

# Writing Case Reports Can Improve Seven Components in Clinical Reasoning

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**Abstract:** Case reports provide scientific knowledge and opportunities for new clinical research. However, it is estimated that less than 5% of cases presented by Japanese generalists at academic conferences are published due to various barriers such as the complex process of writing articles, conducting literature searches, the significant time required, the reluctance to write in English, and the challenge of selecting appropriate journals for publication. Therefore, the purpose of this opinion paper is to provide clinicians with practical tips for writing case reports that promote diagnostic excellence. In recent years, clinical practitioners have been striving for diagnostic excellence and optimal methods to accurately and comprehensively understand the patient's condition. To write a case report, it is essential to be mindful of the elements of diagnostic excellence and consider the quality of the diagnostic reasoning process. We (the authors) are seven academic generalists who are members of the Japanese Society of Hospital General Medicine (JSHGM) – Junior Doctors Association, with a median of 7 years after graduation and extensive experience publishing case reports in international peer-reviewed journals. We conducted a narrative review and discussed ways to write case reports to promote diagnostic excellence, leveraging our unique perspectives as academic generalists. Our review did not identify any reports addressing the critical points in writing case reports that embody diagnostic excellence. Therefore, this report proposes a methodology that describes the process involved in writing diagnostic excellence-promoting case reports and provides an overview of the lessons learned. Based on our review and discussion, we explain the essential points for promoting diagnostic excellence through case reports categorized into seven components of clinical reasoning. These strategies are useful in daily clinical practice and instrumental in promoting diagnostic excellence through case reports.

**Keywords:** case reports, clinical reasoning, diagnostic excellence

## Introduction

Case reports can provide new scientific knowledge and identify opportunities for clinical research.<sup>1-3</sup> However, it is estimated that less than 5% of cases presented at annual academic conferences for Japanese generalists are subsequently published due to various barriers to writing case reports and clinical image descriptions.<sup>4</sup> Some barriers for Japanese generalists to writing case reports were reported as follows: the process of writing articles, literature search/obtaining articles, the time required to write articles, reluctance to write articles in English, selecting a journal for publication, and so on.<sup>4</sup> We, a group of seven academic generalists belonging to of the Japanese Society of Hospital General Medicine (JSHGM) – Junior Doctors Association with a median of 7 years practice after graduation and experience at publishing case reports in international peer-reviewed journals, have previously published guidance on the process of transforming conference presentations to publications and tips on writing clinical image reports,<sup>5,6</sup> which emphasized the importance of finding a mentor and clarifying the writing process. However, mentors can be difficult to find.<sup>5,7</sup> Therefore, before

writing case reports, researchers should find a mentor with extensive experience in publishing such reports in international peer-reviewed journals. Young generalists who do not have a good mentor in their academic environment should try to find one through academic conferences.<sup>5</sup>

In recent years, clinicians have been striving for diagnostic excellence which is defined by timeliness, safety, effectiveness, patient-centeredness, efficiency, and equity.<sup>8</sup> In order to promote diagnostic excellence through case reports, it is essential to consider the components of clinical reasoning.<sup>9</sup> We reviewed the literature and did not find any reports providing guidance on writing case reports that embody diagnostic excellence. This report aims to provide practical tips for clinicians by describing the diagnostic process and summarizing informational messages, thereby providing guidance in writing case reports that embody diagnostic excellence.

