

Mixed-methods research in pharmacy practice: basics and beyond (part 1)

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Abstract

This is the first of two papers which explore the use of mixed-methods research in pharmacy practice. In an era of evidence-based medicine and policy, high-quality research evidence is essential for the development of effective pharmacist-led services. Over the past decade, the use of mixed-methods research has become increasingly common in healthcare, although to date its use has been relatively limited in pharmacy practice research. In this article, the basic concepts of mixed-methods research including its definition, typologies and advantages in relation to pharmacy practice research are discussed. Mixed-methods research brings together qualitative and quantitative methodologies within a single study to answer or understand a research problem. There are a number of mixed-methods designs available, but the selection of an appropriate design must always be dictated by the research question. Importantly, mixed-methods research should not be seen as a 'tool' to collect qualitative and quantitative data, rather there should be some degree of 'integration' between the two data sets. If conducted appropriately, mixed-methods research has the potential to generate quality research evidence by combining strengths and overcoming the respective limitations of qualitative and quantitative methodologies.

Introduction

Since the introduction of the concept of pharmaceutical care in the 1970s^[1] the discipline of pharmacy practice has grown internationally, especially in the developed world. The role of pharmacists has expanded beyond their traditional role of dispensing, to direct patient care, and a range of new pharmacist-led services has been developed in community and hospital settings. Rigorous research methods to evaluate these newly developed services are crucial to determine their effectiveness and to enhance their acceptability among other healthcare professionals, patients and policy makers. Mixed-methods research, often viewed as a third paradigm,^[2] is increasing in popularity among healthcare researchers. This is evident from the number of mixed-methods research projects commissioned by Department of Health's Research and Development Programme in the UK, which has increased from 17 to 30% in the past two decades.^[3] However, the use of mixed-methods research in pharmacy practice research is relatively limited. This is perhaps due to the lack of clear understanding of mixed-methods research and its potential benefits, or reluctance to use these methods, which may be laborious and time-consuming.

This paper is the first of two which discuss various aspects of mixed-methods research. This one focuses on its definition, typologies and advantages. The second paper will discuss limitations, challenges and applications of mixed-methods research in pharmacy practice together with a framework to facilitate quality reporting of mixed-methods studies. Issues related to the paradigm and theoretical framework/worldview (set of beliefs and practices that guide a field^[4]) governing mixed-methods research are beyond the scope of these papers and covered in detail elsewhere.^[4,5]

What is Mixed-Methods Research?

Mixed-methods research involves both qualitative and quantitative components. A number of definitions exist in the literature, but what constitutes mixed-methods research remains open to discussion, as it is relatively new and continues to evolve.^[6] How and when these two components should be combined is an ongoing debate. Tashakkori and Creswell's definition is perhaps the most comprehensive and frequently referred to in the field.^[6] They defined mixed-methods

research as 'research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or program of inquiry.'^[6] Johnson *et al.* reviewed 19 definitions of mixed methods and concluded with the following definition: 'Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the purposes of breadth and depth of understanding and corroboration.'^[7] Importantly, mixed-methods research should not only be a 'means of collecting both qualitative and quantitative data', but also integrate qualitative and quantitative studies within or across the different stages of research.

Beyond Qualitative/Quantitative Conflict: Advantages of Mixed-Methods Research

The respective usefulness and limitations of qualitative and quantitative research methods in answering 'clinical' and 'biopsychosocial' questions are perhaps the most debated topics among methodologists.^[8–12] Arguments about what qualitative and quantitative methods can and cannot do have led to controversies and confusion among readers, especially practitioners who tend to be concerned with the applicability of research to their own practice. Traditionally, in healthcare research, quantitative designs have been widely used because of the generalizability of findings and the ability to address a wide range of clinical topics (e.g. risk factors, diagnosis, prognosis and treatment choice) through a systematic process. More recently, the change of health service focus from being practitioner- to patient-centred has coincided with increased publication of qualitative research. Qualitative research tends to answer questions related to participants' subjective experiences, including behaviour, attitudes, perceptions, expectations, motivations and interactions, often grouped under the 'biopsychosocial' dimension.^[9,10] The problem arises when proponents of each methodology claim that 'one method fits all research questions' by exaggerating its usefulness and overlooking the limitations. However, we believe that superfluous and uncorroborated criticism of one research methodology should not be used solely to advance arguments about the usefulness of other research methodologies.

