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Grounded theory in medical education research: AMEE Guide No. 70

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Abstract

Qualitative research in general and the grounded theory approach in particular, have become increasingly prominent in medical education research in recent years. In this Guide, we first provide a historical perspective on the origin and evolution of grounded theory. We then outline the principles underlying the grounded theory approach and the procedures for doing a grounded theory study, illustrating these elements with real examples. Next, we address key critiques of grounded theory, which continue to shape how the method is perceived and used. Finally, pitfalls and controversies in grounded theory research are examined to provide a balanced view of both the potential and the challenges of this approach. This Guide aims to assist researchers new to grounded theory to approach their studies in a disciplined and rigorous fashion, to challenge experienced researchers to reflect on their assumptions, and to arm readers of medical education research with an approach to critically appraising the quality of grounded theory studies.

Introduction

The last several years have witnessed a gradual increase in the use and acceptance of qualitative methods of inquiry in medical education research. This trend reflects a growing recognition that some of the most pressing, relevant, and important questions in the field cannot be satisfactorily explored using the experimental and quantitative research methods that have traditionally dominated the biomedical domain. Among the multitude of qualitative methods available to the researcher, grounded theory has been the approach most frequently used in both the biomedical and social science realms (Harris 2003). With the increasing prominence of the grounded theory method in medical education research, it has become necessary for researchers and readers alike to have a clear grasp of its potential, its principles, and its pitfalls.

In this Guide, we will offer first an important historical perspective on the origin and evolution of grounded theory. We will then elaborate the key tenets of the grounded theory method – the elements that need to be present in order for a study to call itself a grounded theory study. Although these historical and procedural aspects of grounded theory have been well described by others (Kennedy & Lingard 2006), a guide to grounded theory must begin here, in order to adequately equip readers with the background they will require to do, or to critically evaluate, grounded theory research. This Guide will then build on previous literature on the use of the method in medical education research by examining important critiques that have been aimed at grounded theory and exploring some of the controversies and potential pitfalls that will face researchers. The grounded theory method, and indeed the discourse around knowledge generation, has evolved significantly over the forty-five years since grounded theory was first described. An evolving method deserves a periodic revisiting of its strengths and vulnerabilities so that it can be utilized thoughtfully and for maximum impact by researchers, and this Guide aims to serve this purpose.

Practice points

- Grounded theory has emerged from its origins in 1960s sociology to take an important place in medical education research.
- The grounded theory method is appropriate for exploratory research, especially that which explores social processes. Its intent is the development of a theory, "grounded" in the data, which enables understanding of the process under study.
- Fundamental elements of the grounded theory approach include an iterative process, theoretical sampling, and data analysis using the method of constant comparison.
- Constructivist critiques of a fundamental notion of grounded theory - that theory can "emerge" from data – have led to a reimagining of grounded theory where the roles of the researcher and the research participants in knowledge construction are acknowledged.
- Researchers should reflect on the important critiques of and controversies around grounded theory to facilitate making appropriate analytic choices.

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An historical perspective

Grounded theory remains inextricably linked with its sociologist founders, Barney Glaser and Anselm Strauss, who described, in their 1967 book *The Discovery of Grounded Theory*, a method for generating theory from empirical data (Glaser & Strauss 1967). Although they noted that the method could be applied to both qualitative and quantitative data, even suggesting that the distinction between the two types of data was meaningless as far as theory generation was concerned, their own research was qualitative. Even critics of grounded theory acknowledge that their pioneering work was a key influence on the legitimization of qualitative research methods within the social sciences (Thomas & James 2006).

A perspective on the context of the times in which grounded theory was developed is useful. Glaser and Strauss lamented the strong trend toward theory verification within the social sciences over the preceding decades, and wanted to promote the generation of theory from data rather than the use of research exclusively to test and verify existing theories (Glaser & Strauss 1967). In addition, although qualitative research had previously been well-regarded, by the 1960s, quantitative scholars had relegated qualitative research to subordinate status (Denzin & Lincoln 2005). Glaser and Strauss aimed to legitimize qualitative research in a field increasingly dominated by quantitative approaches by clarifying and codifying their procedures and practices for data analysis. In short, they were interested not only in advancing social science research but also in advancing a political agenda by demonstrating that qualitative research could attain levels of rigour that would allow it to stand alongside well-accepted quantitative methods of inquiry (Bryant 2002).

An examination of Glaser and Strauss's ideas about "theory" and its discovery is enlightening. Their key notion that theory emerges from empirical data, and is thus "grounded" in data, remains an important principle guiding much grounded theory work today, even as the idea of emergence has been disputed and critiqued (Bryant 2002, 2003; Kelle 2005). They distinguished between substantive theories, based on empirical areas of inquiry within a particular domain, and formal theories, which were conceptual, distinct from the time and place of specific settings and social structures. Substantive theories, they argued, could and should be generated from the researcher's own data (Glaser & Strauss 1967). While they called for grounding of even formal theories in data rather than "*borrowing the ways of logico-deductive theorists*" (Glaser & Strauss 1967, p.91), they acknowledged that formal theory could not easily be derived from the researcher's own data, unless a large number of studies in a variety of substantive areas had been done.

Positivism

In its original form, grounded theory was rooted in objectivist and positivist assumptions. The positivist paradigm assumes a true reality that is apprehendable by a detached, objective researcher (Guba & Lincoln 2005). Glaser and Strauss's original work, in fact, occurred at a time when a post-positivist paradigm was emerging, in which reality is viewed more critically as "*only imperfectly and probabilistically apprehendable*" (Guba & Lincoln 2005, p.193), but in fact the differences between positivism and post-positivism in terms of their influences on the approach to research questions are minor. The positivist thinking is apparent in the prominent use of the word "discovery" in the original description of the grounded theory method; the implication is that truth is waiting to be "discovered" by the researcher.

