



## Writing Manuscripts About Quality Improvement: SQUIRE 2.0 and Beyond

### Author

Marilyn H. Oermann, PhD, RN, ANEF, FAAN

Thelma M. Ingles Professor of Nursing, Duke University School of Nursing

Editor, *Journal of Nursing Care Quality* and *Nurse Educator*

Significant work is being done in healthcare settings to improve the quality and safety of patient care, and this work needs to be disseminated broadly for others to use it in their own settings. The successful adoption of interventions and new approaches to improve the quality of healthcare depends on complete and accurate reporting of quality improvement (QI) studies. Good reporting of these studies increases the likelihood that readers will be able to use the interventions and approaches in their own settings and researchers will be able to replicate the studies. When preparing a manuscript on a QI study, you should use the Standards for Quality Improvement Reporting Excellence (SQUIRE) guidelines, which were developed for this purpose. Following these guidelines will not only lead to better reporting of a QI study, but will increase the likelihood that your paper will be accepted for publication. Many journals now require manuscripts follow the SQUIRE guidelines, but even if not required by a journal, you should follow these guidelines to ensure you're submitting a high-quality manuscript.

### What are the SQUIRE guidelines?

The SQUIRE 1.0 guidelines were developed in 2008 to meet the need for improved reporting of QI studies and initiatives. SQUIRE 1.0 provided direction to authors to write “clearly, precisely, and completely” about their QI studies and other improvement efforts.<sup>1</sup> To strengthen the reporting of QI and reflect new knowledge in the field, the guidelines have recently been updated to SQUIRE 2.0. These updated guidelines are easier to use than the original version and can also be used as a framework for planning a QI study that can eventually be published.<sup>2,3</sup>

SQUIRE 2.0 has 18 sections, each with specific items to address; however, not every item needs to be reported in a manuscript. Some may not be appropriate for a specific manuscript<sup>1</sup> or may be summarized briefly because of the page limits of the journal. However, considering all of the items in SQUIRE when writing a manuscript will ensure there is sufficient detail about the study to allow readers to replicate it and implement the intervention in their own settings. The guidelines also provide a logical organization for the paper and headings that can be used.

### Applying SQUIRE guidelines to your manuscript

#### *Title and Abstract*

The title and abstract are seen first by readers and are used when searching for articles and for indexing articles in bibliographic databases. The title should convey the focus of the paper; when the focus relates to healthcare quality,

the title should indicate that.<sup>4</sup> The following title communicates clearly that this article is a QI report: *Quality Improvement Project to Improve Patient Satisfaction with Pain Management Using Human-Centered Design*.<sup>5</sup>

Journals have various formats of abstracts; some are structured, indicating content areas and headings to include in the abstract. These are generally longer than unstructured abstracts, which are in a paragraph format. The abstract of a QI study should indicate the purpose of the study and summarize the information in the text. Because abstracts are used for searching, there needs to be enough information in the abstract for readers to decide if the paper is relevant to them. For QI reports, it also should contain terms that communicate the paper is on healthcare improvement. Here is an example of an abstract that describes what the paper is about and makes it clear this is a report on a QI initiative:

*In this quality improvement project, our health system developed a comprehensive, patient-centered approach to improving inpatient pain management and assessed its impact on patient satisfaction across 21 medical centers. Using human-centered design principles, a bundle of 6 individual and team nursing practices was developed. Patient satisfaction with pain management, as measured by the Hospital Consumer Assessment of Healthcare Providers and Systems pain composite score, increased from the 25th to just under the 75th national percentile.*<sup>5</sup>

Many journals ask authors to provide keywords for indexing, which are often added to the abstract page. Be sure to select terms and keywords that make it apparent the paper relates to healthcare improvement. For example, medical subject headings used for indexing articles in PubMed include *quality improvement*, *quality indicators*, and *patient safety*, among others. *Quality improvement* is also a heading in the Cumulative Index to Nursing and Allied Health Literature database and would be a relevant keyword to include with a manuscript. A combination of the keywords *quality*, *safety*, *improvement*, *process*, and *outcomes* also can be used.

