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Mixed-methods research in pharmacy practice: recommendations for quality reporting (part 2)

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Abstract

This is the second of two papers that explore the use of mixed-methods research in pharmacy practice. This paper discusses the rationale, applications, limitations and challenges of conducting mixed-methods research. As with other research methods, the choice of mixed-methods should always be justified because not all research questions require a mixed-methods approach. Mixed-methods research is particularly suitable when one dataset may be inadequate in answering the research question, an explanation of initial results is required, generalizability of qualitative findings is desired or broader and deeper understanding of a research problem is necessary. Mixed-methods research has its own challenges and limitations, which should be considered carefully while designing the study. There is a need to improve the quality of reporting of mixed-methods research. A framework for reporting mixed-methods research is proposed, for researchers and reviewers, with the intention of improving its quality. Pharmacy practice research can benefit from research that uses both 'numbers' (quantitative) and 'words' (qualitative) to develop a strong evidence base to support pharmacy-led services.

Introduction

In the first article of the pair we introduced the basic concepts of mixed-methods research including its definition, advantages and typologies. In this second article the rationale, applications, limitations and challenges of conducting a mixed-methods study are discussed. A framework to improve quality of reporting mixed-methods studies is also proposed for researchers and reviewers.

Rationale and Applications of Mixed-Methods Research in Pharmacy Practice

Not all research problems require mixed-methods enquiry and therefore the rationale for choosing a mixed-methods approach should always be presented. A literature review by Greene *et al.* in 1989 identified five reasons for conducting mixed-methods research including triangulation, complementarity, development, initiation and expansion (explained below).[1] In 2006, in a review of social science literature, Bryman expanded the list and identified 16 reasons for conducting mixed-methods research.[2] To date the use of mixed-methods research in pharmacy practice is relatively limited. To illustrate this point, a quick Medline and EMBASE search combining the keywords 'mixed-methods' or 'multi-methods' with 'pharmacy' or 'Pharmacist' resulted only in 33 hits (after deduplication; date of search 2 April 2012). However, it should be noted here that it was not a comprehensive search to locate all mixed-methods studies but rather it aimed to identify examples and highlight the limited use of mixed-methods research in the field of pharmacy practice.

In this section we will explore some examples of how pharmacy practice researchers have used mixed methods together with a discussion of the strengths and weaknesses of the reporting within each study. We have purposively selected these examples to illustrate the five reasons identified by Greene *et al.*[1] for using a mixed-methods approach.

Triangulation

'Triangulation seeks convergence, corroboration and correspondence of results from different methods'.[1] Guirguis used a mixed-methods approach (concurrent triangulation) to

study pharmacists' experiences and beliefs about an interactive communication approach, the three prime questions (3PQs) model.[3] Developed in the USA, 3PQs is a patient-centred model designed to assess the patient's knowledge and recognize information deficits before providing education. The quantitative methods included pharmacist self-report forms to record their experiences using the 3PQs and a 19-item questionnaire survey (16 closed and three open-ended questions) for evaluating pharmacist self-efficacy and role beliefs towards 3PQs. The qualitative method included a focus-group interview to elaborate on the pharmacists' experience using 3PQs. The author combined data to triangulate findings from both quantitative and qualitative components and generated a rich description of pharmacists' experiences and perceptions of the 3PQs. In this study the mixed-methods approach allowed the researcher to not only quantify pharmacists' beliefs about the 3PQs but also provided a rich description to expand understanding which would not have been possible using a mono-method design. Furthermore, triangulation of two datasets ensured greater validity of the findings. The author justified the choice and described the design of the mixed-methods approach.

Expansion/broader understanding of research problem

'Expansion seeks to extend the breadth and range of inquiry by using different methods for different inquiry components.'[1] Pumtong *et al.* used a mixed-methods approach to evaluate the Pharmacy First Minor Ailments Scheme (PFS) in Nottingham, UK.[4] The aim of PFS was to reduce workload of general practitioners (GPs) and improve access to medicines by encouraging the role of community pharmacists in the management of minor ailments. The authors used face-to-face interviews with the stakeholders, including pharmacists (26), GPs (7), service commissioners (7) and parents of patients under the age of 16 (6), to explore acceptability, benefits and barriers to the use of the scheme. The quantitative component consisted of a survey ($n = 143$) using an adapted version of the Patient Satisfaction Questionnaire (PSQ III) to evaluate patient satisfaction with the service and an analysis of data of Nottingham Primary Care Trust (PCT) to determine the types of ailment managed, the nature of consultations and prescribing trends. The Nottingham PCT, which is part of the UK National Health Service (NHS), is responsible for managing and commissioning the city's local health services. The use of mixed-methods research enabled the researchers to answer different research questions requiring different methods within a single study. The research design facilitated understanding various components of the service including the nature of consultations and prescribing trends, identifying barriers from both patients' and healthcare professionals' perspectives, and evaluating patient satisfaction. However, the timing of the conduct of the qualitative and quantitative components (concurrent versus sequential) or priority in answering the research question (equal versus dominant status) was not reported. Furthermore, the rationale for choosing a mixed-methods approach and the interaction between the two datasets was not explained. The study used a mixed-methods approach to collect qualitative and quantitative data, but there did not appear to be a rigorous integration of the two datasets.

