

# Research using qualitative, quantitative or mixed methods and choice based on the research

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## Abstract

Research is fundamental to the advancement of medicine and critical to identifying the most optimal therapies unique to particular societies. This is easily observed through the dynamics associated with pharmacology, surgical technique and the medical equipment used today versus short years ago. Advancements in knowledge synthesis and reporting guidelines enhance the quality, scope and applicability of results; thus, improving health science and clinical practice and advancing health policy. While advancements are critical to the progression of optimal health care, the high cost associated with these endeavors cannot be ignored. Research fundamentally needs to be evaluated to identify the most efficient methods of evaluation. The primary objective of this paper is to look at a specific research methodology when applied to the area of clinical research, especially extracorporeal circulation and its prognosis for the future.

## Keywords

extracorporeal circulation; clinical methodology research; mixed methods; research methodology; human services

## Introduction

Qualitative research is characterized by its aims, which relate to understanding some aspect of social life and its methods which (in general) generate words, rather than numbers, as data for analysis. For researchers more familiar with quantitative methods, which aim to measure something (such as the percentage of people with a particular disease in a community or the number of households owning a bed net), the aims and methods of qualitative research can seem imprecise.

Qualitative methods generally aim to understand the experiences and attitudes of patients, the community or healthcare worker. These methods aim to answer questions about the ‘what’, ‘how’ or ‘why’ of a phenomenon rather than ‘how many’ or ‘how much’, which are answered by quantitative methods. If the aim is to understand how a community or individuals within it perceive a particular issue, then qualitative methods are often appropriate.<sup>1</sup>

The personality of the researcher (and his/her integrity) may play a much greater role than in quantitative research. Therefore, the quality of raw data is essential. If the data are not of high quality, all statistical calculations will be either wrong or of inferior quality. So, for qualitative research, the researcher will be important to ensure the quality of the process, since he/she will need

to interpret data after its acquisition; in contrast, in quantitative research, the quality of the raw data will be more important.

Numerous studies have been constructed into the field of research on human services, utilizing both quantitative and qualitative methodologies and, in some instances, a combination. For the purposes of this paper, quantitative research is selected as a possible methodology, therefore, elements of this type of research are evaluated regarding if quantitative research meets the criteria needed when investigating the broad topic pertaining to general human services.

Adding to this observation, it is interesting to note that numerous scholars are of the opinion that the “gap” between qualitative and quantitative research is too

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wide, yet other opinions point out that this gap is conducive to facilitate the acquisition of information.<sup>2</sup> Accepting the validity of both these methodologies, effort is now directed at ascertaining the feasibility of effectively applying the elements found in quantitative research to the field of interest.

This report aims to bring an introduction to the theoretical concepts, as well as the qualitative and quantitative research methods that are used by the main disciplines engaged in research on health and health services. In order to understand why the various research methods are used, it is important to be aware of the conceptual backgrounds and scientific philosophies of those involved in research and evaluation, in particular, in demography, epidemiology, health economics, psychology and sociology.

### *Methods of accessing information*

In order to justify the selection of quantitative research and use the preferred methodology, attention should be focused on both perceived differences found within both research methods and their relativity to the field of study.

To enable this process, comparisons of the different elements contained within both methodologies were looked at with a view to justifying this paper's preferred choice of research.

We searched for publications using MEDLINE, EMBASE, CINAHL, CENTRAL and Web of Science in a three-month period. We used several key words: extracorporeal circulation, clinical methodology research, mixed methods, research methodology, human services. We included studies examining any type of research methodology (qualitative, quantitative or combined) and two reviewers independently extracted data. Effort was directed at accessing sources which provided a current overview of the area of general human services, while also looking at future predictions.

Moreover, these variable sources were also looked at from a "human services" point of view. While the effort was primarily focused on more recent studies, challenges were encountered, resulting in sources being accessed that were published less recently. Perhaps the combination of both recent and 'historical' viewpoints may serve to provide a broader outlook on how these methodologies have evolved up until today.

Attention was also focused on sources that depicted the applications of both methodologies and the anticipated or desired results. This report submits that opting to implement only the quantitative method as a means to establish the effectiveness in researching general human services may result in inadequate testing of theory or facts. However, accepting this limitation, this response seeks to lend credibility regarding the idea that

this methodology is a viable option in which to effectively research the field of general human services.

Based on the criteria above, 31 sources were accessed in order to enable effective research. Then attention was drawn to different elements found in the quantitative research method.

