The Use of Technology in Nursing: A Grounded Theory for *Getting a Picture*

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Dissertation Abstract

Background

Using technology requires nurses to capture, retrieve and organize digital data within virtual environments. Nurses often integrate digital data with other data sources when providing patient care with telehealth technologies and conducting research. Little is understood of how nurses navigate technology and process digital data in professional practice.

Purpose

The overall aim of this dissertation was to explore how nurses navigate virtual environments and integrate digital data in professional practice through a grounded theory study of how nurses know the person using telehealth technology. The goals of the dissertation were to:

a) Describe how knowing the person occurs with use of telehealth technology;
b) Create a theoretical conceptualization of how the nurse comes to know the person in a virtual environment; and,
c) Explicate data collection and analytical processes in Charmaz's constructivist grounded theory.

Methods

Charmaz's constructivist grounded theory (ConGT) was used for the research study.

Findings

The process of conducting this study yielded two outcomes:

1. A grounded theory and conceptualization for *Getting a Picture,* which illuminates an integrated and iterative interplay of seven processes and 21 sub-processes that nurses described when forming a mental image of the person being cared for. Twenty-two registered nurses from five telehealth programs in two different provincial health systems participated. Primary data sources included 22 first interviews and 11 second interviews with the participants, and five observational experiences.
2. The approach for conducting ConGT involved operationalizing a series of five steps in the analytic process to visualize and conceptualize *Getting a Picture*. These steps

included Initial Data Collection, Initial Coding, Focused Coding, Theoretical Coding and Theory Building.

Conclusion

Visualization played an instrumental role when technology was used for both knowing the person in a virtual environment and operationalizing the methodological processes for this ConGT research study. Three main themes related to this overall finding in this dissertation were: (a) visualization and conceptualization to create a mental image is evident in both clinical and research domains of nursing practice; (b) interoperability of technology can impact visualization; and (c) competencies are required to support mental imaging and use of technology in visualizing a whole and accurate picture.

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Finally, I dedicate this thesis to my mom, Dolores, and to the memory of my maternal grandparents, Wilda and Edwin Donnenworth, who supported my early nursing education beginning with my diploma from the Misericordia Hospital Edmonton. They were immensely proud when I became the first university graduate in the family in 1990, and would have been thrilled to share this capstone in my career. Grandma was a nursing graduate from the Royal Alexandra Hospital School of Nursing in 1938 and was always so passionately proud of the nursing profession; may our nursing graduate pins always remain together.

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List of Abbreviations

ARNNL	Association of Registered Nurses of Newfoundland and Labrador
ARNPEI	Association of Registered Nurses of Prince Edward Island
BP	Blood Pressure
CARNA	College and Association of Registered Nurses of Alberta
CASN	Canadian Association of Schools of Nursing
CHF	Chronic Heart Failure
CMC	Computer-mediated Communication
CNA	Canadian Nurses Association
CNO	College of Nurses of Ontario
CNPS	Canadian Nurses Protective Society
CRNBC	College of Registered Nurses of British Columbia
CRNM	College of Registered Nurses of Manitoba
CRNNS	College of Registered Nurses of Nova Scotia
ConGT	Constructivist Grounded Theory
COPD	Chronic Obstructive Pulmonary Disease
ECG	Electrocardiogram
EMR	Electronic Medical Record
GT	Grounded Theory
HFE	Human Factors Engineering
ICN	International Council of Nurses
ICT	Information and Computer Technology
NANB	Nurses Association of New Brunswick
NIFTE	National Initiative for Telehealth
OIIQ	Ordre des infirmières et des infirmiers du Québec
OTN	Ontario Telemedicine Network
RN	Registered Nurse
RNANTN	Registered Nurses Association of the Northwest Territories and Nunavut
RNAO	Registered Nurses' Association of Ontario

RPM	Remote Patient Monitoring
SRNA	Saskatchewan Registered Nurses Association
VC	Videoconferencing
VE	Virtual Environment
YRNA	Yukon Registered Nurses Association

Chapter 1

Introduction

Introduction

Technology is increasingly being used to deliver services to persons with a range of healthcare needs and support self-management of complex health conditions (Arnaert & Macfarlane, 2011; Care, Gregory & Chernomas, 2014; Schlacta-Fairchild et al., 2014). This rise in use of technology for care is in response to pressures such as escalating healthcare costs, human resource factors (e.g. availability of healthcare providers), societal expectations for access to services, geographical factors (e.g. distance and access), and uptake of technological innovations (Care et al., 2014; COACH, 2015; Gartner Inc., 2011; Schlacta-Fairchild et al., 2014). As a result, nursing is becoming more involved in delivery of care using telehealth technology (Arnaert & Macfarlane, 2011; Care et al., 2014; Schlacta-Fairchild et al., 2014).