Development/overcoming limitations of mono-method design

'Development seeks to use the results from one method to help develop or inform the other method where the development is broadly construed to include sampling and implementation as well as measurement decisions.'[1] Guirguis used a three-stage sequential mixed-methods approach to explore pharmacists' understanding and adoption of prescribing in Canada.[5] The authors conducted focus-group interviews among community pharmacists to inform the design of a questionnaire. In stage 2, the questionnaire was piloted to determine its validity and reliability. Finally, the questionnaire was sent to a random sample of community pharmacists to test the generalizability of the findings of the focus group interviews. The design (sequential) and the rationale for choosing mixed-methods approach were clearly described. The use of the mixed-methods approach provided a rich and generalizable description of pharmacist prescribing in Canada by overcoming the limitations of qualitative (generalizability) and quantitative (in-depth understanding) methodology.

Complementarity

'Complementarity seeks elaboration, enhancement, illustration and clarification of the results from one method with the results from the other method.'[1] Bruhn *et al.* reported a pilot randomized controlled trial which was complemented with qualitative interviews to evaluate the effectiveness of pharmacist-led management of chronic pain in primary care (the PIPPC study).[6,7] The patients were randomized to one of three arms: (1) pharmacist medication review with pharmacist prescribing, (2) pharmacist medication review with feedback to GP and (3) treatment as usual. The qualitative component consisted of face-to-face interviews with the pharmacists, GPs and patients to explore their experiences. It is noteworthy that the qualitative interviews did not contribute towards answering the effectiveness question (the primary aim of the study); rather, they helped to understand and explain how the intervention might have worked. The two datasets were described separately in two different conference proceedings and were therefore not integrated. Integration of

the two datasets may have allowed researchers to draw more meaningful inferences from the findings and authors may do so in a full report. However, if the purpose of a mixed-methods study is to answer different research questions within the same study (embedded design), as in this example, the authors may choose to present findings separately.[8] Again, neither the rationale nor the design was reported.

Initiation

'Initiation seeks the discovery of the paradox and contradiction, new perspectives of frameworks, the recasting of questions or results from one method with questions or results from the other method.' It generates ideas by initiating new interpretations, highlighting areas for additional investigation and reshaping the entire research question. Initiation is predominantly used in the disciplines of social sciences and psychology. We were unable to find an example in the area of pharmacy practice to illustrate initiation.

It should be noted that in these examples we have tied each example to only one reason or rationale for choosing a mixed-methods design, which in practice is not always true, as researchers might use a mixed-methods approach for more than one reason. Furthermore, in instances where a rationale was not mentioned by the authors we used our own interpretations after reading the full text of the paper.

Reporting Mixed-Methods Research in Pharmacy Practice

It is evident from the examples given above that reporting of mixed-methods research is still suboptimal in pharmacy practice research. In addition, the studies did not meaningfully integrate qualitative and quantitative components and used mixed methods merely as a 'tool' to collect qualitative and quantitative data. The problem of transparent and quality reporting of mixed-methods studies is also common among other health services researchers.[9] O'Cathain *et al*. assessed the quality of 75 mixed-methods studies in health services research conducted between 1994 and 2004 funded by Department of Health in England.[9] The authors reported that researchers ignored describing and justifying mixed-methods designs and their rationale, and lacked integration between qualitative and quantitative components.