New paradigms

The decades that followed the original description of grounded theory witnessed extensive critiques of the positivist assumptions underlying research and the emergence of new paradigms, including constructivism. The constructivist paradigm views knowledge as actively constructed and co-created as the product of human interactions and relationships. Data and analysis are therefore created from "*shared experiences and relationships with participants and other sources of data*" (Charmaz 2006, p. 130). Within the constructivist paradigm, the goals of research shift from the positivist goal of discovering truth toward the development of understanding and adequate models for specific, situated purposes (Bryant 2002). Constructivists acknowledge the interpretive nature of theory generation. They are reflexive about the role of the researcher in creating these interpretations and reject positivist notions of the researcher as dispassionate analyst (Charmaz 2005). The research process is viewed as one of active engagement, where the researcher brings his or her own background and assumptions to the analytic process.

The influence of postmodern notions of knowledge production has led to further calls to updating the grounded theory method. In stark contrast to positivism, with its goal of uncovering basic social processes that are simple and generalizable, postmodernism acknowledges and emphasizes complexity, instability, and heterogeneity (Clarke 2003). Clarke contends that grounded theory and other qualitative approaches are no longer acceptable without the reflexivity and explicit acknowledgment of complexity that postmodernism demands. She has advocated for a more sweeping overhaul of the grounded theory method through the incorporation of newer approaches, such as situational mapping, that are more compatible with postmodern sensibilities (Clarke 2003).

Doing grounded theory research: Principles and procedures

Although grounded theory has evolved as a result of this critical questioning of its underlying assumptions, there remain a number of fundamental methodologic strategies that define grounded theory studies. These metholodologic fundamentals, including an iterative process, systematic treatment of data through coding, constant comparisons, and theoretical sampling, will be discussed in the next section. We will illustrate these principles and procedures, where useful, by making reference to a recent grounded theory study of our own (the "influential experiences study") in which we explored the important influences on physicians' learning

(Watling et al. 2012). We will start, however, where every piece of research should start – with a strong research question.

Research questions in grounded theory studies

Unlike the experimental approach to research that dominates biomedical disciplines, grounded theory research is not about testing hypotheses. Rather, grounded theory research is exploratory, seeking to understand the core social or social psychological processes underlying phenomena of interest. Grounded theory allows the researcher "*to explicate what is going on or what is happening . . . within a setting or around a particular event*." (Morse 2009, p.14) These aims determine the types of research questions that should be asked in a grounded theory study. The questions should be broad enough to allow the researcher the freedom to explore a topic in depth, while not being entirely unfocused (Corbin & Strauss 2008). The initial research questions should define the scope of the study and guide the collection of data, while allowing flexibility for the researcher to follow the sometimes unexpected turns that arise as data is examined. For example, in our "influential experiences study", we were interested in exploring the qualities of those clinical experiences that meaningfully influenced physicians' learning[1]. In the interviews we employed for data collection, we asked what kinds of experiences physicians considered most influential in their learning, and what allowed these experiences to resonate with them (Watling et al. 2012). These questions were sufficiently broad to allow us to collect data that elucidated the experience of clinical learning in some depth, while still allowing us to define the contexts and individuals of interest.

Ensuring methodologic fit

The researcher may benefit, at this stage, from pausing to ensure that the grounded theory method is an appropriate fit for exploring the research questions at hand. Qualitative researchers have a number of approaches from which to choose. In addition to grounded theory, some common approaches include ethnography, phenomenology, and case study. An appreciation of the key features of each of these alternative approaches will assist the researcher in choosing wisely.

Although there may be some overlap between the various approaches to qualitative inquiry, they have, at their core, distinctly different goals, and as a result they lead to distinctly different products. Ethnographic research uses the concept of culture as a lens through which to interpret data (Goodson & Vassar 2011). The ethnographer aims to understand a social organization from within, and typically relies heavily on observations as a data source, often obtained through sustained immersive engagement in a social milieu (Atkinson & Pugsley 2005). The product of ethnographic research, an *ethnography*, provides a "holistic cultural portrait" of the studied group. (Cresswell 2007, p. 72). Phenomenology, in contrast, focuses on describing the meaning of an experienced concept or phenomenon. The research starts with a phenomenon of interest, then studies several individuals' experiences of that phenomenon to reduce it to its essence (Cresswell 2007). Central to phenomenology is the practice of *bracketing,* in which the researcher identifies preconceptions, suppositions, and biases that may influence data interpretation, then attempts to deliberately set these biases aside (Dornan et al. 2005). In the case study approach, the researcher chooses to study a case or a small number of cases whose boundaries can be readily defined (Stake 2005). Case study research is defined by what is studied rather than by how it is studied, and typically involves the collection and analysis of information from multiple sources. Its goal is an in-depth understanding of the complexity of an individual case, rather than the derivation of theory or the elaboration of generalizable principles (Cresswell 2007).

Of course, a myriad of other qualitative approaches also exist to explore social phenemona, such as auto-ethnography, hermeneutics, and critical discourse analysis. While it is outside the scope of this Guide to review all possible approaches with regards to the question of how a researcher determines whether grounded theory is the best methodological fit, we would encourage researchers to take seriously this step of the research process by informing themselves of the most relevant methodological options and weighing their relative strengths and weaknesses for grappling with a particular research question.

Once the researcher has crafted a compelling research question, considered the methodologic options, and determined that grounded theory is an appropriate approach, concern can shift to the procedural elements that define the conduct of a grounded theory study, which we describe below.

Iterative process

In *The Discovery of Grounded Theory*, Glaser and Strauss highlighted the iterative nature of the grounded theory method, noting that collection, coding, and analysis of data should "*blur and intertwine continually*" (Glaser & Strauss 1967, p.43). In contrast to most experimental, hypothesis-driven quantitative research, in which data collection is carefully controlled and deliberately not influenced by emerging results, grounded theory research involves performing data collection and data analysis simultaneously, with each informing the other. In an interview study, for example, an iterative process means reading transcripts as they are completed and allowing early analytic insights and conceptual ideas to shape subsequent data collection. Findings that were unanticipated or that may represent a compelling area for further exploration are followed up in subsequent interviews with directed probes. In turn, the additional information gained by directing the inquiry toward emerging areas shapes the ongoing analysis.