The primary purpose of this dissertation is to advance understanding of how the nurse comes to know the person in a virtual environment with a focus on use of remote patient monitoring (RPM), one modality of telehealth technology. In this dissertation I sought to answer the research question "How does the nurse come to know the person in a virtual environment?" using Charmaz's (2000, 2006, 2014) constructivist grounded theory (ConGT), a relatively new methodological approach to qualitative research. The goals of this dissertation were to: (a) describe how knowing the person occurs with use of telehealth technology; (b) create a theoretical conceptualization of how the nurse comes to know the person in a virtual environment; and, (c) explicate data collection and analytical processes in Charmaz's constructivist grounded theory.

1.1 Background and Research Focus

Knowing the person in nursing practice has been identified as foundational to: (a) establishing a professional and therapeutic nurse-person relationship; (b) providing holistic, person-centered care; and (c) making clinical decisions (Gillespie & Paterson, 2009; Tanner, 2006; Tanner, Benner, Chelsa & Gordon, 1993). Knowing the person entails appreciating complexities of the individual in the context of interconnected phenomena that influence healing and health, such as biological, psychosocial and environmental aspects that define a person's wholeness. There are philosophical and perceptual tensions in the use of technology for knowing the person in delivery of nursing care; physical presence has traditionally been regarded as essential to demonstrating care in nursing practice, however technology use (e.g. RPM)

creates a physical distance between the nurse and person (Barnard, 2009; Barnard & Sandelowski, 2001; Finfgeld-Connett, 2006; Fredriksson, 1999; Sandelowski, 2002).

With the use of telehealth technology, more interactions between the nurse and the person are occurring by distance through digitally mediated spaces referred to as *virtual environments*. For the purpose of this dissertation, telehealth was regarded as remote delivery of nursing care through technology for purposes of assessment, information exchange, clinical decision-making and providing nursing interventions. Given the connection of nurse-person relationships in the use of telehealth technology and the notion of presence, Wilson's (1997) definition for virtual environment was used at the outset of the dissertation work:

> "...an environment other than the one in which the participant is actually present; more usefully it is a computer-generated model, where a participant can interact intuitively in real time with the environment or objects within it, and to some extent has a feeling of actually 'being there', or a feeling of presence" (p. 1058).

A challenge in knowing the person through virtual environments is not having a physical presence and, in many cases, actual visualization of the person by the nurse. Also, many forms of telehealth technology are asynchronous wherein communication and data exchange does not occur in real time (Schlacta-Fairchild et al., 2014).

There is a dearth of research directly related to the phenomenon of nurses knowing the person (Macdonald, 2008), and a review of the literature revealed that a gap exists in the development of theories and conceptual models to describe how nurses come to know the person through use of technology (Chapter 2). Thus, the research focus for this dissertation was to explore how the nurse comes to know the person in the context of practice with telehealth technology, specifically use of remote patient monitoring (RPM). RPM is used to monitor persons and support them in the management of health challenges, such as diabetes and cardiovascular disease (COACH, 2015; Schlacta-Fairchild et al., 2014).