## Method

We conducted a narrative review and discussed ways to write case reports that promote diagnostic excellence. Based on the outcomes, we summarize the essential points for writing case reports that promote diagnostic excellence, categorized according to seven components of clinical reasoning (Table 1).<sup>10</sup>

## Information Gathering

Case reports are a valuable educational tool in the medical field, offering benefits such as improved critical thinking and writing skills.<sup>11</sup> When writing diagnostic excellence-case reports, especially clinical image reports, clinicians must determine whether the case in question provides a “visual impact” through images, or presents a “learning point”.<sup>6</sup> Cases with “visual impact” include those in which patient images relate directly to the diagnosis or have a noteworthy “characteristic.” Gathering information on hallmark physical examination and imaging findings specific to the disease is useful. Preserving images or videos taken before and after treatment may provide opportunities for writing future reports. In cases with a “learning point”, it

**Table 1** Seven Components of Clinical Reasoning That Need to Be Considered When Writing Case Reports That Promote Diagnostic Excellence

Component	Point
1. Information gathering	<ul style="list-style-type: none"> <li>• Clinicians should consider whether the case provides a “visual impact” directly related to the diagnosis.</li> <li>• Cases that present a “learning point” are also suitable for promoting diagnostic excellence.</li> </ul>
2. Hypothesis generation	<ul style="list-style-type: none"> <li>• When writing reports about atypical cases, it is crucial to document the process that led to the final diagnosis.</li> <li>• Use characteristic clinical manifestations and test findings to conduct searches for similar case reports.</li> </ul>
3. Problem representation	<ul style="list-style-type: none"> <li>• In cases where the initial diagnosis does not align with the course of the disease, it is essential to periodically reevaluate the problem to arrive at a final diagnosis.</li> <li>• It is crucial to report how similar diagnostic errors can occur.</li> </ul>
4. Differential diagnosis	<ul style="list-style-type: none"> <li>• It is crucial to systematically compile a list of differential diagnoses and logically narrow down to the final diagnosis.</li> </ul>
5. Leading or working diagnosis (Collaboration)	<ul style="list-style-type: none"> <li>• Collaboration with patients and other researchers can be useful for arriving at an accurate diagnosis.</li> <li>• In situations where necessary diagnostic tests are not locally available, contacting authors of similar case reports or considering alternative diagnostic procedures may be useful for achieving a diagnosis.</li> </ul>
6. Diagnostic justification	<ul style="list-style-type: none"> <li>• Diagnostic justification involves using a clear and definitive analysis, such as checking against set diagnostic criteria.</li> <li>• The essence of diagnostic excellence in case reports lies in the iterative process of learning from both successes and failures in diagnosis.</li> </ul>
7. Management and treatment	<ul style="list-style-type: none"> <li>• Clinicians must implement evidence-based management and treatment approaches.</li> <li>• Conducting appropriate follow-up and documenting turning points or changes in patient progression is essential and provide evidence that the diagnosis and treatment are correct.</li> </ul>

is important to clarify the educational points.<sup>12</sup> Reports that are focused and which explain why the diagnosis and treatment were challenging, or why diagnostic errors occurred, can be very instructive for readers.

## Hypothesis Generation

When writing reports on atypical or rare cases, it is important to document the hypothesis-generation process that led to the final diagnosis by referring to previous reports. A thorough literature review should be conducted to identify similar case reports and similarities between the case under consideration and previously reported cases to develop a provisional diagnosis. The value of case series has been questioned in the era of evidence-based medicine. On the other hand, case series are still highly sensitive to the discovery of novelty and thus remain one of the cornerstones of medical progress and provide medicine with many new ideas.<sup>13</sup> If a case series is to be described, the information must be documented completely and transparently so that it can be reproduced by others.<sup>14</sup>

Combining characteristic clinical manifestations and test findings as search terms can aid in conducting searches that lead to similar case reports for sporadic cases such as genetic disorders or toxicological conditions.<sup>15,16</sup> In recent years, some unique specialized search engines have been reported to be superior to Google Search and PubMed for web search as an aid in the diagnostic process for rare diseases.<sup>17</sup> This approach enables clinicians to achieve an accurate diagnosis, conduct appropriate discussions, and promote diagnostic excellence using case reports. Additionally, highlighting the differences between previously reported cases and the case under consideration can emphasize the rarity of the case.