Coding

Coding is a key part of the analytic strategy in grounded theory studies. Through coding, data are organized around key conceptual areas or themes. As a result, coding done well requires more than merely describing or summarizing the

contents of the data. Rather, coding requires the researcher to interact with their data in order to make sense of it. Coding is therefore an intrinsic and essential part of the process of theory building.

There are multiple approaches to coding data that have been described in detail elsewhere (Charmaz 2006; Corbin & Strauss 2008). During initial coding, it is important that the researcher remains open to many possible conceptual and theoretical directions (Charmaz 2006). Focusing the initial coding phase on small units of analysis, such as individual lines or sentences within transcripts, ensures that the most salient ideas are identified and given appropriate attention. From this initial detailed mining of data comes a second coding phase where broader categories are developed that may encompass a number of conceptually related ideas. Frequently, the coding scheme will evolve as further data are collected. Certain categories will be absorbed by others as it becomes clear that their data are related by particular unifying features, while other categories will split as distinct sub-concepts emerge in the process of examining fresh data.

A more detailed coding example may be instructive at this stage. In Box 1, we show an early coding scheme that evolved as interview data were analyzed in our ''influential experiences study''. The coding scheme shown in Box 1 was developed after reading and re-reading the first 15 of what would ultimately turn out to be 22 interview transcripts. Note that each proposed code is followed by a series of descriptors that define its characteristics and its limits. This strategy provides important guidance to the researcher as the task of categorizing data is approached.

Constant comparison

As coding proceeds, the analytic process enacted is one of constant comparison. As the data are examined, incidents are compared with other incidents and with the emerging characteristics and properties of the category (Glaser & Strauss 1967; Corbin & Strauss 2008). The comparative process defines the breadth and characteristics of each category, and facilitates the emergence of new categories when incidents are encountered that illustrate new concepts. Counter-examples – the ''negative cases'' that are encountered – are particularly important within the constant comparative process. Indeed, such outliers can unlock vital analytic insights that contribute to theory development. In comparing these incidents with the existing properties of the category, the researcher is forced to think beyond simple categorizations of like with like, revealing in the process conceptual principles that can account for the full range of data that is encountered.

From codes to concepts

Coding is not an end in itself; rather, it is a strategy to facilitate theory development. The strategy only succeeds when its power is harnessed, and doing so requires that the researcher not be satisfied with mere thematic classification. The analysis must be raised from the categorical to the conceptual in order to generate theory. Analysis at the conceptual level requires asking questions of the data: What is happening here? What is

Box 1. Coding scheme for ''Influential Experiences Study''.

1. Feedback credibility
- The process of deciding what feedback/information can be trusted
- Deciding how much weight to place on feedback
- Influence of the source/sender of the feedback on its credibility
- Which sources of feedback are respected? What earns them respect?
- Alignment of feedback with self-assessment

2. Influence of feedback
- When is feedback influential/neutral/non-influential/counter-productive?
- Comments related to the influence of negative feedback and the influence of positive feedback
- Comments about barriers to the creation or delivery of useful feedback
- Influence of style of feedback delivery on whether it is influential
- Influence of context on receptivity to feedback

3. Learning by observation
- Observation and attempted emulation as an approach to learning
- What is being observed? (physician behaviour, patient response, one's own comfort…)
- Comments about ''negative'' role modeling (learning how *not* to do things)

4. Learner attitude
- What the learner brings to the table and its influence on learning
- Taking initiative… to seek out feedback, learning experiences, etc.
- Openness to learning
- Motivation for learning – e.g. Wanting to be good at the job, wanting to look competent

5. Measuring up
- Wanting to measure up to peers
- Wanting to please supervisors, meet their expectations, earn their respect
- Not wanting to disappoint/fail
- The effects of the threat of being humbled in front of peers or colleagues on learning

6. Confidence
- Influences on the development of confidence and/or self-doubt
- Comments relating to the development of professional identity
- Learning to trust judgment and instincts
- Fragility of confidence
- Interaction between confidence and receptivity to feedback

7. Learning from the work
- Memorable clinical or work experiences
- Emotional impact of memorable clinical experiences
- Value of supervised teaching vs. simply accumulating clinical experience
- Role of supervisors in debriefing work incidents and the effect of this input
- Clinical outcomes/results as a form of feedback on performance
- Limitations of learning from the work – i.e. When is the 'feedback' offered by the clinical work itself less than trustworthy?
- ''Growth moments'' that signal readiness to move to the next level

8. Self-assessment
- Perceived role and importance of self-assessment during training
- Perceived accuracy of self-assessment
- Influences on self-assessment – how it is informed or constructed

9. Independence/autonomy
- Experiences of independence, autonomy, or ''freedom'' during training
- Being given trust or autonomy as a form of positive feedback (e.g. comments about a supervisor deciding not to come in to review a case personally, or about being allowed to do a procedure)
- Taking responsibility for clinical cases and its effect on learning

10. Collegiality
- Being included or ''let in''
- The value of ''support'' (vs. supervision, teaching, etc)
- Rites of passage (e.g. ''surviving'' critical feedback as a rite of passage)
- Support of peers; camaraderie

11. Assessments
- Influence of assessment strategies (including OSCE, ITER, final exams) on learning and development during training
- Influence (positive or negative) of looming certifying exams on learning

12. Role models
- Comments related to individuals viewed as role models
- What enables someone to become a role model?
- Ideas about the influence of role models

13. Mentoring
- Comments related to mentoring (either explicitly labeled as such or not)
- Comments related to individuals offering advice, guiding career decisions, offering opportunities that were important

this incident an example of? Why are participants reacting this way? Such efforts to define the underlying story within the data are rewarded with a richer analytic product. One approach to deeper, conceptual analysis involves exploring the relationships among the major categories that emerge from the coding process. The ideas that link categories can provide the conceptual scaffold to support theory development.

Returning to our example, the coding scheme evolved and was refined as further data were analyzed, as the links between categories were explored, and as we asked not only what was said but what was meant. The final list of coding categories for this study reflects a move toward conceptualizing our data rather than simply categorizing it (Box 2). For example, the previous categories of "learner attitude" and "independence/autonomy" were conceptualized as elements of "learning conditions", while "measuring up", "formal assessments", and "role models" were conceptualized as elements of "learning cues". Although "feedback" was also a learning cue, we felt this category was so significant that we opted to keep it distinct to ensure that its richness was not lost in the analysis.

