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Case study research designs: their place in chiropractic

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Case studies involve utilizing a distinct research approach. They are often confused with case reports, case series, cases used in rounds, and cases without control groups or baseline measures. The case study approach can provide a way to investigate broad chiropractic issues, policies, or practices in their real settings. Case study research designs are appropriate in both clinical and nonclinical settings. They require good conceptual skills not elaborate equipment; extensive "thinking" time but not sophisticated statistical analysis; and, a well-designed case study protocol but no control groups or randomized trials.
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KEY WORDS: case study research, nonclinical applications of research, case studies versus case reports, chiropractic, manipulation.

Pour faire une étude de cas, on doit utiliser un protocole particulier. Les études de cas sont souvent confondues avec les rapports de cas, les séries de cas, les cas de rondes et les cas sans groupes de contrôle ou mesures de base. L'étude de cas est un bon outil pour évaluer la progression de la chiropratique, ses politiques, sa mise en pratique et ses résultats. Les méthodes suggérées permettent des études de cas en clinique ou «sur le terrain». Elles requièrent de bonnes aptitudes conceptuelles et pas d'équipement compliqué; beaucoup de travail cérébral mais pas de calcul statistique élaboré; un protocole bien pensé mais sans groupe de contrôle ou essais au hasard.
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MOTS-CLÉS : recherche par étude de cas, application non-clinique de la recherche, étude de cas vs rapport de cas, chiropratique, manipulation.

Introduction

Frequently, case reports are referred to as case studies or case series, especially in the fields of chiropractic, medicine, and social work. Generally, the aim of this type of case study is to illustrate a technique or record an interesting condition and its therapeutic outcome in one or a few patients.[1] Well-designed case reports or case series provide information from which controlled research studies may be developed.[2]

Similarly, case studies are used in teaching. The "case" is not necessarily an accurate account of an individual's condition but rather a framework designed to provide enough information to stimulate discussion among students regarding the diagnosis and treatment of the patient described in the case.

However, as a research activity, the case study arises from a desire to understand complex processes and broad issues, and may involve nonclinical aspects of professional practice.[3] Unfortunately, case study research methodology is often given minimal, if any, attention in courses and textbooks on research design even though superb examples of its use do exist.[4–6] When attention is directed to case study research it is often erroneously compared to a one-group-post-test-only study, a quasi-experimental design.[7–9]

This article, the second in this series, provides information on the case study as a research strategy by suggesting topics that are appropriate, discussing elements that make up a good design, and offering some ways to formulate ideas before undertaking this type of research.

The case study as a research strategy

The case study is one way of conducting research. Specifically, as defined by Yin,[7] a case study is an empirical inquiry that:

> "investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used." (p. 23)

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Exemplary illustrations of case studies exist going back several decades and spanning several topics. Examples of significant case studies include Jane Jacobs'[10] work on the death and life of great American cities, Peter Blau's[11] study of the dynamics of bureaucracy, and David Sternberg's case study of chiropractic students confronting a medically oriented society.[12]

Picking the topic

It is difficult to overestimate the "thinking time" it takes to narrow down a research idea and select an appropriate research strategy. Although case studies can lend themselves to studying many areas of the chiropractic profession, some topics may be inappropriate. For example, are you interested in athletic injuries? Achilles tendonitis or shin splints? Are you interested in researching a specific condition? Carpal tunnel syndrome, dysmenorrhea, or vertigo? Are you interested in examining the effectiveness of a chiropractic technique such as activator, diversified or Gonstead? Do you want to examine the impact of the Wilk decision on chiropractic? Are you interested in the history of chiropractic in your province? Or are you interested in examing the role of patient education in treatment outcome regardless of injury or condition?

In reviewing the definition of a case study, the topic of patient education and the Wilk decision mentioned in the preceding paragraph are probably the most suitable ones for a case study. For example, patient education is a contemporary phenomenon, and the boundaries between treatment and education are often not clearly evident. Further, to understand the role of patient education in treatment outcome a variety of measures would be necessary to grapple with how and why a patient education program has worked (or not). The other research possibilities mentioned above are probably best left to other types of research designs (e.g., an experiment, a survey, an archival analysis). If the intent of your research is to focus on a condition, treatment, and outcome independent of its personal, social, and professional contexts, an experiment might be more appropriate.[3] If your research interest involves the history of chiropractic, an archival approach to data collection and analysis would be more appropriate.