## **Results**

While many studies have described transformative designs, few have focused on their advantages and disadvantages. We are interested in providing information that allows prospective researchers, specifically those working in the perfusion-related arena, to make informed decisions about whether or not to apply these designs in their research.

### *Features of quantitative research*

The aim is to classify features, count them and construct statistical models in an attempt to explain what is observed.<sup>3</sup>

- Researcher knows clearly in advance what he/she is looking for
- Recommended during latter phases of research projects
- All aspects of the study are carefully designed before data is collected
- Researcher uses tools, such as questionnaires or equipment, to collect numerical data
- Data is in the form of numbers and statistics
- Quantitative data is more efficient, able to test hypotheses, but may miss contextual detail
- Researcher tends to remain objectively separated from the subject matter

### *Construction of statistical models*

The above list clearly depicts a number of elements that are involved in quantitative research. The first element involves the identification of data followed by numerically quantifying it. By deriving statistics from data allows the researcher to fulfill a primary research function, which is to choose what information is needed and "control the acquisition of data".<sup>4</sup> In further pursuing the method of "collecting data", attention is drawn to the aspect of generalization contained within quantifiable research.

According to studies into qualitative research, the focus is narrowed down to data derived from specific participants and their personal viewpoints and opinions.<sup>5</sup> Alternatively, the utilization of quantitative research requires the extraction of data in a larger volume, using standardized methods that include more

generalized samples, where the emphasis is on statistical information rather than individual perceptions. McRoy points out that such statistical analysis allows a deductive approach, thereby, enabling “hypothesis testing”.<sup>5</sup> To determine the future direction of general human services, a wide “inclusive” method of gaining data is more relevant than merely deriving specific detail, which only reflects the viewpoint of a relatively narrow sample.

In today’s socio-economic environment, quantitative research is still utilized as a preferred methodology by many perfusion researchers due to issues relating to time and financial considerations.<sup>3</sup> Accessing quantifiable information and data is relatively simple compared to qualitative research. This latter methodology requires time and considerable effort in the field, allocating resources to a relatively small sample of participants. Therefore, when looking at a broad and diverse field such as general human services, perhaps statistics can deliver more valid data in order to ascertain present and future trends. In addition, the process of quantifying can be repeated utilizing the same formula or methods. Repetition of larger and multiple samples under similar conditions allows comparisons to be formulated. Comparing statistics is perhaps easier to understand compared with a more subjective and narrow approach. Understanding numerical implications can lead to the assumption that the findings are valid, thereby, perceived as “the truth”.<sup>6</sup>

Furthermore, statistics rather than “real life” scenarios tend to remove the researcher from the emotional and subjective bias that can be more prevalent in qualitative research. Therefore, information and data can be interpreted, utilizing basic figures without the influence of participants compromising neutrality.

Adding to these ideas, ‘meta-analysis’ is not a function of qualitative research, but enhances qualitative research methodology. This analytical process enables the acquisition of multiple quantitative findings, followed by merging data and information to create a more representative viewpoint. This form of analysis is seen as a form of “systematic review which is largely a statistical technique”.<sup>7</sup> Meta-analysis allows findings from different sources to be factored into a broader analysis, thereby, creating a more representative finding of a topic under investigation. When applied to the field of general human services, various findings, each conducted into more specific areas of interest such as social care, health-care and financial security, can be statistically evaluated and correlated into a broader picture, thereby, enabling a more accurate representative conclusion to be drawn.

### *Clear objective of the research phenomenon*

Another element of quantitative research relates to a more planned sourcing process in which the researcher

has a definitive or clean objective as a basis from which to research. Alternatively, by implementing qualitative research, the researcher may only possess an idea or approximation of the objective.<sup>3</sup> A study conducted into the theory of qualitative research clearly states, “In many qualitative research studies, there is no specific hypothesis at the outset. Instead, hypotheses are produced (or induced) during the early stages of research.”<sup>8</sup> Thereby, confirming the lack of an initial definitive objective prior to enacting qualitative research.

Further expanding on the application of these two methodologies, another line of thought suggests that, ideally, quantitative research should possess an originating hypothesis, followed by the utilization of measured data, thereby, conclusively enabling either proving or disproving the hypotheses.<sup>9</sup> Relating to the field of general human services, this paper submits that an initial clear objective regarding the specifics of ascertaining both existing and future prognosis is perhaps lacking or inadequate when implementing the qualitative approach.

