Research and diabetes nursing. Part 2: Process of critical review

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This article is the second in a six-part series addressing research and the DSN. Critical review is a key aspect of research and evidence-based care and, therefore, of clinical and professional practice. Critical review is an analytical and reflective process that involves judging the quality of research publications and their relevance to practice. This article outlines key aspects of how to review publications and conference presentations, how critical review applies to clinical care, and how this process can help develop writing and critical thinking skills. Also addressed are the general aspects of critical review, and a list of further reading and useful websites is provided. Specific considerations for particular research methods such as quantitative, qualitative, evaluation studies and audits will be addressed in later articles in the series.

Article points

1. Critical review is an analytical, reflective process that involves searching and reading literature on a particular topic and discussing the information using logic, knowledge of the topic, and professional judgment.
2. Critical review involves two main processes: initial or "skim reading" the publication, and then detailed critical reading.
3. Keeping up-to-date with research and having the ability the review publications critically enables DSNs improve their professional standing.

Key words

- Critical review
- Publication
- Research
- Writing

The ability to appraise research publications and presentations critically is a part of the research process. It is also essential to evidence-based care. Keeping up-to-date with current research is vital in all fields. The volume of publications in all formats makes it difficult to read every relevant publication, therefore it is important to develop the ability to determine rapidly the content and quality of a publication. Although many publications undergo editorial scrutiny and peer review before they are published, these processes are not foolproof. In addition, keeping up-to-date with research and having the ability to review publications critically enables DSNs improve their professional standing and writing skills.

The first article in this series (Dunning, 2011) discussed how to make decisions about the quality of research publications and their application to practice. This article intends to introduce the key aspects of the process of critical review, rather than be a definitive guide. Processes for reviewing different types of articles – quantitative, qualitative, evaluation and case studies – will be addressed in subsequent articles in the series.

Background

Critical review is an analytical, reflective process that involves searching and reading literature on a particular topic and discussing the information using logic, knowledge of the topic, and professional judgment. *Table 1* lists some of the benefits to taking a critical approach when reading research publications to create and maintain the academic basis for evidence-based diabetes education and management, and advancement in the discipline.

Most day-to-day reading involves "skim

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Page points

1. If a publication is relevant, a structured approach is needed to determine the quality and trustworthiness of the material selected.
2. Undertaking a critical review course and/or participating in journal club discussions and other relevant professional development processes help develop confidence and skills.
3. Critical review involves two main processes: initial or "skim reading" the publication, and then detailed critical reading.

reading" or flicking through journals, online information, articles selected for journal club discussions and conference presentations. This helps determine whether the publication is relevant to the particular area of practice or the reader's interest at the time. If the publication is relevant, a structured approach is needed to determine the quality and trustworthiness of the material selected.

READER

One method of commencing a critical review is embodied in the acronym "READER" (MacAuley, 1994):

R: Is the article *relevant* to your practice?
E: Is it *educational*: will it change how you practice?
A: Are the findings *applicable* to your practice?
D: *Discrimination*. Are the findings valid?
E: Can you *evaluate* the quality of the article?
R: What is your *reaction* to the article?

The acronym does not address the depth of critical thinking or reflection needed to review objectively and judge the scientific merit of a publication. However, DSNs new to critical review might find it a useful starting point. Undertaking a critical review course and/or participating in journal club discussions and other relevant professional development processes help develop confidence and skills.

The process of critical review

Critical review involves two main processes: initial or "skim reading" the publication, and then detailed critical reading.

Initial reading

Skim reading involves a quick first reading of the publication to gain an overall impression of the content, making a note of questions and/or issues you need to examine more carefully. "READER" can be useful in the initial reading to help formulate specific questions about information you do not understand or where you might need to seek further information.

It can help to think of the publication as a story. Like all stories, research publications have a theme, a beginning, a middle and an end. The story should flow logically so the connections among the sections of the publication are clear and easy to follow. Subheadings are like signposts, they help the reader negotiate the story and make it easier to read. Below is a list of common subheadings, along with the purpose of each section. A selection of questions you might ask yourself when critically reading the publication is shown in *Table 2*.

Table 1. Why is it important to review articles critically?