In narrowing your research interest, let us assume that you are interested in conducting a case study about the effect of patient education on patient improvement. You might, for instance, hypothesize that knowledge acquired by patients attending patient education classes may have a positive effect on the therapeutic outcome.

The next step involves determining the status of the research that has been done in the area. Reviewing the literature unearths the material upon which to judge the clinical-experimental status of your research idea. Specifically, using Keating's[13] classification scheme, you would assess the acceptability of the patient education approach, the extensiveness of use, and where previous research has been conducted. Is the effectiveness of patient education based on anecdotes or testimonials? Is it based on a few controlled outcome trials, or is it supported by different research stategies and multiple replications? Let's assume that minimal work has been done in the area of patient education and you would like to investigate the contemporary use of patient education in a real-life context (e.g., your own practice). Some guiding principles in case study research follow.

Designing a case study

A research design should be the logic that links the data to be collected to the initial questions of the study and, ultimately, to its conclusions. In case studies, a number of different types of designs exist, each having the following specific components in common: the study's questions and propositions; its unit(s) of analysis; the logic linking the data to the propositions; and the criteria for intepreting the findings.[7]

Defining the question

Reading the literature available on your topic helps to develop sharper and more insightful questions. For example, if you are interested in the impact of the Wilk decision on chiropractic as a vocational choice, you would want to examine how a legal discovery process affects policies and procedures, and how vocational guidance counsellors influence chiropractic career choices, as well as how the chiropractic profession has been studied by other researchers. If you are studying the role of patient education in professional practice, you would want to look at how patient education has been studied in other professions; what models have been used; and how clinical practices have been compared.

Defining the unit of analysis

Specify your unit of analysis, defining what the "case", in fact, is. The case may be an individual, or it may be an event, policy or entity that is less well-defined than a single individual. For example, if you wish to study how education as a part of treatment affects patient recovery, specific treatment approaches might be the unit of analysis and different principles of practice might be the subjects of the study. In this example, a case study would involve a comparison of approaches, provided the case study compared two different types of practices using the same criteria for treatment success.[14]

Linking the question and its measurements

Demonstrate how your data link to the question under study. If you are examining the extent of patient improvement in a practice that utilizes patient education classes versus a treatment-only practice, your case study could involve one measurement (e.g., post-test administered after a series of treatments) or a series of measurement occasions extending over a period of time[15] and including a number of ways to measure the outcome (e.g., observations, interviews).

Another, more comprehensive, way of doing this is to develop a typology. Typologizing is a tool to aid in systematic understanding.[16] It involves developing "types" in pairs of polar extremes. These "types" are concepts which focus atten-

tion on practice details that might otherwise be overlooked. For example, how would you characterize a clinical practice that uses mandatory patient education class attendance as a precondition for treatment versus a practice that does not have structured patient education classes. From your observations, you might feel that the patient-physician relationship is different in a treatment-only practice (one type) in contrast to one with patient education classes (another type). Continue to think about differences between the two until you have developed two extreme types. Examples of possible differences are outlined in Table 1.

When comparing the two types of practices, the case study researcher needs to be fully cognizant of the context in which the treatment is being delivered in order to rule out variables other than education. For example, different practice approaches may stem more from the individual characteristics of the chiropractors than from the differential use of educational practices. Developing a typology enables one to begin capturing dynamics in both types of clinical practices: those that require class attendance and those that do not. Once a typology is developed, it guides your observations. As your observations confirm or disconfirm your initial impressions, modifications are made until you are confident that your typology reflects actual differences that you observed and recorded.