### *Quantitative research - latter phases of research projects*

A third element pertaining to quantitative research is the supporting role of qualitative research when utilized in combination with quantitative research. According to a recent article, it is suggested that the ‘opening’ phase of research is enacted by first utilizing qualitative research as a ‘lead in’, prior to conducting primary research via quantitative research methodology.<sup>10</sup> It is interesting to note that qualitative research assists management personnel when investigating marketing strategies, especially concerning issues that are underlying to the main research question. Another study likewise points out that there is an acceptance among researchers that qualitative methodologies are applicable to the initial stages or when exploring the validity of the project.<sup>11</sup>

### *Planning prior to data collection*

One significant difference between the two above-mentioned research methods relates to the design and formulation of the research study. In planning the design of the research paper, questions will need to be asked regarding if the research can be “generalized” in order to collect relevant findings in other sources accessed.<sup>12</sup> Furthermore, such findings should enable such ‘generalization’ to be applied to the theory or to “the theory or to the practice”.

Another factor to be analyzed prior to determining which research methodology is most applicable pertains to the objective of the study. The objective in looking at general human services is to establish existing conditions and possible future outcomes. If the objective has

been to evaluate social processes, perhaps the qualitative research methods would be more suitable.

Both research methodologies conduct 'content' analysis, yet, regarding the preference of quantitative research, content analysis can be utilized to evaluate the quantity of data and information, thereby, categorizing such content into a format that can be counted.<sup>13</sup> In addition, there are many potential risks pertaining to obtaining 'sensitive' or 'personal data,' such as normally derived from qualitative research.

Assuming the existence of a plan or goal prior to the research design, focus on an objective lends weight to the argument promoting this paper's response choice of quantifying data and information in order to establish an overall picture of general human services. To achieve this, an objective truth, as derived by quantitative research, needs to be a primary focus rather than a subjective truth.<sup>14</sup> This objective approach, incorporating a 'truth' or 'reality,' is also linked with 'positivism' which is explained by identifying quantitative research with positivism and further expanded as "that physical and social reality is independent of those who observe it".<sup>15</sup>

### *Utilization of tools*

For perfusionists who are practicing clinicians, researchers and scholars using quantitative methods for research purposes, data and information is accessed by the utilization of tools from which they can quantify and build on existing theory. However, those applying qualitative methods are perhaps more restricted in their scope of research, due to their role as a tool or instrument in which to collect subjective and more personalized data.<sup>3</sup> Another restriction is that it is more challenging for qualitative researchers to attain a general overall picture pertaining to multiple settings.<sup>16</sup> In the time-frame needed to conduct qualitative research, in which the researcher personally interviews individual participants, such an allocation of time could have been directed quantitatively at existing sources from which existing data and information could have been gathered on a much broader scale.<sup>17</sup> This may act differently if the quality of data was of inferior quality or might the quality of data play an important role. The database of most clinical studies might be too small to allow for a generalization.

Additionally, utilizing quantitative research enables many factors to be investigated, some of which may be linked or influence each other, allowing the researcher to analyze varying factors in how they relate to the research question. Set within these parameters, tools such as questionnaires or equipment can be applied in multiple areas of the study, allowing more inclusive findings.

### *Statistically-derived data and information*

One way of achieving relevance when establishing 'truth' or proven facts is by gathering quantified data and information. Mays and Pope argue that detail is also relevant in order to establish if findings are applicable with a similar environment.<sup>17</sup> However, they also admit that 'probability sampling' is a viable method in which to ascertain the measure of representation, adding that form of 'sampling' is often ignored by researchers using qualitative methods. Inference derived by this frequent 'omission' by qualitative researchers can lead to the assumption that quantitative research utilizes a more objective probable scenario when enacting the research process. They suggest that quantitative research sampling is biased towards statistics rather than theory, as is more the practice with qualitative-based studies.

### *Data in numerical and statistical format objective*

Two further elements of quantitative research relate to the presence of numbers and statistics when evaluating sources. To facilitate accuracy of measurement and evaluation of objective concepts, the achievement of such objectives is enabled by tools such as surveys and questionnaires. In a twenty-year study into psychosocial studies by Hawker and Boulton, quantitative research was designed around cross-sectional findings.<sup>18</sup> They admitted that there were 'some design limitations to the studies reviewed, but altogether their results provide a strong background for more complex research in to the course and treatment of victim's distress'. In their quantitative research, it was noted that extensive sources were accessed, including electronic databases, utilizing keywords and the names of researchers who had published studies related to specifics or niche areas within the field of psychosocial studies. Here, it is clearly seen how a large volume of information and data can be effectively evaluated by quantifying rather than qualifying the content.