Box 2. Final coding scheme for "Influential Experiences Study".

1. Learning by doing/ learning from clinical work
2. Learning conditions
   a. Autonomy
   b. Collegiality
   c. Influential teachers
   d. Learner attitude
   e. Presence of mentors
3. Learning cues
   a. Being allowed to do things vs. requiring supervision
   b. Feeling comfortable with tasks
   c. Formal assessments of knowledge and skill
   d. Measuring up (to peers, to standards, to expectations)
   e. Responses of patients and families
   f. Patient or clinical outcomes
   g. Role models
4. Determining credibility (i.e. of learning cues and experiences)
5. Receiving feedback
   a. Influence of feedback in general
   b. Debriefing difficult experiences
   c. Preceptors' responses to learner errors
6. Learning outcomes
   a. Confidence
   b. Practice change
   c. Fragility of learning from clinical experience
7. Reflection

Facilitating analysis with memos and diagrams

Memos are a written record of analysis (Charmaz 2006; Corbin & Strauss 2008). Grounded theory researchers should write memos regularly as they collect and analyze their data. Although memo writing can serve as an intermediate step between collecting data and drafting a manuscript for publication, the process should be free and informal. Researchers should record the ideas that occur to them as they move through the process of exploring their accumulating data. Memo-writing facilitates the emergence of new insights and the elaboration of relationships among categories, propelling the analytic process forward. The act of writing a memo forces the researcher to examine coded data and to interpret its meaning at a conceptual level. A collection of memos signposts the development of a grounded theory, ensuring that the process is logical, systematic, and grounded in the data.

Box 3 contains an extract of a memo written during the analysis of data collected for the "influential experiences study" example. As the data was examined, we noted recurring references to the credibility of information that was available to learners related to their own performance, and we became interested in how learners determined what information was credible and what was not, particularly as it related to

Box 3. Memo on "Determining credibility".

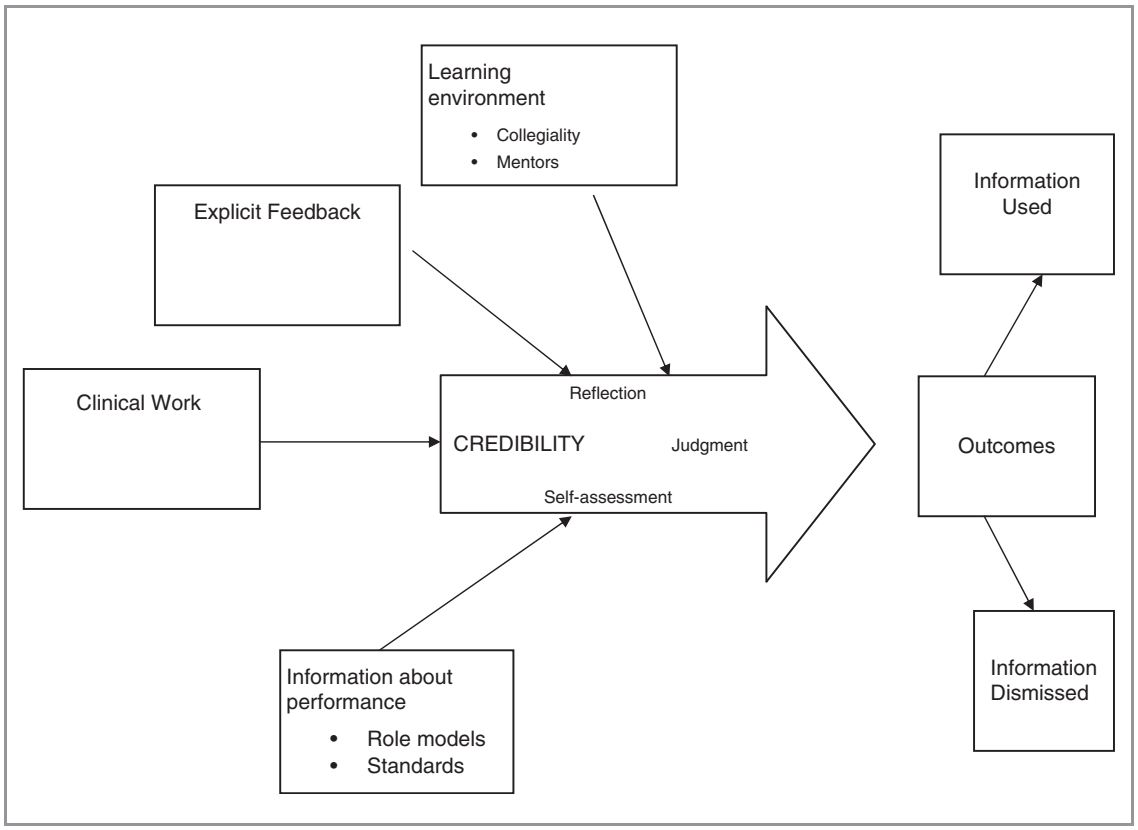
1. Learners consider a number of factors when making judgments about the credibility of the learning information that surrounds them. These factors include whether or not the information aligns with their personal values. If it conflicts with their personal and professional values, it is likely to be judged as not credible and discarded.
2. Credibility of feedback received from a supervisor is strongly linked to the respect the learner has for the supervisor. Respect is derived largely from that individual's performance as a clinician, rather than his or her style of relating to the learner. The degree of esteem in which the supervisor is held within the community may factor into the decision-making process, and learners may use informal networks of colleagues to determine this. Learners also use their own observations of the clinical performance of their supervisors to guide their credibility judgments.
3. As they become more experienced themselves, they are able to make more sophisticated judgments. Reputation alone is not a guarantee of credibility.
4. Linked with #2 above, those supervisors who achieve role model status tend to have credibility, again based on their perceived clinical expertise.
5. When feedback from a supervisor is clearly linked to the clinical work, and when the central concern is patient well-being, the feedback is deemed credible (regardless of how it is delivered)
6. Feedback that matches self-assessment is more likely to be deemed credible.
7. Feedback credibility is strengthened when sound rationale or justification accompanies it. The most persuasive rationale is grounded in clinical work and outcomes. Feedback needs to "make sense" in the clinical context.
8. Feedback from patients or families is more likely to be judged as credible.
9. Negative feedback can be judged as credible when accompanied by clear evidence that it is true. Perhaps this evidence is a requirement? In a sense, it is necessary for the learner to decide to agree with the feedback.
10. Feedback deemed not credible may have unintended consequences. (e.g. Feedback is dismissed, learner career choice is affected, etc)

Some general comments:

Credibility statements mainly relate to determining the credibility of feedback. Does this imply that other performance indicators (e.g. Clinical outcomes) have intrinsic trustworthiness?