## **Introduction**

The SQUIRE 2.0 guidelines follow the IMRAD (Introduction, Methods, Results, and Discussion) format for writing research reports.<sup>6,7</sup> The introduction should describe the background of the problem, including an explanation of the problem that led to the need for the QI initiative and related literature review. The introduction often reports the standard to be achieved and the gap in quality at the local level. For example, in the article on improving pain management, the introduction discussed the need for pain management, The Joint Commission standards, that only 71% of composite pain management scores on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) across the United States reflected optimal pain management, barriers to pain management and related literature, and the local problem of low patient satisfaction with pain management HCAHPS scores.<sup>5</sup>

The introduction also should include a rationale as to why the intervention is expected to work.<sup>8</sup> This can be accomplished with an explanation of the framework, model, or theory that guided the study and development of the intervention or an explanation of principles underlying the intervention. In the pain management study, the authors described how they used human-centered design to explore user experiences (nurses and patients) and a model of best practices for pain management.

The last item in the introduction is a statement of the specific aims of the study and goal of the manuscript—what is being reported in the paper. The aims should be consistent with the background and gap in quality, stating why the study was conducted. For example:

*The aims of the QI project reported here were to develop a multifaceted, patient-centered approach to improve inpatient pain management, implement it across 21 KPNC hospitals, and assess its impact on patient satisfaction, as measured by the HCAHPS pain management composite score.*<sup>5</sup>

## Methods

The next section of a QI manuscript covers the methods: basically, what the author did in the study. The Methods section should begin with the context of the study. As discussed earlier, understanding the context is important because it guides readers in deciding if the intervention is applicable to their own setting. A detailed report of contextual factors also allows researchers to plan ahead as to factors that could influence the success of the intervention when they implement it. The SQUIRE guidelines recommend providing information about the location of the healthcare setting, patient population and size, staffing, type of practice, teaching status of the institution, system affiliation, and care processes relevant to the initiative.<sup>8</sup>

Any aspects of the local setting that could potentially influence the intervention's effectiveness should be described in the Methods (for example, if there was strong leadership for QI, staff participated recently in another QI initiative, and there was adequate staffing). Factors such as these can influence the process and outcomes of the intervention. For example, in the QI study on pain management, the authors noted that frontline nurses in their setting routinely conduct plan-do-study-act (PDSA) rapid improvement cycles, which facilitated implementation of the QI project. This information is important to know when considering implementation of the intervention in settings in which nurses and other staff lack this expertise.

The Methods section should include a description of the intervention with enough detail for others to replicate it. The intervention is presented similarly to a research report. To encourage better reporting of interventions, a checklist such as the Template for Intervention Description and Replication (available online at [www.bmj.com/content/348/bmj.g1687.long](http://www.bmj.com/content/348/bmj.g1687.long)), can be used.<sup>1</sup> In the example of the QI project on pain management, the authors provided a detailed explanation of the six practices in the pain management intervention, referred to as KP Painscape, and how each of these was implemented.

In the next part of the Methods, the author should report the design used and the approaches for assessing the impact of the intervention and whether the outcomes were due to the intervention or other factors. For example, in the article on improving pain management, a *pre/posttest design was used to assess the impact of KP Painscape on patient satisfaction with inpatient pain management, measured by the HCAHPS pain composite.*<sup>5</sup>

Similar to research reports, the QI manuscript should describe the measures and instruments used for studying the intervention, why they were selected, their validity and reliability, and scoring. The data analysis section includes both quantitative (e.g., traditional parametric and non-parametric tests between groups, logistic regression) and qualitative (e.g., interviews, focus groups, root cause analyses) methods used in the study. The data analysis methods should be consistent with the aims and measures. For example: *Changes over time in HCAHPS scores were assessed with linear regression analysis, with a P value of less than .05 representing statistical significance.*<sup>5</sup>