- To provide evidence-based clinical care:
  - Keep up-to-date and make informed decisions about current evidence.
  - Identify evidence to support clinical care or suggest the need for change.
  - Determine whether a publication or conference presentation is relevant to local needs and clinical practice areas.
  - Evaluate the evidence when developing care plans and clinical practice guidelines.
  - Contribute to clinical decision-making.
- In education and professional development:
  - Appreciate which research methods are suitable to particular research aim/questions and their relevance to clinical care.
  - Prepare assignments and literature review sections of articles, thesis and conference presentations.
  - Participate in journal club discussion groups.
  - Understand how journal peer reviewers critically review articles submitted for publication. Peer-reviewed publications are regarded more highly than non-peer-reviewed publications. Thus, peer reviewers work in partnership with authors and journal editors to ensure articles accepted for publication meet required standards of quality writing and scientific merit.
  - Being able to act as a peer reviewer or serve on the editorial boards of journals.
- In research and publication:
  - Publish research findings in peer-reviewed publications and conference presentations.
  - Develop research proposals and/or grant applications.
  - Judge conference presentations for awards.
  - Improve funding applications.

Title
Should reflect what the article is about.

Abstract
Abstracts summarise the main points in the article. Structured abstracts have an introductory background sentence, an aim, method, results and findings, and conclusion. Abstracts are usually short, between 100 and 300 words.

Literature review
Sometimes the literature review incorporates an introductory paragraph or separate subheading that describes the origins of the study and defines the scope of the article. The literature review should encompass relevant existing literature relating to the topic.

The literature review sets the context of the article. It should outline what is already known about the topic and identify the gaps in the literature it aims to address. That is, it shows how the study fits within the existing body of literature. The literature should be discussed by outlining the strengths and limitations of the work cited. Sometimes conceptual or theoretical frameworks are described as part of the literature review or as a separate subheading, especially for qualitative studies. The literature review should logically move the reader towards the next section of the article.

Aim or purpose
The aim is arguably the most important part of the article because it is the framework for the method, the results and the conclusion, as well as any implications for practice.

Methods
The method describes how the study was carried out. It usually has several subsections, for example sampling population. The sample selection process might include inclusion and exclusion criteria. The sample size is denoted as "*n*". The methods section may also contain the following subheadings: data collection process (there may be more than one if there is more than one aim); data collection instruments; data analysis techniques; and ethical considerations. Many journals require ethics approval from an appropriately constituted ethics committee before they will publish an article and will require a statement to that effect in the manuscript.

Results or findings
In the results section the authors should tell the reader what they found. In qualitative studies some discussion of the findings might also occur, consistent with the method.

Discussion
In the discussion section the authors tell the reader what the results mean, how the study relates to the existing literature, and provide some explanations for similarities and differences.

Strengths and limitations
A good discussion of the strengths and limitations helps the reader interpret the findings. It also provides important information about the validity and reliability of the results, which helps the reader make conclusions about the generalisability and/or transferability to other populations and settings.

Conclusion
The conclusion should not speculate too far beyond the study findings. It should address the aim of the study.

Other subsections typically found within research articles are acknowledgements, references, and tables and figures. Sometimes, the implications of the findings and areas for further research are included. Likewise, definitions of terms and a conceptual or theoretical framework for the study might be included, especially in publications reporting qualitative research. Subheadings are very useful when undertaking a detailed critical review. They also help determine whether the author told the reader everything they need to know about each section of the publication, and overall.

Detailed critical reading

Undertaking a detailed critical reading involves considering three main issues:

- Structure of the article.

Page points

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2. The aim is arguably the most important part of the article because it is the framework for the method, the results and the conclusion, as well as any implications for practice.
3. Many journals require ethics approval from an appropriately constituted ethics committee before they will publish an article and will require a statement to that effect in the manuscript.
4. Subheadings are very useful when undertaking a detailed critical review. They also help determine whether the author told the reader everything they need to know about each section of the publication, and overall.

Table 2. Questions that should be asked about each subsection when reading a research article critically* (cont'd overleaf).