The judgments that are made are grounded in the clinical work – Is the feedback source good at the work? Does the feedback align with the learner's value system and their approach to their professional work?

Box 4. Example of diagram drawn from data collected.



feedback received from their supervisors. In this memo, written after careful examination of the data contained in the "determining credibility" category of the final coding scheme shown in Box 2, key insights emerging from the data on this issue are outlined. Note that the writing is free and stylistically crude; the attention is on the ideas themselves rather than on grammar and syntax. Questions raised in the analytic process are articulated in the memo to signal potentially important ideas requiring further thought and attention.

Ultimately, we recognized that learners' judgments about the credibility of feedback and other information about their performance played a pivotal role in their clinical learning. Memos such as this one facilitated our recognition of the richness and centrality of this idea. Analysis is strengthened when memos are treated iteratively; they should be revisited and revised as data collection and analysis proceeds. It is worth noting that in the original, lengthier version the memo shown in Box 3, each listed point was supported by 2-3 quotations directly drawn from the data. Although direct quotations need not appear in memos, the exercise of inserting them into the original memo on determining credibility served not only to ensure that the insights were grounded in the data but also to facilitate the writing of the manuscript later.

Diagrams can serve a similar purpose to memos in grounded theory work. Diagrams are visual representations of the relationships between concepts that emerge. The creation of a diagram requires the researcher to raise their thinking about the data from the level of categories to the level of concepts, adding value to the analysis (Corbin & Strauss 2008). They promote organization of concepts, understanding of relationships among concepts, and reduction of data to its essence (Corbin & Strauss 2008). Building on the same example, our ability to relate our key concepts to one another in a unified model of clinical learning was very much facilitated by the use of diagrams. Consistent with the iterative nature of grounded theory research, our diagrams evolved through multiple incarnations, both reflecting and driving our conceptual thinking. Box 4 shows an example of one such diagram; interested readers may wish to compare this early diagram with the final version that was included in our published manuscript (Watling et al. 2012).

Inspiration and creativity

Grounded theory seeks to derive conceptual understanding of a process by carefully examining the elements and categories related to that process emerging from the data collected. Just how categories become concepts and description becomes understanding can seem mysterious and difficult to grasp. Creative thinking is an inescapable element of grounded theory research, which requires interpretation rather than mere description. Interpretive inspiration, however, is not accidental. The researcher must deliberately create the conditions that will facilitate the emergence of meaningful interpretive insights. Maintaining a flexible coding system that is responsive to the data, engaging in regular memo writing, and using diagrams to help bring ideas together into a coherent story are all deliberate strategies for facilitating the interpretive process.

Ultimately, however, the key facilitator of interpretation is a thorough knowledge of the data. Only by examining and re-examining data in detail will the researcher be able to recognize the patterns and recurring themes that will guide the analytic process.

Theoretical sampling

The sampling strategy in grounded theory research is purposive and guided by theoretical considerations. Initial sampling is guided by the research question. The researcher purposefully selects sources of data that are considered likely to provide rich information relevant to these questions. As Charmaz points out, this initial sampling provides only "*a point of departure*" (Charmaz 2006, p.100); subsequent *theoretical sampling* is guided by the categories and concepts that emerge from this initial data collection.

Theoretical sampling entails the collection of data "*from people, places, and events that will maximize opportunities to develop concepts in terms of their properties and dimensions, uncover variations, and identify relationships between concepts*" (Strauss & Corbin 2008, p.143). Unlike sampling strategies used in hypothesis-driven experimental research, theoretical sampling is responsive to the data rather than established before the research begins (Strauss & Corbin 2008). Theoretical sampling can therefore only occur in the context of an iterative process in which data analysis not only occurs concurrent with data collection, but actually drives data collection. The researcher explicitly seeks out new sources of data that facilitate developing and refining theoretical constructs. The goal of theoretical sampling is not to ensure that the sample is representative of a population nor to allow statistical generalizability of the results; rather, the aim is to ensure rich and full theoretical development through strategic and specific sampling to elaborate and refine categories and concepts (Charmaz 2006). Theoretical sampling allows the researcher to confirm, refute, expand, and refine developing ideas.

Saturation

How does the researcher know when enough data has been collected? The guiding principle is to continue sampling until saturation has been reached, but saturation refers to more than a state where no new data are emerging. Saturation is intimately linked with the analytic process, and can only be determined within an iterative process of data collection and data analysis. Saturation must be viewed at a conceptual and theoretical level, rather than at a data level. The important questions to ask in determining saturation relate to whether sufficient data has been collected for the researcher to have gained an adequate understanding of the dimensions and properties of the concepts and themes that have emerged.

The notion of saturation is challenging because the determination that it has been reached rests on the judgment and experience of the researcher. Unlike in the quantitative methods familiar in biomedical research, there are no guidelines or formulae available to grounded theory researchers for estimating the sample size that will be required to adequately address the research question. As a result, sample size in qualitative research in general can be a thorny issue for both novice researchers and for institutional review boards and granting agencies, particularly those from fields where the quantitative, experimental approach to research is dominant.