### *Efficiency of quantitative research*

As this paper has already frequently noted, the element of efficiency is contained within quantitative research methodology. It has also drawn attention previously that the allocation of available time resources may be more effectively managed when enacting the quantitative methodology due to the potential of procuring large amounts of data within a given time period. Another aspect of this research method relates to the ability for organizations to act on the findings and formulate valid policy based on generalized statistical evidence. Arguably, a valid objective from research is by

investigating existing problems and future trends, such as in the field of general human services, thereby, influencing the establishment of ‘informed’ policy by human services organizations’ decision-makers. Supporting this argument, a study into both research methodologies suggests that “in the right circumstances, quantified models can be valuable tools for policy analysis.”<sup>19</sup>

### Researcher’s role

Perhaps the final element contained within quantitative research is regarding the function and objective of the researcher. When discussing quantitative research versus the subject matter, Neill defines the researcher’s role in an objective light while indicating the qualitative researcher is fully involved or immersed within area of consideration.<sup>3</sup>

When looking at quantifiable research objectives, a primary objective from a ‘human sciences’ perspective is the collection of data and information that verifies or disproves the theory. According to Castellan, such a methodology allows better understanding of a theory “that will allow scientists to state causes and predict human behavior.”<sup>14</sup> Throughout the above discussion, emphasis has been placed on the appropriateness of both research methodologies in areas such as general human services. Based on the aforementioned data and information derived from cited sources, it is suggested that quantitative research remains the preferred option to enable an effective and accurate assessment of this paper’s research interest.

### Perfusion-related research

Cardiovascular perfusion is a profession that combines technical expertise and medical knowledge. A scientific approach to extracorporeal circulation and related techniques is necessary to solve the problems ahead.

Qualitative and mixed methods offer unique opportunities to contribute to the empirical literature on key aspects of cardiovascular outcomes.<sup>20</sup> Translation of evidence-based practices in primary care is a major focus of outcomes and effectiveness research. Qualitative methods have also been used to examine aspects of organizational change in implementing guidelines for improving timeliness of cardiac care for patients. Development of patient-centered outcomes measures has been identified as a primary goal in outcomes research. Patient-centered outcomes research requires the development of functional assessment benchmarks that reflect patient perceptions of important aspects of function in everyday life.<sup>21,22</sup> Disentangling the potential sources of documented disparities in access to and outcomes of cardiac care has been identified as a priority.

## Conclusion

Research is the systematic and rigorous process of enquiry which aims to describe phenomena and to develop and test explanatory concepts and theories. Ultimately, it aims to contribute to a scientific body of knowledge. More specifically, in relation to the focus of this paper, it aims to improve health, health outcomes and health services.

However, it is not possible to place research methods in a hierarchy of excellence, as different research methods are appropriate for addressing different research questions. It should be pointed out that research on health services is not insulated from the society within which it is placed. It is often responsive to current policy and political issues<sup>23</sup> and is, thus, dependent upon decisions taken by others in relation to research topics and research funding.

The strengths and weaknesses of qualitative and quantitative research are a perennial, hot debate, especially in the health sciences. The issues invoke classic ‘paradigm war’. The personality/thinking style of the researcher and/or the culture of the organization is under-recognized as a key factor in the preferred choice of methods. Overly focusing on the debate of “qualitative *versus* quantitative” frames the methods in opposition. It is important to focus, also, on how the techniques can be integrated, such as in mixed methods research. More good can come of healthcare researchers developing skills in both realms than debating which method is superior.

Mixed methods designs can provide pragmatic advantages when exploring complex research questions. The qualitative data provide a deep understanding of survey responses and statistical analysis can provide detailed assessment of patterns of responses. However, the analytic process of combining qualitative and survey data by quantifying qualitative data can be time-consuming and expensive and, thus, may lead researchers working under tight budgetary or time constraints to reduce sample sizes or limit the time spent interviewing. Ultimately, these designs seem most appropriate for research that does not require either extensive deep analysis of qualitative data or multivariate analysis of quantitative data.

Research that draws on the strengths of both quantitative and qualitative approaches has become increasingly recognized as essential in a number of fields intrinsic to outcomes research. A clear understanding of such methodologies and systematic incorporation of established techniques for ensuring rigor can help outcomes researchers successfully adopt and integrate qualitative approaches when they are appropriate.

### Declaration of Conflicting Interest

The authors declare that there is no conflict of interest.

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