Mixed-methods research can potentially resolve this 'decisive battle' between the two types of methodology as it recognizes and appreciates the strengths and weaknesses of both qualitative and quantitative research designs. Mixed-methods research combines the strengths of the two methodologies to overcome their respective limitations. It allows

researchers to choose and merge different methodologies to develop the best possible method to comprehensively answer a specific research question.^[5] Mixed-methods research can potentially answer different research questions within a single study that addresses the same research problem but requires different methodologies. The essence of mixed-methods research is to allow the research question/problem to dictate the choice of the method rather than the inclination towards a specific quantitative-only or qualitative-only methodology. Creswell and Plano Clark described mixed methods as 'practical' as it gives freedom of choice among methods, allows mixing of numbers and words, and combining of inductive and deductive thinking.^[5] Nonetheless, if the research problem requires a mono-method study design to answer the question then it should be chosen bearing its limitations in mind.

Typologies of Mixed-Methods Research

Choosing an appropriate research design is one of the most complex and challenging issues in mixed-methods research.^[13] Mixed-methods designs can be fixed or emergent. In fixed designs the use of qualitative and quantitative approaches is premeditated and implemented accordingly.^[5] Emergent designs arise when a single method is insufficient and a second approach (qualitative or quantitative) is added once the study is in progress.^[14] Various classifications or typologies of mixed-methods design exist in the literature.^[14–20] These assist researchers in designing their mixed-methods study, developing a common language and organizational structure for the field and, most importantly, ensuring rigour in mixed-methods research.^[5,13,21] The research problem or question should guide the choice of which particular mixed-method design to use and the rationale for selection should be presented clearly.^[5] Creswell and Plano Clark outlined four key decisions involved in choosing an appropriate mixed-methods design:^[5]

- 1 the level of interaction between qualitative and quantitative components (i.e. the extent to which the two components are kept independent or interact with each other);
- 2 the relative priority of the two components (i.e. the relative weighting given to each qualitative and quantitative component);
- 3 the timing of conduct of the two components: this refers not only to the order in which qualitative and quantitative data are collected but also to the use of results from these data sets;
- 4 the point(s) of interface (i.e. one or more points where the qualitative and quantitative components are integrated) (Figure 1^[5,17,22]).

As mentioned above, several typologies (classification system) exist in the literature but we will outline two

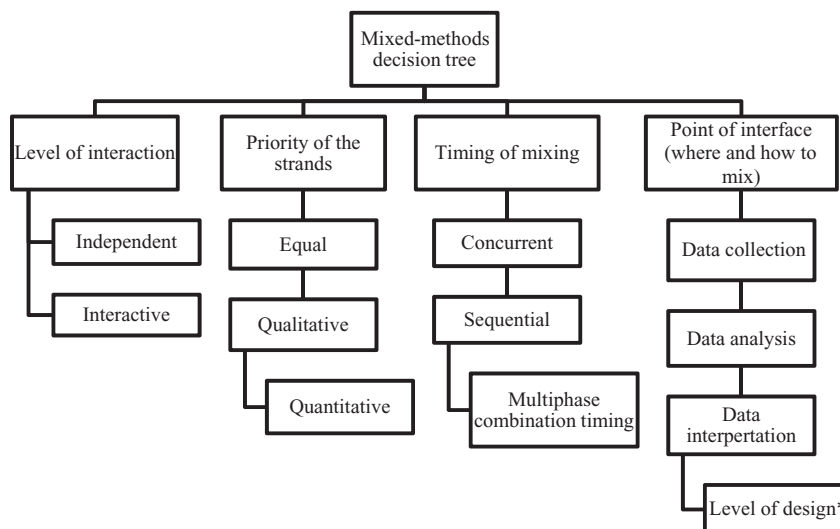


Figure 1 Creswell and Plano Clark mixed-methods decision tree.^[5] Adapted and modified from [22]. *Mixing at design level refers to the mixing which occurs when within a traditional quantitative or qualitative research design, an emancipatory theory, a substantive social science theory or an overall programme objective.^[5,17]

which appear most relevant for pharmacy practice researchers. Creswell and Plano Clark^[5] have suggested six mixed-methods designs (four basic and two advanced) that offer the necessary structure and logic to guide the researcher in designing and implementing a mixed-methods study. Since this article is intended simply as a primer, we will briefly explain only the basic four designs with their application to pharmacy practice research.