Morse (1995) has offered a number of useful guidelines for addressing problem of saturation. Perhaps most important, she calls for thoughtful and theoretical justification of the sample, noting that saturation will occur more readily with theoretical sampling than with convenience or random sampling. She also emphasizes data richness and variation over data quantity. As we have emphasized above, careful attention given to the infrequently occurring outliers and negative cases may be much more productive in achieving saturation than collecting a large number of like cases, as it is the examination of these infrequent cases that can facilitate delineation of concepts, linking of concepts, and development of theory. In short, data collection can stop when a complete and convincing theory has been developed that provides a plausible account of the data without gaps or leaps of logic (Morse 1995).

Critiques of grounded theory

The grounded theory method has been criticized on a number of fronts. A brief overview of some of the key critiques is relevant both for researchers using the method and for readers of grounded theory studies. Researchers will benefit from an awareness of these critiques, both in the design of their studies and in how they position their work. Educators reading grounded theory research will benefit from the critical eye afforded them by a familiarity with some of the reservations about the method that have been articulated.

Critiques from the interpretivists

The strongest critiques of grounded theory target its failure to shake off its positivist origins and to reimagine and realign itself as new ways of thinking about knowledge and its generation have emerged (Bryant 2002). To those who embrace the constructivist paradigm, the notion of "emergence" of theory from data is especially problematic. How does theory, in fact, emerge from data? Classic grounded theorists call for the researcher to enter the field with "*abstract wonderment*" (Glaser 1992, p. 22), and emphasize the "informed detachment" of the researcher (Glaser & Strauss 1967). The researcher, freed from the shackles of prior knowledge or personal perspectives, can then "discover" the truth within their data. Constructivists argue that these ideas about the passive stance of the researcher toward their data and the emergence of theory are simply not tenable within postmodern paradigms (Bryant 2002). Fish (1994) speaks colourfully about the zaniness of putting aside personal beliefs and perspectives for purposes of doing grounded theory research, and this comment reflects a key constructivist critique of grounded theory: that it fails to acknowledge the researcher's key role in constructing and creating knowledge through interaction with the participants and with the data.

Some grounded theorists have responded to these critiques by emphasizing the importance of researcher reflexivity in the

analytic process. Deliberate reflection provides perspective on the researcher's influence on the research process, making clearer his or her own contribution to the construction of knowledge. What the researcher should do with the insights gained from reflection is the subject of debate. Corbin and Strauss, for example, display hints of constructivism in enshrining reflexivity as essential to the grounded theory process, but imply that the value of reflexivity is, in part, in providing a safeguard against the intrusion of personal bias into the analysis (Corbin & Strauss 2008). This notion that the researcher must recognize and then deliberately temper his or her perspective as they approach the task of theory-building has been criticized as still firmly reflective of a positivist tradition, as it suggests that there is a truth within the data that can only be revealed if the researcher remains somehow outside of it.

Those speaking from a more firmly constructivist or interpretivist position ask why this kind of interpretive distance is useful. Constructivist grounded theory retains the emphasis on an iterative approach to analyzing and conceptualizing data, but redefines the ultimate theory-construction goal to aim for "*interpretive understanding and situated knowledge*" (Charmaz 2008, p.133). Constructivist grounded theory stresses reflexivity, acknowledging the roles of the researcher, the research participants, and the research situation and process in knowledge construction (Charmaz 2008). Given the shift in fundamental assumptions about knowledge creation that underlie constructivist grounded theory, some interpretivists have questioned why the term 'grounded theory' is retained at all by those who undertake qualitative research in the constructivist paradigm (Thomas & James 2006).

Critiques from the classicists

Led by Barney Glaser, adherents to classical grounded theory have criticized the constructivist modification of grounded theory for its failure to maintain some of the important principles that define the method. In particular, the issue of researcher bias is presented as a problem that can be resolved by ensuring that the data is raised to a conceptual level, and by treating the researcher's own experiences, if they are similar to those of some of the research participants, as data to be compared with other data. Glaser contends that the work of Charmaz and other constructivists represents legitimate qualitative data analysis, but not legitimate grounded theory (Glaser 2002). He maintains that legitimacy, in grounded theory, grows out of trust in and adherence to the constant comparative approach. If, he contends, the researcher looks carefully at multiple cases of the same phenomenon, researcher bias will be eliminated and the data will be made objective. Legitimate grounded theory, in his view, is about conceptualization, while the constructivist modification is so focused on description and on representing the voice of its research subjects that it ceases to be grounded theory (Glaser 2002).

Positioning ourselves

We view these critiques from both ends of the spectrum as healthy and invigorating for grounded theory research. In the spirit of reflexivity that is inherent in the constructivist approach to grounded theory, we acknowledge our own position as constructivist qualitative researchers. In order to remain relevant we believe that grounded theory must evolve to incorporate constructivist notions of knowledge creation. To us, the idea that the researcher can set aside his or her own background knowledge, experience, and theoretical leanings on entering the research field and play the role of passive, objective observer seems outdated and implausible.

On the other hand, we believe there is much value in the principles grounded theory provides for approaching exploratory, qualitative research. Methodologic evolution based on reconsideration of underlying assumptions about knowledge and the role of the researcher in its elaboration does not mean that these useful principles should be abandoned. As Babchuk (1997) has noted, grounded theory has been used as an umbrella term for a wide variety of styles and approaches to qualitative data analysis across a range of literatures; this "anything goes" approach is surely harmful to the credibility and relevance of grounded theory research. We therefore advocate for an informed use of grounded theory, combining respect for the rigour provided by maintaining its core tenets with recognition that the positivist assumptions on which the method was built require rethinking in view of constructivist conceptions of knowledge creation. Grounded theory researchers can help readers to use their work in an informed way by being explicit about their paradigmatic allegiances, their background, their role in data collection, and their relationship to their subjects or to their field of study.

Pitfalls in grounded theory research

Not taking the interpretive process far enough

Not all grounded theory studies can generate bold, enlightening new theories. However, some studies seem content not to try, settling instead for lists of themes or concepts, rather than a "big picture" rendering of their data (Kennedy & Lingard 2006). Compared with other forms of qualitative inquiry, grounded theory seems on the surface to provide a clearer roadmap for researchers to guide their efforts. This very structure, however, might promote an analysis that is not fully realized. It is relatively easy to describe a process by which data can be classified and categorized, but not at all straightforward to describe the subsequent creative element of developing theory from these categorizations, which calls for interpretive skill and creativity. It is easy for the researcher to become bogged down in the apparently prescriptive coding procedures and to lose sight of the larger goal. Juliet Corbin, who has described the techniques and procedures of the grounded theory method in considerable detail, reminds us that "*the analytic process is first and foremost a thinking process*" (Corbin 2009, p.41) that should be driven by the insights gained through interaction with data rather than by a need to follow specific procedures. Charmaz helpfully urges researchers to push the boundaries of their findings and answer the '*So what?*' questions (Charmaz 2006, p.107).