Section	Question
Title	● Does it reflect the content of the article? ● Is it succinct?
Abstract	● Can you tell what the article is about from the abstract? ● Can the abstract be stand-alone? ● Does it entice you to read the full article? *Common problems:* – It introduces the topic but does not outline the contents of the article. – Its conclusion introduces new information and does not address the study aim.
Literature review	● Is it clear whether the points discussed reflect the opinion of the authors or whether they are citing other authors? ● Are key points referenced? ● Is the literature review focused on the topic of the article? ● Were any relevant key publications omitted? *Common problems:* – Making assumptions about the knowledge of the reader. – Referencing every statement. – Placing references in the middle of sentences affecting the flow of information. – Making controversial comments without referencing and/or justifying them. – Inappropriately quoting secondary sources. – Incorrect citations and/or differences or omissions between references in the text and in the reference list. – Citing internet references without indicating when they were accessed, or not providing complete link. (Wikipedia is not regarded as an appropriate reference in scholarly publications.)
Aim	● Is the aim clear, and is it measurable? *Common problems:* – The aim/question is not clearly stated, or several questions are listed as aims.
Method	● Was the method suitable to address the study aim/questions? ● Is the sampling population described well? ● Is there an inclusion and exclusion criteria? ● Was there an appropriate control group? ● Were the methods of selecting participants appropriate? ● If the sample is stated as random, was it truly random? ● What outcomes were measured and how? ● Were valid and reliable instruments used? Was there consistency in the data collection methods? ● Were validity and reliability data provided for questionnaires? ● Was the study adequately powered (quantitative) or large enough (qualitative)? ● Were the data analysis techniques appropriate to the type of data and the method? ● Were ethical issues addressed, including informed consent, privacy, and author disclosures of conflict of interest? *Common problems:* – Inadequate information in some or all these areas.
Results	● Are the results reported accurately? ● Were appropriate statistical procedures used and the reasons for using them explained? ● Are groups comparable? If necessary, were adjustments made for baseline differences? ● Is significance, and associations, interpreted correctly? ● Are missing data and dropouts accounted for? ● Are raw scores used for small samples? ● Do the numbers add up? If not, are discrepancies explained? ● If quotes are cited in qualitative studies, are they attributed to specific participants? Some journals do not require the quote to be attributed to protect anonymity, however quotes can by coded to protect participants.

Table 2. Questions that should be asked about each subsection when reading a research article critically* (continued).

Section	Question
Discussion	● Are the findings discussed critically, logically and objectively? ● Are the findings discussed in light of the existing literature? ● Is it clear what new information the study adds? ● Are reasons for differences suggested? ● Are the strengths and limitations of the article acknowledged? ● Are the possible effects of confounders discussed? ● Are references used appropriately? *Common problems:* – Repeating the results in different words without actually discussing their meaning. – Introducing new information at this stage.
Conclusion	● Do the conclusions address the study aims, and are they succinct and focused? *Common problems:* – Introducing new information that does not relate to the aim. – Long conclusions that repeat the discussion.
Tables and figures	● Do tables and figures support information presented in the text? ● Are the captions or legends appropriate and do they explain the content? ● Are abbreviations and keys used to explain the table/figure if relevant? *Common problems:* – Inappropriate column headers. – Inadequate captions/legends.
Clarity of the writing	● Is the article written in past tense? ● Does the information flow logically? ● Does the structure anticipate and address reader's questions? ● Are there transition words, phrases or sentences between ideas, sentences and paragraphs? ● Are relevant subheadings used? ● Are the arguments developed logically?

* These questions can be used alone or within the Critical Appraisal Skills Programme (Public Health Resource Unit, NHS England); The information is based on the literature and extensive experience of the author as a peer reviewer and editorial board member of several journals, and as an author.

- Scientific content.
- Author's ability to use clear, concise writing, i.e. their ability to communicate effectively.

Studies generally fall into the following broad categories:

- Quantitative studies (empirical).
- Review articles (which might include systematic reviews, structured reviews, meta-analysis or meta-synthesis).
- Qualitative studies (human behaviour).
- Evaluation studies.
- Audits.
- Case studies.

A number of tools are available that outline critical review processes for specific types of studies (*Box 1*). These tools are also helpful when developing clinical practice guidelines (which should be based on the best available evidence), when writing assignments, research protocols, and when making grant applications.

Plagiarism

Plagiarism and self-plagiarism can occur and are very serious offences. Plagiarism can bring the author/s and publisher into disrepute.