The convergent parallel design

This involves conducting qualitative and quantitative components concurrently, giving them equal priority, keeping both components independent during data collection and analysis, and only mixing data during interpretation. The convergent parallel design is also referred to as ‘current triangulation’,^[16] ‘simultaneous triangulation’^[23] and ‘parallel study’.^[24] The convergent design is best suited for ‘obtaining different but complementary data on same topic’,^[5] overcoming weaknesses of one method, triangulating findings for confirmation and validation, and developing a complete understanding of the research problem. For example, a convergent design might be used to study community pharmacists’ attitudes towards continuous professional development. The researcher concurrently conducts a cross-sectional survey and focus group interviews with the community pharmacists about their attitudes towards continuous professional development. The researcher analyses each data set separately and then integrates the findings to get a broader understanding of the issue.

The explanatory sequential design

This involves two distinct interactive phases. In the first phase, quantitative data are collected, analysed and given priority in answering the research question. Following this, qualitative data are collected to help to explain the findings of the quantitative phase. The purpose of the explanatory design is to explain the quantitative results using qualitative methods. For example, the researcher may conduct a randomized controlled trial to assess the effectiveness of a new pharmacist-led smoking cessation programme. It shows significantly lower smoking cessation rates among women of Arab origin. The researcher then conducts face-to-face qualitative interviews with the women, to explore their individual perspectives and identify possible explanations for the results.

The exploratory sequential design

This also has two distinct sequential phases. However, unlike the explanatory design, it prioritises qualitative data collection and analysis which occur in the first phase. The quantitative phase builds on the results of qualitative data analysis to test or generalize its findings. For example, the researcher intends to assess patient satisfaction with a pharmacist-led medication adherence clinic. In the first phase, the researcher conducts focus groups with patients who have attended the clinic to identify issues related to patient satisfaction in this context. Based on the findings from the qualitative data analysis, the researcher may then develop a structured questionnaire to assess patient satisfaction. The researcher then

Table 1 List of Leech and Onwuegbuzie^[20] mixed-methods design

1. Partially mixed concurrent dominant status design
2. Partially mixed concurrent equal status design
3. Partially mixed sequential dominant status design
4. Partially mixed sequential equal status design
5. Fully mixed concurrent dominant status design
6. Fully mixed concurrent equal status design
7. Fully mixed sequential dominant status design
8. Fully mixed sequential equal status design

conducts a cross-sectional survey with a random sample of patients to obtain generalizable results.

The embedded design

This was first described by Caracelli and Grenne in 1989.^[15] It is characterized by having one principal method (qualitative or quantitative) with the other method providing a secondary or supportive role. Depending on the purpose of the research the qualitative and quantitative data can be collected concurrently or sequentially. The principal method (qualitative or quantitative) is given priority. The mixing occurs at the design level. The embedded design is particularly useful when a single data set is not sufficient and different questions requiring different methodologies need to be answered within a single study. Referring back to the earlier example of pharmacist-led smoking cessation programme, in addition to the randomized controlled trial to evaluate the effectiveness of the programme, the researcher may consider conducting face-to-face interviews to evaluate patients' satisfaction with the service. It must be noted here that in contrast to the convergent design, where both qualitative and quantitative components aim to answer one research question, in the embedded design the qualitative component has a supportive role and answers a different research question.

Leech and Onwuegbuzie^[20] proposed the simplest typology of mixed-methods design based on three criteria. These criteria included level of mixing (partially or fully mixed), time orientation (concurrent or sequential) and emphasis of approaches (equal status or dominant status). The classification system resulted in eight designs (Table 1^[20]). They described partially mixed studies as those 'where both qualitative and quantitative data are collected and analyzed independently before mixing occurs at data interpretation stage'. Fully mixed studies involve mixing both qualitative and quantitative components within or across the following:

research objective, type of data, analysis and inference. The concept of time orientation refers to the timing of conduct of qualitative and quantitative components (either concurrently or sequentially) and emphasis of approach refers to whether qualitative and quantitative components are given equal status in addressing the research question or one component is given more priority than the other (i.e. dominant status).

The purpose of these classification systems is to develop a common language and to give structure and clarity to mixed-methods research. No classification system is superior to another and researchers can choose any of the classification systems based on their preference, ease of use and relevance.

Conclusion

Mixed-methods studies should collect and meaningfully mix qualitative and quantitative data as without purposeful mixing the mixed-methods designs are merely a tool to collect two different types of data.

Several mixed-methods designs are available to researchers, but the choice should be made based primarily on the nature of the research question, together with the availability of time, skills and resources. The classification systems described in this paper offer a general framework for researchers to consider when designing mixed-methods studies. The second paper in this pair explores in more detail the way in which the different designs have been used in pharmacy practice research.

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.

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