Making unsupportable claims of explanation

Legitimate questions have been raised about whether the product of grounded theory studies is really "theory" at all (Thomas & James 2006). Thomas has criticized grounded theory for promising too much; its insistence that its product is "theory" rather than description or understanding suggests a power to explain and predict that, he argues, is rarely present (Thomas & James 2006). Indeed, grounded theorists must guard against making unsupportable claims from their analyses. Unlike Thomas and James, however, we do not believe that the goal of theory generation should be abandoned, as it is this very goal that distinguishes grounded theory work from other forms of qualitative research. Charmaz (2006) resolves this issue by suggesting that grounded theory researchers look to interpretive definitions of theory that emphasize "imaginative understanding" (p. 126) rather than explanation. Similarly, Bryant (2002) suggests targeting a constructivist goal of achieving adequate understanding for specified contexts and purposes, rather than a positivist goal of discovering truth or establishing generalizable theories with the power to explain and predict.

Researchers should therefore reflect thoughtfully on the goals of their work and the limits of their emerging theory's explanatory power. Bold claims of generalizability of findings should be viewed with suspicion. Grounded theory might identify relevant relationships, key influences on a process, or challenges facing individuals or groups, for example, but cannot determine the magnitude of these relationships, influences, or challenges. Making such determinations would require an entirely different research approach, involving statistical sampling, with a distinctly different goal. Grounded theory might therefore generate hypotheses that could be tested using other methods, including quantitative, experimental methods, but grounded theory is not the vehicle for testing those hypotheses.

Controversies in grounded theory research

The literature review

One area where researchers will encounter variable and often conflicting advice is the place of the literature review in grounded theory studies. Dunne (2011) notes that performing a literature review is considered appropriate by researchers at all points along the spectrum of grounded theory; the controversy lies in the suggested timing of that review. Glaser and others, for example, argue against a significant literature review in advance of data collection and analysis on the grounds that an early, comprehensive literature review will so burden the researcher with preconceived notions and theoretical baggage that his or her analytic capacity will be irretrievably weakened (Glaser 1992, Nathaniel 2006). Others have noted the inefficiency of abstinence from a literature review in advance, and have commented on the potential for the literature review to enrich the research by sharpening the focus and improving the research questions (Dunne 2011). In programmatic research, where one study follows logically from one that precedes it, the researcher's growing familiarity with relevant literature in the area of research is unavoidable and in fact will facilitate the generation of compelling new research questions that advance the program.

Interestingly, even Glaser and Strauss acknowledged that researchers require a perspective that allows the identification of relevant data and the abstraction of significant themes from that data (Glaser & Strauss 1967). Our own view is that a literature review is indispensible in providing exactly this perspective and in shaping the research question. We caution researchers, however, to remain deliberately open-minded to the data and the concepts and ideas that it contains: across the spectrum of grounded theorists, this initial open-minded approach to data analysis is widely endorsed (Glaser & Strauss 1967; Charmaz 2006).

The integration of existing theory

Although Glaser and Strauss cautioned researchers against bringing preconceived notions drawn from existing formal theories into the field (Glaser & Strauss 1967), they acknowledged that the generation of new grounded theory need not occur in complete isolation from existing theory. Their aim was to highlight the importance of explicit efforts at open-mindedness, which we believe remain central to grounded theory research. Can open-mindedness co-exist with knowledge of and familiarity with existing theoretical perspectives? Can existing theory be integrated into grounded theory research without "contaminating" the analytic process? We believe that it can and should be integrated, but the approach to using existing theory remains controversial.

Certainly *after* a grounded theory emerges, it is appropriate to consider how existing theoretical frameworks might complement or extend the data interpretation or offer alternate explanations for challenging data. Indeed, some have suggested that researchers should, as a matter of course, explicitly "ground" the theories they derive from data in existing theories, in part as a response to the criticism that grounded theory work done in isolation from existing theories risks non-cumulative theory development and thus stifles the building of knowledge (Goldkuhl & Cronholm 2003). Even those researchers with positivist leanings tend to support the linking of emergent grounded theories with existing theories, provided that the timing of doing so is such that the very development of the grounded theory is not forced into a pre-existing theoretical framework. Constructivists would argue, however, that this notion of first allowing the grounded theory to emerge, free of existing theoretical constraints, and then only later integrating relevant existing theories to enrich it is artificial and impractical. To the constructivist, the researcher's disciplinary background and theoretical perspective may provide vital sensitizing concepts that alert them to possibilities and processes within their data and that guide them in asking relevant questions (Charmaz 2006).

Controversy around how and when to integrate existing theory in grounded theory research creates challenges not only for researchers but also for those who will read and review their work. Researchers using grounded theory need to be skillful in their descriptions of their research methods in

manuscripts they submit for publication, anticipating and addressing potential critiques based on their use of existing theory. A clear description of a careful and methodical coding process in which codes and categories emerge from the data rather than being imposed on the data will reassure readers and reviewers that the researcher has been open-minded in their initial approach to their data. Furthermore, researchers should make the case for the logic of drawing on existing theories; the use of existing theory must "make sense" in the context of the data analysis that is presented.

Computer-assisted data analysis

Qualitative data analysis of any type can be daunting, as researchers often face the challenge of managing mountains of data. Increasingly, computer software programs are being used by grounded theorists and other qualitative researchers to facilitate the process of data analysis. These programs offer many potential advantages to the researcher. Software packages can allow organization of data into coding categories and subcategories, can identify links between categories, and can link categories to memos and other relevant documents. This organizational system is readily searchable, allowing efficient data management and ensuring that gems within the data are readily found when the researcher needs to support core concepts as they write up or present their analysis. The use of data analysis software also can provide an audit trail that tracks the analytic steps that were taken.