Plagiarism refers to intentionally or unintentionally omitting to acknowledge other people's work, including online publications. It can be difficult to identify plagiarism. Reviewers and authors need to become familiar with copyright laws and understand

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what constitutes plagiarism. Importantly, ignorance of copyright law does not protect authors, if plagiarism charges are made. One indication that plagiarism might have occurred is a distinct change in the writing style and word usage that is not attributed to another author.

Self-plagiarism is a type of plagiarism in which the same author/s publish various very similar articles about the same piece of work. It is sometimes referred to as "salami slicing". One reason for self-plagiarism is the increasing pressure on academics to publish and build a track record ("publish or perish").

There are a number of online tools that academics can use to detect similarities among texts and therefore root out plagiarism.

Conclusion

Critical review is a skill that can be learnt and developed over time. It is a logical process that involves reading a publication critically, asking relevant questions, reflecting on the publication in light of experience and knowledge, and making informed judgments about the content, scientific merit and clarity of the writing. Authors need to consider the reviewers' comments when their article undergoes critical review as part of the publication process. Reviewers' comments almost always improve the article and the chances of publication. ■

Dunning T (2011) Research engagement: a key aspect of diabetes management. *J Diabetes Nursing* **15**: 9–14

MacAuley D (1994) READER: an acronym to aid critical reading by general practitioners. *Br J General Practice* **44**: 83–5

Other resources

Blackwell Publishing. Author Services: *http://authorservices.wiley.com* (accessed 01.02.11)

Centre for Evidence Based Medicine: *http://www.cebm.net* (accessed 01.02.11)

Chalmers I, Altman D (eds) (1995) *Systematic Reviews*. BMJ Publishing, London

Cochrane Collaboration: *http://www.cochrane.org* (accessed 01.02.11)

Greenhalgh T, Taylor R (1997) How to read a paper: Papers

Box 1. Examples of critical appraisal tools.

- AGREE – The Appraisal of Guidelines for Research and Evaluation instrument. The AGREE Collaboration, St George's Hospital Medical School, London. Available at: http://bit.ly/hGYqpN (accessed 01.02.11).
- CASP – Critical Appraisal Skills Programme. Public Health Resource Unit, NHS, England. Available at: http://bit.ly/gK76Vt (accessed 01.02.11).
- Delfini – This website provides access to a range of tools relevant evidence-based practice, including critical appraisal tools. Delfini Group, USA. Available at: http://bit.ly/ghqBSR (accessed 01.02.11).
- DISCERN – This is a brief questionnaire that provides users with a valid and reliable way of assessing the quality of written information on treatment choices for a health problem. Division of Public Health and Primary Health Care, University of Oxford. Available at: http://bit.ly/emenMG (accessed 01.02.11).
- DynaMed – This interactive website provides access to a range of critical appraisal solutions for various research designs. DynaMed, USA. Available at: http://bit.ly/hV4RNQ (accessed 01.02.11).
- GATE – Graphic Appraisal Tool for Epidemiology. School of Population Health, The University of Auckland, New Zealand. Available at: http://bit.ly/gx54W1 (accessed 01.02.11).
- JBI-NOTARI – Narrative, Opinion and Text Assessment and Review Instrument. The Joanna Briggs Institute, The University of Adelaide, Australia. Available at: http://bit.ly/gffpuD (accessed 01.02.11).
- READER Critical Appraisal Tool. Macauley, Queen's University, Belfast, Northern Ireland. http://bit.ly/emKy6O (accessed 01.02.11).
- STROBE – Strengthening the Reporting of Observational Studies in Epidemiology. University of Bern, Switerzland. Available at: http://bit.ly/hdQrSj (accessed 01.02.11).
- TREND – Transparent Reporting of Evaluations with Nonrandomized Designs. Centre for Disease Control and Prevention, USA. Available at: http://bit.ly/grKFC4 (accessed 01.02.11).
- PRISMA (formerly QUOROM) – PRISMA provides an evidence-based minimum set of items for reporting systematic reviews and meta-analyses, and is an update and expansion of QUOROM. Ottawa Hospital Research Institute, Canada. Available at: http://bit.ly/if5nqD (accessed 01.02.11).