## Problem Representation

Problem representation entails taking a structured diagnostic approach to a diagnostic problem.<sup>18</sup> Cases in which the initial diagnosis does not align with the disease course, leading to a reevaluation before reaching a final diagnosis are suitable for case reports to promote diagnostic excellence. For example, in cases in which the chief complaint did not improve despite an initial diagnosis, it is valuable to report the clinical findings that did not align with the initial diagnosis, and discuss how the problem was reassessed leading to a different final diagnosis.<sup>19</sup> In such cases, it is crucial to report how similar diagnostic errors can occur.

## Differential Diagnosis

To write a case report promoting diagnostic excellence, it is critical to systematically compile a list of differential diagnoses, and logically and scientifically narrow down the final diagnosis from the list of differential diagnoses. A systematic framework for constructing a differential diagnosis is necessary for the beginning student, for example, using a two-dimensional grid where one axis is anatomic (referring to organs and structures) and the other axis is type of disease (congenital, metabolic, infectious, etc.).<sup>20</sup> For diagnostic excellence, it is important to carefully rule out the differential diagnoses without choosing the most obvious diagnosis. Failure to rule out differential diagnoses may lead to an incorrect diagnosis. In addition, the list of potential differential diagnoses can provide valuable information to readers with similar cases. As exceptions, some case studies lead directly to a diagnosis through disease-specific findings. These can also serve as a lesson for readers.

## Leading or Working Diagnosis (Collaboration)

Collaboration with patients and other researchers can be useful for arriving at an accurate diagnosis in case reports. It has been reported that by sharing visit notes, patients can avoid diagnostic delays and missed diagnoses, as well as identify documentation errors that may compromise diagnostic accuracy.<sup>21</sup> For example, in a case of suspected bacteremia due to a mouse bite, it may be important for the clinician to visit the patient's home to collect a mouse specimen, with the patient's permission.<sup>22</sup> If specialized diagnostic tests such as genome analysis are not available, it may be worth contacting authors who have written case reports about similar cases to request their assistance with performing the tests or considering alternative diagnostic procedures may be useful for achieving a diagnosis, especially in cases that are difficult to diagnose.

## Diagnostic Justification

Diagnostic justification is important in writing case diagnostic excellence-case reports. This requires using a clear and definitive analysis such as checking against a set of diagnostic criteria. This is particularly important for cases with diagnostic and treatment challenges. When diagnostic errors occur and result in delays, physicians must analyze the causes of the error and include messages about lessons learned to improve future diagnoses.<sup>23</sup> Furthermore, providing an appropriate interpretation of any results that do not align with the final diagnosis is crucial. Overall, the essence of case reports to promote diagnostic excellence lies in the iterative process of learning about diagnosis from both successes and failures, while keeping the goal of improving patient care at the forefront. The ability to identify and learn from opportunities for diagnostic improvement, especially in organizations, is also reported to be key to improving diagnostic safety.<sup>24</sup>

## Management and Treatment

Implementing evidence-based management and treatment approaches and reporting the outcomes are crucial for case studies promoting diagnostic excellence. Additionally, conducting appropriate follow-up and documenting turning points or changes in the disease course are essential. The improvement of the patient's condition may be the only evidence to confirm that the final diagnosis and treatment are correct.

## The Importance of Writing Case Reports to Promote Diagnostic Excellence

The merit of case report writing to promote diagnostic excellence lies in its contribution to the development of the academic field and the promotion of new clinical research.<sup>1,2</sup> Case reports are particularly valuable in shedding light on scientific findings that have been overlooked in clinical research.<sup>25</sup> However, clinicians face challenges such as time constraints, competing priorities, and administrative burdens that may hinder their ability to allocate resources to case report writing. In such situations, it would be beneficial to manage one's schedule to allocate "protected time" each week specifically for writing case reports. Orthopedic residency programs that have protected time for research have reported significantly more publications.<sup>26</sup> In addition, sharing case report writing among a team, rather than one person doing all the work, is an effective strategy. To evaluate the impact and outcomes of case report writing that promotes diagnostic excellence, it may be useful to consider metrics such as citation and download frequencies. Although citation rates for case reports are generally low, studies have found a close relationship between the number of citations and the number of downloads, suggesting that these indicators may play a complementary role in assessing the impact of case reports.<sup>27</sup>