TABLE 1: SAMPLE TYPOLOGY: TWO TYPES OF PRACTICES

TREATMENT ONLY PRACTICE	TREATMENT AND CLASSES PRACTICE
Attending to educational information is optional	Class attendance is required
Clinical and group setting	Clinical setting only
One-way information dissemination	Two-way interactive information sharing
Patient responsibility for improvement is low	Patient responsibility for improvement is high
Patient understanding of condition is low.	Patient understanding of condition is high.

Specifying your methods of analysis

Show the criteria you will use to assess your findings. In case study research, multiple sources of evidence are used. If you are measuring therapeutic outcomes in two different types of clinical practices, how will you measure the extent of improvement in the patient's condition? You might decide to develop a patient productivity index that includes an established disability questionnaire,[17] a measure of lost work days, observation of the chiropractor-patient interaction, family reports, and so forth. The reason for using many sources of evidence is to rule out other possible explanations for observed differences in patient improvement.

Another technique that aids in formulating how data will be analyzed involves the preparation of alternative propositions. For example, if you hypothesized that patient education combined with treatment would result in increased patient response to treatment, you would graph two propositions; one showing an effect and one showing no effect. Later, once you have gathered your information, you can see which pattern your data match.

Frequently, dummy tables are prepared in order to numerically portray your hypotheses. As the sample dummy table (Table 2) illustrates, your expectation is that patient improvement as measured by increased productivity is influenced by the presence of an education component in treatment. In this example, patient education (the independent variable) is seen as influencing patient productivity (the dependent variable). Assume that you plan to conduct your interviews and observations on 50 patients in each of the two chiropractic offices. One practice uses patient education classes and the other does not. Let's also assume that you expect more patients attending patient education classes to report higher levels of improvement than in the treatment-only practice in the amounts estimated in Table 2.

TABLE 2: DUMMY TABLE: THE EFFECT OF PATIENT EDUCATION CLASSES ON PATIENT IMPROVEMENT

IMPROVEMENT REPORTED (dependent variable)	PATIENT EDUCATION (Independent variable) PRESENT n	%	ABSENT n	%
HIGH	40	80%	20	40%
LOW	10	20%	30	60%
TOTAL	50	100%	50	100%

While there are many ways to prepare tables, it is best to standardize your format. In Table 2, patient education (present or absent) is placed horizontally and improvement (high or low) is placed on the vertical axis. When the independent variable is placed on the horizontal axis and the dependent variable is placed on the vertical axis, the rule is "sum down, read across". In this hypothetical example, you would conclude that 80 percent (n = 40) of the patients in the treatment plus education practice reported a high level of improvement, while 40 percent of the patients in the treatment only practice reported high

improvement levels. If you found a similar pattern when you conducted your research, then your hypothesis that patient education classes affect therapeutic outcome would have been supported.

You would continue with dummy table preparation until all of the issues you are examining have been portrayed in either graphic or tabular form. Doing this exposes gaps in your research plan if they exist because visual analysis has a built-in bias against the selection of weak variables.[15,18]

Graphic representation may also stimulate further refinement of your ideas. For example, you might begin to question if formal patient education classes are the only way to transmit educational principles. Or you might reason that the impact of education results in a series of gradual changes not easily captured by one self-report completed by each patient. Further, you may begin to question whether the effect of education occurs in stages, steps, phases, cycles, spirals, or sequences.[7] At this point, great care must be exercised in order to overcome potential criticism of your case study and you may need to re-examine the issues you are planning to study. Case study research involves writing, rewriting, then writing again in order to clarify your topic of interest.

Conclusion

Although case study research is frequently misunderstood, hundreds of compelling and informative case studies exist. Reading one or two of them provides insight into the flexibility of this type of research strategy. Case studies can investigate contemporary aspects of the chiropractic profession in the context in which they occur, in contrast to experimental research that focuses on conditions and their treatment.

Case studies require careful planning. The plan needs to include a review of the literature to define the scope of the research question; a specification of the unit of analysis; a method to link the question to its measurements; and a graphic portrayal of the criteria that will be used to assess the results. Above all, case study research in chiropractic requires curiosity about chiropractic as a profession. In this respect, case studies can highlight the "culture" of chiropractic in contrast to focusing on treatment modalities and their outcome.

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