The last item to include in the Methods section is a statement about the ethical aspects of the study and how they were addressed, including a formal ethics review and any potential conflicts of interest. If the QI study was reviewed and approved by an Institutional Review Board (IRB) or had another type of human subjects review, you should state this in the manuscript. In many healthcare settings, improvement studies are no longer reviewed by an IRB. In these cases, the author can include a statement such as: *This project was QI in nature and not subject to IRB oversight.* Avoiding conflicts of interest is as important for QI initiatives as it is for research. These potential conflicts should be identified with a statement of how they were addressed in the intervention.<sup>1</sup>

## Results

The Results section reports the findings similar to a research report. In the pain management example, the authors reported, and illustrated with a figure: *Between 2008 and December 2013, KPNC as a whole demonstrated*

*improvement from the 25th to just under the 75th national percentile (Figure 2), reflecting an increase in the annual average score from 63.9% to 72.7%. Changes in HCAHPS scores over time were statistically significant ( $P < .05$ ) and sustained through November 2014.*<sup>5</sup>

The Results section should also include a description of the initial intervention, its implementation over time, and any changes to the intervention that were made during the project.<sup>8</sup> In the study on pain management, the authors described the phases of implementing KP Painscape, beginning with completion of PDSA cycles and pilot testing, distribution of a toolkit with implementation guide, use of a change workbook available online to facilitate spread of the intervention, midmorning huddles to provide feedback about implementation, and weekly coffee chats to share successes, challenges, and solutions.<sup>5</sup> The phases of the intervention may be illustrated with a figure or shown in a table. With these details, readers can more easily adapt the intervention to fit their own setting.

This section of the manuscript also should report on the extent the intervention, and its component parts, were implemented (e.g., *94% of the units implemented all of the pain management strategies as intended*). As a QI study, one of the main challenges is assessing the effects of context, such as type of clinical setting, numbers and types of patients, technology, leadership on the unit, staff motivation to change practice, and others, on the outcomes. Contextual factors, if measured, should be reported (e.g., differences in HCAHPS scores across units and settings, based on patient diagnosis and level of pain reported, and as related to scores on perceived support of managers for practice change).

### **Discussion**

The discussion section of a QI manuscript is similar to a research report where you discuss the main findings, relating back to the aims, relevant literature, and framework or rationale for the intervention. The discussion should not repeat the results but explain their relevance and meaning for readers. This section allows the authors to discuss possible reasons for the lack of success of the intervention in their own settings.<sup>7</sup> The authors can explain what contextual factors in their settings might have influenced outcomes, such as a large turnover of staff, low volume of patients, and competing QI initiatives. The discussion section also includes limitations such as the limits to the generalizability of the study, and issues with tools and measurement.<sup>8</sup>

### **Conclusions**

In this last section of a manuscript, the SQUIRE guidelines recommend including discussion about the implications of the study, use of the findings in other settings, potential for spread, and next steps.<sup>8</sup>

### **Additional Recommendations**

The SQUIRE guidelines provide a structure for preparing a QI manuscript and ensuring that the paper includes essential information for readers. Without using these guidelines as a framework, critical information may be missing from a manuscript. In a study on the impact of the original SQUIRE guidelines on the quality of QI reports, Howell et al<sup>9</sup> found no significant improvements in reporting after SQUIRE was introduced. However, the study also revealed missing information from QI articles that would hinder replicating the study in one's own setting and would make it difficult to implement an intervention that the article indicated was successful. Individuals involved in healthcare improvement, and students, trainees, and faculty in health professions, should be made aware of SQUIRE as a starting point for planning a QI initiative and for writing a manuscript on the results. The SQUIRE website ([www.squire-statement.org](http://www.squire-statement.org)) provides the guidelines and an explanation of them with examples. McQuillan and Wong<sup>10</sup> recommend including QI articles in journal clubs, holding workshops on how to write a QI paper, and planning other strategies to familiarize staff with QI initiatives and best practices in reporting them.

Innovations to improve the quality and safety of healthcare need to be studied and outcomes disseminated beyond the local setting. For these reports about QI efforts to be valuable to readers, they need to be complete and present essential information about the context in which the QI initiative was implemented, specific intervention studied, and outcomes. The SQUIRE 2.0 guidelines will help you prepare a manuscript that meets these standards.

## References

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