Computer assisted data analysis is not a substitute for a rigorous method of data analysis, and studies purporting to use grounded theory whose methods are described in terms such as "Data were analyzed using N-Vivo" should be viewed with suspicion (Jones & Diment 2010). It is grounded theory, and not the software package, that provides the principles that guide the data analysis. The computer is merely a tool that can support the researcher in being both thorough and efficient in the analysis. The researcher still must interpret the data, recognize emerging concepts, ask how concepts and categories relate to one another, and push the analysis to an abstract level that promotes theory development. The creativity required of the researcher in developing theory cannot be provided by a computer (Becker 1993). However, software packages can provide opportunities for researchers to explore their data visually in a variety of ways, which when used strategically may foster creative thinking and stimulate the emergence of insights that enhance the analytic process (Bringer et al. 2006).

Solo analysis versus collaborative analysis

Much grounded theory work is described as if the analysis is done entirely by a single researcher, hunched over a computer or sifting through piles of documents on a table until some sense can be made of the data. Indeed, outstanding grounded theory work can be done by solo researchers; there is nothing in the method that requires collaboration among researchers. Researchers working alone with their data must be particularly reflective about their position and perspective relative to the area of study, recognizing and accounting for how that perspective influences their analysis and their theory construction.

We have found that working collaboratively can enhance the analytic process significantly. The entire process need not be a group effort, but there are key points in the course of the research where strategic use of collaborators can be highly productive and illuminating. During the phase of initial coding, it can be helpful to have two or three researchers examine the same data independently and code the data for the themes that they perceive as emerging from it. As collaborators meet to discuss their initial impressions of the data and the codes they have devised, a more robust coding scheme can emerge as disagreements are aired and consensus is reached. The process of constant comparison is thus expanded to include comparisons not only among the data but among different perceptions and readings of the data. Collaboration may also be valuable after the initial coding is complete, at the critical stage where the researcher needs to raise the interpretive level from the concrete to the abstract – from categories to concepts. We often bring in collaborators at this stage to discuss the elements of one or more categories at an interpretive level. These discussions invariably assist in raising the analytic thinking to a conceptual level, as the *why*, *how,* and *so what* of the processes identified within the data are examined from different perspectives. Collaborative discussions of emerging concepts can also provide the researcher with a useful perspective on how these concepts might resonate with their target audience, or on which concepts are the most central or compelling in the overall story of the research.

Collaboration is not a substitute for reflexivity for the grounded theorist. However, deliberate collaboration with colleagues with distinctly different perspectives can help to ensure a balanced rendering of the data in the analytic process. Colleagues from different backgrounds can push the researcher to think beyond their own disciplinary box, or rein in the researcher who needs reminding to ground their theory development firmly in the data rather than allowing that theory to be shaped primarily by their own background and perspective.

Quality criteria for grounded theory research

Although the procedures for carrying out grounded theory research are highly structured, the criteria on which the quality of a grounded theory study should be evaluated are less clear. Relative to the quantitative research strategies that dominate biomedical research, where researchers and readers alike can refer to clear guidelines for appraising the quality of a piece of research, the criteria for judging grounded theory work can seem vague and challenging to interpret. Nonetheless, a number of authors have suggested criteria for evaluating grounded theory studies, and a brief examination of some of these criteria is useful.

Glaser and Strauss, in their original description of the grounded theory method, suggested that a grounded theory needed to be readily understandable, to "fit" the substantive area to which it was applied, to be sufficiently general to be applied to a variety of diverse daily situations, and to provide the user with sufficient control to bring about change in situations. Grounded theory, to them, needed to be useful and

applicable to the area studied (Glaser & Strauss 1967). Corbin and Strauss also stressed the importance of "fit", which implies that the findings resonate with both the professionals for whom the research was intended and the participants who took part in the study, as well as applicability or usefulness. They added a number of other quality criteria, including the development and contextualization of concepts, logic, depth, variation, creativity, sensitivity, and evidence of memos (Corbin & Strauss 2008). This last criterion speaks to the importance of a transparent process, also highlighted by Glaser and Strauss. The researcher should be able to demonstrate how they derived theory from data; memos elucidate the process of analysis and guard against the sense of "impressionistic" theory development (Glaser & Strauss 1967).

Charmaz (2006) has suggested her own set of four key criteria for evaluating grounded theory studies: credibility, originality, resonance, and usefulness. Credibility implies that the depth and range of data collection is sufficient to support the analytic claims made. Credibility also depends on a systematic process of comparisons that ensures that the argument that emerges is logical and linked clearly to the data. Originality implies that the research offers new insights, fresh conceptual understandings, and that the analysis is theoretically or socially significant. Resonance implies that the grounded theory makes sense to the participants and captures the essence and fullness of their experience. Usefulness implies interpretations that can be used in day-to-day situations by individuals who inhabit the world under study (Charmaz 2005, 2006). One can appreciate considerable overlap in these criteria, even though they were developed by individuals who approach grounded theory from very different paradigmatic perspectives. These criteria can arm readers and researchers alike with an approach to interrogating the quality of grounded theory work.

Conclusion

Among qualitative research methodologies, grounded theory may be the most accessible to medical educators. The appeal of grounded theory to this audience might relate to its objectivist origins, which may seem familiar and comfortable to those accustomed to experimental research methods. Grounded theory has undergone considerable evolution since its inception, increasingly incorporating constructivist paradigms, and, more recently, postmodern orientations. In this Guide, we have reviewed both the key changes in grounded theory and the critical constants, in hopes of providing readers with an appreciation for its potential and its limitations. That grounded theory has thrived and grown in influence despite seismic shifts in thinking about knowledge creation suggests both strong fundamentals and a degree of adaptability that position it well to address a range of complex issues within medical education into the future.

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Note

1. Here and elsewhere, we draw on this example from our own work to illustrate the grounded theory method. We have done so in order to unveil some of the hidden aspects of the research process, which, although critical to the final product, often do not form part of published manuscripts.

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