## Limitations

This study provides guidelines for writing case reports that promote diagnostic excellence. However, it is important to acknowledge the limitations of its applicability. The opinion is based on the experience of a specific group of academic generalists within the JSHGM, which may limit its generalizability to other settings or specialties. It is important to acknowledge that this text reflects the experiences and views of clinicians within the Japanese healthcare system. Therefore, it may not be applicable in medical contexts with different clinical practices, resources, and cultural backgrounds. Additionally, it is crucial to consider issues of patient privacy, consent, and confidentiality when writing case reports in all settings. Establishing metrics and criteria for evaluating the effectiveness of proposed strategies in terms of diagnostic accuracy, patient outcomes, and improvements in clinical practice is critical. However, this statement does not provide clear metrics and criteria. Internal and external validation will be necessary to reach a conclusion. Finally, it is important to consider the potential for unintended consequences or negative outcomes associated with writing case reports. This includes publication bias and the possibility of disproportionately emphasizing rare or unusual cases at the expense of more common clinical scenarios.

## Conclusion

The purpose of this paper is to provide clinicians with practical tips for writing case reports that promote diagnostic excellence. To craft such a report, it is essential for clinicians to apply the seven components of clinical reasoning outlined above, regardless of their level of experience. These strategies are not only useful in daily clinical practice, but

also instrumental in promoting diagnostic excellence through case reports. It requires internal and external validation, has limitations that are not universally applicable, and requires further research.

## Acknowledgments

We thank Editage for editing a draft of this manuscript.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Funding

There is no funding to report.

## Disclosure

The authors report no conflicts of interest in this work.