Poor or inadequate reporting of mixed-methods studies has serious implications for readers in understanding the purpose/benefit of using mixed-methods approach, future researchers in designing their own mixed-methods studies, policy makers for informing policy based on poor-quality mixed-methods studies and especially for the field of mixed methods itself. A number of quality criteria have been proposed in the literature for reporting mixed-methods research,[8–10] but unlike PRISMA guidelines[11] (guidance on reporting systematic reviews) and the CONSORT statement (guidance on reporting randomized controlled trials)[12] there is no single framework for reporting mixed-methods research. Perhaps this is because mixed-methods research is an emerging and evolving methodology. O'Cathain *et al*. proposed a framework of six essential components for Good Reporting of Mixed Methods Study (GRAMMS).[9] We have adapted, modified and expanded this framework to meet the discipline specific needs of pharmacy practice (Table 1). This expanded eight-item framework describes all the key elements, from the statement of the research problem to the implications of research findings on pharmacy practice, education or policy, necessary to ensure transparent and comprehensive reporting of mixed-methods research studies. Although these criteria have been developed specifically for pharmacy practice researchers, they can be used by other clinical disciplines as well. This framework can also be used by reviewers and editors during the peer-review process. However, it should not be seen as a 'definitive checklist' but instead as guidance for the quality reporting of mixed-methods studies.

We are aware that describing and justifying the above-mentioned issues might be difficult due to the word limits imposed by journals. The *Journal of Mixed Methods Research*, a leading mixed-methods journal, has a maximum word limit of 10 000 words for original research articles in contrast with *International Journal of Pharmacy Practice* and *International Journal of Clinical Pharmacy*, which have word limits of 4000 and 3000 words respectively. The restricted word limit may

Table 1 Recommendations to improve reporting of mixed-methods research in pharmacy practice. Adapted and modified from [8]

1. Describe the research objectives in a way which clarifies the necessity for using a mixed-methods approach.
2. Explain the rationale and justify the choice of mixed-methods approach in relation with the research problem.
3. Explain the design in terms of the purpose, priority and timing of methods using a common mixed-methods language.
4. Explain methods of sampling, data collection and analysis of both qualitative and quantitative approaches independently with sufficient detail to allow reproducibility.
5. Explain how and where the integration of conduct, analysis or interpretation has occurred.
6. Explain, if any, limitations of both qualitative and quantitative methods used.
7. Explain and reflect on how mixed methods have benefited the understanding of the research problem/answering the research question.
8. Explain the potential implications of the research on pharmacy practice, education or policy.

also encourage pharmacy practice researchers to publish the qualitative and quantitative components separately, thereby jeopardizing the usefulness of mixed-methods research. Therefore, we urge all the pharmacy practice/education journal editors to consider increasing the word limit for mixed-methods research to allow the inclusion of sufficient detail to ensure high-quality reporting of studies. In cases where increasing the word limit in print format is not practical, publishing online supplemental material can also help to overcome the word-limit problem.

Limitations and Challenges

Like any other research design the conduct of mixed-methods research has its challenges and limitations. These should be carefully considered before embarking on mixed-methods research. The biggest challenge perhaps is to possess the required knowledge and skills for both qualitative and quantitative data collection, analysis and interpretation. This can be overcome by developing teams of researchers with the required range of expertise, collaborating with researchers in other disciplines where necessary.[8]

Mixed-methods study designs, especially sequential study designs, may take significantly more time and resources to undertake the distinct phases of a study.[13] For concurrent study designs it may be difficult for a single researcher to collect both qualitative and quantitative data together and several data collectors may be required.[14,15] Since mixed-methods research is a relatively new methodology, convincing and enlightening others about its usefulness may be challenging[8] and providing a sound rationale for this approach is important. In light of these limitations we suggest the following four questions to assist researchers to clearly think through before choosing a mixed-methods design. Firstly, after stating the research question the researcher must ask: Is mixed-methods methodology best suited to answer the research question? Secondly, which mixed-methods research design is the most appropriate to answer the research question? Thirdly, do I or other members of the research team have the necessary knowledge and skills to conduct both qualitative and quantitative studies and meaningfully combine them to comprehensively answer the research question(s)? Finally, do we have adequate time and resources to carry out a mixed-methods study?

Conclusion

Well-designed and -executed research is essential for the development of pharmacy practice. Pharmacy practice research can benefit from mixed-methods as it allows combining the strengths of both qualitative and quantitative methodologies to gain greater understanding of the research problem.[6] The 'numbers' can demonstrate the effectiveness of the service/intervention and the 'words' can describe how/why the intervention works. It also gives the researcher the freedom to choose and mix different methods. Mixed-methods research has its own challenges and limitations which should be well considered. There is a need to improve the quality of reporting of mixed-methods research in pharmacy practice. The framework proposed in this article can ensure quality reporting of mixed-methods studies. Mixed-methods approaches have huge potential to develop, inform and improve the fast-growing discipline of pharmacy practice.

Declarations

Conflict of interest

The Authors declare that they have no conflicts of interest to disclose.

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Authors' contributions

All Authors state that they had complete access to the study data that support the publication. All Authors contributed substantially in the development of the article and all Authors have read the final version of the article and approved it for submission.

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