately referenced to normal findings?
- Are all the abnormalities described in the case description explained?

Tables

- Are the tables clear and easy to understand?
- Are all the variables, time intervals, and other information pertinent to the case included?
- Is all the information included in the tables necessary?
- Are units and normal ranges provided as needed?

Figures

- Are the included images the ones best suited to the case, rather than what just happened to be available?
- Do the figures add to the report rather than duplicating information in the text or tables?
- Are the figures of optimal magnification, resolution, and/or contrast, and appropriately cropped, for communicating what is intended?
- Are the findings in the images made clear to the reader, including the use of arrows and labeling as appropriate?
- Would inclusion of alternative or additional images have improved the clarity or teaching value of the report?
- Do the legends make clear what the figures show?

Discussion

- Is there a clear statement of what is important about this case and why it was reported?
- Is everything in this section necessary and relevant to the case?
- If the case is atypical or if there are unexpected features, are these explained?
- If there are missing features or the included information is incomplete, is this acknowledged and explained?
- Are the conclusions and recommendations made appropriately constrained and justifiable from the information presented?
- Has the author avoided unwarranted extrapolation and generalization?

References

- Does it appear that the author's review of the literature was complete?
- Is the reader directed to accessible sources for more comprehensive information on the subject of the report?
- Are key original descriptions or essential prior reports included?
- Are only directly relevant references included?
- Are citations to obscure, outdated, or inaccessible sources avoided?

* Content may vary with format, as with case reports presented as unknowns in some journals.

Table 2. Special Considerations in Assessing a Case Report Involving a New Intervention or Use of a New Device

Is an adequate case made that it was necessary?
No comparable approved intervention or device available
Usual interventions inappropriate or unsuccessful
Physiologic and/or clinical need for additional intervention demonstrated
Is it described in sufficient detail so that the reader could recognize the need and duplicate what the author did?
Is enough information provided to convince the reader that the observed changes or events were due to the intervention or device in question, and not to physiologic variation, the natural course of disease, or some other intervention?
Is appropriate attention given to the potential down sides?
Patient and/or environmental safety
Adverse effects
Patient discomfort
Cost implications

Records of the Massachusetts General Hospital in the *New England Journal of Medicine*, several features in *JAMA*, and *Chest's* "Pulmonary and Critical Care Pearls." In *RESPIRATORY CARE*, the analogous feature is the "Teaching Case of the Month,"³³ presenting exceptionally well characterized examples of conditions, findings, or responses to intervention that serve as starting points for concise discussions of the teaching points they raise.

Prior to publication, case reports submitted to *RESPIRATORY CARE* undergo rigorous peer review. Typically, 3 external referees evaluate the manuscript once the editor determines that it is potentially worthy of publication in terms of subject, format, and various technical matters. The reviewers provide expert analysis and, if eventual acceptability for publication seems feasible, they recommend that the author consider making specific changes aimed at improving the manuscript. One or more rounds of revision and reevaluation follow; almost never is a submitted case report accepted "as is." Nevertheless, despite the quality safeguards implicit in this sequence, the peer review process is not perfect, in this or any other journal. Reports that are inaccurate, interpreted wrongly, or biased in important ways do find their way into the medical literature. As a result, it behooves the reader to approach each published case report objectively and with a degree of skepticism. The following discussion describes what to look for in reading a case report, and provides an assessment scheme for judging its validity and potential worth as an educational exercise.

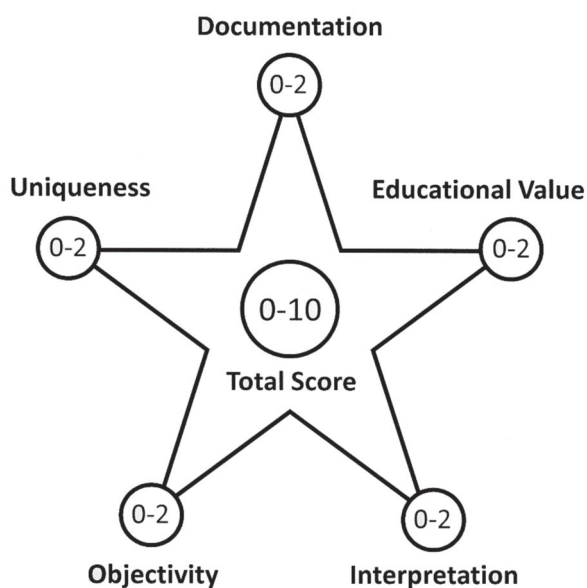


Fig. 3. Conceptual scheme for evaluating the quality of a case report. Assignment of scores in each of the 5 component domains is described in Table 3. Reports scoring 9 or 10 points are likely to be valid and worthwhile contributions to the literature; a score of 6–8 suggests that the reader should be cautious about the validity and/or clinical value of the report; reports scoring 5 points or less are of great concern with respect to the 5 domains shown in the figure and should not be published.

The Case Report as a Teaching Exercise

While it would be a mistake to base the assessment and management of future patients on what happened in a single instance, an individual case may serve as the starting point for a valuable teaching exercise. Many journals regularly feature case-based topic reviews and educational features. Familiar examples are the Case

Evaluating the Validity and Educational Value of a Case Report

Table 1 lists a series of questions for a reader to ask about a case report, whether it describes something new or is presented as a teaching exercise. After a few general considerations, each section of the report is examined in turn, including its tables and figures. The questions are mainly the same ones asked by the Journal's editor in deciding whether to accept and publish the manuscript. Some of them are technical and relate to how well the article is written. Most, however, deal with the accuracy and believability of the observations described, and how reasonably the author has interpreted these in light of previous knowledge.