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## References

1. Ortega-Loubon C, Culquichicón C, Correa R. The importance of writing and publishing case reports during medical training. *Cureus*. 2017;9(12):e1964. doi:10.7759/cureus.1964
2. Carey JC. The importance of case reports in advancing scientific knowledge of rare diseases. *Adv Exp Med Biol*. 2010;686:77–86.
3. Cohen H. How to write a case report. *Am J Health Syst Pharm*. 2006;63(19):1888–1892. doi:10.2146/ajhp060182
4. Kenzaka T, Kamada M. Barriers to preparation of case reports among Japanese general practitioners. *Saudi J Med Med Sci*. 2020;8(3):239–240. doi:10.4103/sjmms.sjmms\_604\_19
5. Yamashita S, Sasaki Y, Miyagami T, Kondo T. Five tips to help young, non-native speakers of English write reports of cases presented at academic conferences. *J Hosp Gen Med*. 2022;4:36–39.
6. Ishizuka K, Yamashita S, Katsukura S, Matsuura H. Five tips to guide beginners and young general physicians on writing clinical image reports. *J Gen Fam Med*. 2022;23(6):413–415. doi:10.1002/jgf2.569
7. Shikino K, Watari T, Tago M, Sasaki Y, Takahashi H, Shimizu T. Five tips on writing case reports for Japanese generalists. *J Gen Fam Med*. 2020;22(2):111–112. doi:10.1002/jgf2.395
8. Yang D, Fineberg HV, Cosby K. Diagnostic Excellence. *JAMA*. 2021;326(19):1905–1906. doi:10.1001/jama.2021.19493
9. Singh H, Connor DM, Dhaliwal G. Five strategies for clinicians to advance diagnostic excellence. *BMJ*. 2022;376:e068044. doi:10.1136/bmj-2021-068044
10. Daniel M, Rencic J, Durning SJ, et al. Clinical Reasoning Assessment Methods: a Scoping Review and Practical Guidance. *Acad Med*. 2019;94(6):902–912. doi:10.1097/ACM.0000000000002618
11. Packer CD, Katz RB, Iacopetti CL, Krimmel JD, Singh MK. A Case Suspended in Time: the Educational Value of Case Reports. *Acad Med*. 2017;92(2):152–156. doi:10.1097/ACM.0000000000001199
12. Aitken LM, Marshall AP. Writing a case study: ensuring a meaningful contribution to the literature. *Aust Crit Care*. 2007;20(4):132–136. doi:10.1016/j.auc.2007.08.002
13. Vandenbroucke JP. In defense of case reports and case series. *Ann Intern Med*. 2001;134(4):330–334. doi:10.7326/0003-4819-134-4-200102200-00017
14. Agha RA, Fowler AJ, Lee SY, et al. Systematic review of the methodological and reporting quality of case series in surgery. *Br J Surg*. 2016;103(10):1253–1258. doi:10.1002/bjs.10235
15. Cooper CM, Cheung PW, Penney EB, Linnoila JJ. Case 15-2020: a 79-Year-Old Man with Hyponatremia and Involuntary Movements of the Arm and Face. *N Engl J Med*. 2020;382(20):1943–1950. doi:10.1056/NEJMcp1913477
16. Nishizawa T, Ikenaka Y, Ichikawa G, Taguchi T. Thiamethoxam intoxication due to occupational inhalational exposure. *BMJ Case Rep*. 2022;15(11):e251110. doi:10.1136/bcr-2022-251110
17. Dragusin R, Petcu P, Lioma C, et al. Specialized tools are needed when searching the web for rare disease diagnoses. *Rare Dis*. 2013;1(1):e25001. doi:10.4161/rdis.25001
18. Nendaz MR, Bordage G. Promoting diagnostic problem representation. *Med Educ*. 2002;36(8):760–766. doi:10.1046/j.1365-2923.2002.01279.x
19. Kushiro S, Miyagami T, Kanai Y, Yang KS, Naito T. Delayed Diagnosis of Portal Vein Thrombosis Due to Premature Closure of Cholecystitis. *Am J Med*. 2021;134(11):e543–e545. doi:10.1016/j.amjmed.2021.05.015
20. Fulop M. Teaching differential diagnosis to beginning clinical students. *Am J Med*. 1985;79(6):745–749. doi:10.1016/0002-9343(85)90526-1
21. Blease CR, Bell SK. Patients as diagnostic collaborators: sharing visit notes to promote accuracy and safety. *Diagnosis*. 2019;6(3):213–221. doi:10.1515/dx-2018-0106
22. Kawashima A, Kutsuna S, Shimomura A, et al. Streptobacillus notomytis Bacteremia after Exposure to Rat Feces. *Emerg Infect Dis*. 2022;28(4):886–888. doi:10.3201/eid2804.204965
23. Miyagami T, Nakayama I, Naito T. What Causes Diagnostic Errors? Referred Patients and Our Own Cognitive Biases: a Case Report. *Am J Case Rep*. 2022;23:e935163. doi:10.12659/AJCR.935163

24. Mathews BK, Fredrickson M, Sebasky M, et al. Structured case reviews for organizational learning about diagnostic vulnerabilities: initial experiences from two medical centers. *Diagnosis*. 2020;7(1):27–35. doi:10.1515/dx-2019-0032
25. Cohen H. How to write a case report. *Am J Health Syst Pharm*. 2006;7:1888–1892.
26. Williams BR, Agel JA, Van Heest AE. Protected Time for Research During Orthopaedic Residency Correlates with an Increased Number of Resident Publications. *J Bone Joint Surg Am*. 2017;99(13):e73. doi:10.2106/JBJS.16.00983
27. Ruan QZ, Chen AD, Cohen JB, Singhal D, Lin SJ, Lee BT. Alternative Metrics of Scholarly Output: the Relationship among Altmetric Score, Mendeley Reader Score, Citations, and Downloads in Plastic and Reconstructive Surgery. *Plast Reconstr Surg*. 2018;141(3):801–809. doi:10.1097/PRS.0000000000004128

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