Reports dealing with a diagnostic or therapeutic intervention deserve special consideration by the reader, particularly if a commercial device is involved (Table 2). If the developer or manufacturer of a product or device was involved in any aspect of the case report, assuring objectivity and completeness of its contents can be challenging. It is especially important that the experience reported in this specific instance not be used to generalize broadly with respect to use of the device or procedure in other

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Table 3. Evaluation of a Case Report According to the 5-Component Scheme Shown in Figure 3

Component	Points	Criteria
Documentation	2	Complete, accurate, appropriate: everything needed to demonstrate that case is what the author contends it is, including appropriate diagnostic tests, physiologic data, and images; no coexisting conditions or manifestations casting doubt on diagnosis, attribution of findings, or reasons for observed events; appropriate citation of references for case documentation
	1	Most usual criteria for diagnosis, manifestations, or outcome are fulfilled, although confirmatory or additionally instructive data/images not included; case is apparently as the author claims, although additional documentation would strengthen it; references appropriate but suboptimal
	0	Insufficient data provided to be certain that the reported findings, phenomena, or events were due to claimed mechanism and not something else; other explanations not adequately excluded; incomplete references for documentation
Uniqueness	2	Satisfactory demonstration that the illness, manifestation, finding, complication, course, or intervention described has not previously been reported; appropriate citation of references to support uniqueness
	1	Although previously reported in the literature, this is the first report in this field or in this journal; references cited to substantiate this
	0	Subject of report has previously been documented in this field or in this journal; potential uniqueness cannot be determined from report
Educational value	2	Case described exactly fulfills accepted definition and/or description, without missing or atypical features; case is sufficiently "classic" or typical that reader could use it as a template for the future with respect to the condition or point under discussion; case and discussion facilitate comprehension and appreciation of topic; references complete, appropriately recent, and accessible, providing opportunity for further learning on topic
	1	Case has general attributes of claimed entity or occurrence, but with missing, atypical, or contradictory features rendering it less than a "classic" example; incomplete discussion of topic for optimal instructional benefit in allotted space; references less than ideal
	0	Case is sufficiently incomplete or atypical that generalization to other cases could be confusing or misleading; case lacks important aspects of "classic" description of entity under discussion; instructional content weak or very incomplete; references incomplete, irrelevant, outdated, or inaccessible
Objectivity	2	Data complete, contemporaneous, and presented in format appropriate for setting; no evidence of selective data presentation or emphasis; absent or atypical features identified and explained; possible alternative diagnoses or explanations listed and discussed; citation of alternative or contradictory sources provided if warranted; no evidence of author advocacy or bias related to conflict of interest
	1	Data presented in appropriate format but with uncertain completeness, timing or selection; evidence of subjectivity or selectivity in presentation of case; discussion presented such that incomplete or atypical features or alternative explanations are omitted or deemphasized; undue emphasis on references supporting author's position
	0	Selective presentation of data; evidence of author bias in favor of claimed diagnosis, event, intervention, or commercial product, with insufficient presentation of inconsistent, or contradictory material; inadequate presentation and consideration of alternative explanations or approaches; only references supporting author's position are cited
Interpretation	2	Conclusions and recommendations conservative, restricted to those consistent with and supported by evidence presented, and appropriately linked to cited literature; if reporting something new, acknowledgement by author of limitations of individual case and need for additional evidence; any conjectures about mechanisms or implications for therapy clearly identified as such; avoidance of general clinical recommendations extending beyond context of case
	1	Some conclusions overstep the data presented, although general clinical recommendations based on this case are avoided; incomplete linkage of presented data to literature
	0	Extrapolation of conclusions about mechanisms or interventions well beyond the data presented; literature citation in support of conclusions biased and/or incomplete; statement of general recommendations for patient management or use of therapy, clinical approach, or commercial product based solely on this case

Implications of total score:

9–10: report is likely to be a worthwhile contribution to the literature

6–8: reader should be cautious about validity and clinical value of report

5 or less: report is of insufficient quality for publication

patients or clinical circumstances. A number of unfortunate instances have occurred in the past at the RESPIRATORY CARE OPEN FORUM,³⁴ with posters and presentations that were inappropriately influenced by device manufacturers, and while the more stringent review process for published case reports makes this problem much less likely, it is important for readers to be aware of the possibility.

Whether it documents new scientific knowledge or provides an educational resource on a previously known entity, the potential validity and value of a case report are determined by the following characteristics:

- How well the case is documented
- Its uniqueness and/or educational value
- The objectivity with which it is described
- How the information is interpreted with respect to broader principles and applicability to other patients

Figure 3 depicts these 5 characteristics, or domains, for assessing a case report, and illustrates how they relate to one another. The figure also incorporates a scoring system for rating the report on a scale of 0 to 10. A score between 0 and 2 is assigned for each of the domains, such that a case report meeting all the criteria for valid data and appropriate presentation would score 10 points, implying that it was a valuable contribution to the literature, whose contents could be relied upon by the reader. Scoring for each of the figure's domains is explained in Table 3.

The value of individual case reports should be kept in perspective in the larger context of the scientific literature. Appropriately viewed, however, the case report remains an important cog in the wheel of medical progress, which can stimulate clinician interest, generate further research, or serve as a helpful educational tool. Application of the principles summarized in this article can help the reader to approach case reports critically but also to gain maximum benefit from them.

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