1.2 Dissertation Format

This dissertation is a manuscript-based thesis that includes an original constructivist grounded theory study, explication of the analytical methods used in the research process and reflections on the research process. The thesis components are outlined in Table 1.1. Chapter 1 introduces the dissertation purpose, focus of the research and organization of this thesis. Chapter

2 is a literature review and synthesis of conceptual frameworks and theoretical models that may be used to inform use of telehealth technology in nursing practice. Chapter 3 is the *a priori* protocol of the research study for this dissertation. Chapter 4 presents the findings from the grounded theory research, including the theoretical conceptualization of nurses knowing the person in a virtual environment. Chapter 5 is a methods paper focused on describing our process for operationalizing ConGT, and is situated in the thesis to follow presentation of the theoretical model *Getting a Picture* (Figure 4.1). Chapter 6 highlights my reflections on the research process as a novice researcher, and this chapter: (a) is a retrospective account of my use of visualization and conceptualization as part of the research process; and, (b) describes my use of technology for visualizing and conceptualizing a grounded theory. Chapter 7 presents the integrated discussion of key themes shared across the two manuscripts (Chapter 4 and Chapter 5) and reflections on the research process (Chapter 6). Chapter 8 highlights the roles of each of the contributors in the development of the two manuscripts.

Table 1.1 *Dissertation Format and Components*

Chapter	Chapter Title	Chapter Description	Chapter Format
1	Introduction	Outlines the overall purpose of the dissertation, the purpose of the research and organization of the dissertation.	American Psychological Association (APA, 2010)
2	Conceptualizing Telehealth in Nursing Practice: A Review of Existing Conceptual Models and Theoretical Frameworks	Presents a review of conceptual frameworks and theoretical models in the literature that informs use of telehealth technology in nursing practice. This literature review was subsequently published (Nagel & Penner, 2016).	American Psychological Association (APA, 2010)
3	Knowing the Person in a Virtual Environment: Research Proposal for a Grounded Theory Study of Telehealth in Nursing Practice	Presents the original research proposal for the dissertation that was subsequently revised and published (Nagel, 2014).	American Psychological Association (APA, 2010)
4	*Getting a Picture*: A Grounded Theory of Nurses Knowing the	Articulates the findings from the research study, and includes a grounded theory and theoretical	Journal of Holistic Nursing

Chapter	Chapter Title	Chapter Description	Chapter Format
	Person in a Virtual Environment	model that describes how nurses come to know the person through use of RPM and other telehealth technologies (published - Nagel et al., 2016).	
5	Explication of an Approach to Constructive Grounded Theory: The Process for *Getting a Picture*	Delineates the methods and procedures used to navigate the steps of sampling, data collection and analysis in our execution of a ConGT study.	International Journal of Qualitative Methods
6	Reflections on Conceptualization, Visualization and Technology Use in the Research Process	Presents my reflections on engaging in the research process as a novice researcher and highlights three key insights related to conceptualization, visualization and technology use in operationalizing ConGT methodology in the research process.	American Psychological Association (APA, 2010)
7	Integrated Discussion: Visualizing a Whole and Accurate Picture	Summarizes the two main manuscripts (Chapter 4 and Chapter 5) and reflections on the research process (Chapter 6), and highlights themes across these three chapters relating to visualizing a whole and accurate picture with technology. The themes are identified and implications for nursing practice are discussed.	American Psychological Association (APA, 2010)
8	Contribution of Collaborators	Details co-author contributions to the development of the manuscripts within this dissertation.	American Psychological Association (APA, 2010)

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Chapter 2

Conceptualizing Telehealth in Nursing Practice: Advancing a Conceptual Model to Fill a Virtual Gap

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(accepted for OnlineFirst publication April 10, 2015).

Abstract

Increasingly nurses use various telehealth technologies to deliver healthcare services, however there has been a lag in research and generation of empirical knowledge to support nursing practice in this expanding field. One challenge to generating knowledge is a gap in development of a comprehensive conceptual model or theoretical framework to illustrate relationships of concepts and phenomena inherent to adoption of a broad range of telehealth technologies to holistic nursing practice. A review of the literature revealed eight published conceptual models, theoretical frameworks or similar entities applicable to nursing practice. Many of these models focus exclusively on use of telephones and four were generated from qualitative studies, but none comprehensively reflect complexities of bridging nursing process and elements of nursing practice into use of telehealth. The purpose of this article is to present a review of existing conceptual models and frameworks, discuss predominant themes and features of these models, and present a comprehensive conceptual model for telehealth nursing practice synthesized from this literature for consideration and further development. This conceptual model illustrates characteristics of, and relationships between, dimensions of telehealth practice to guide research and knowledge development in provision of holistic person-centered care delivery to individuals by nurses through telehealth technologies.

Conceptualizing Telehealth in Nursing Practice: Advancing a Conceptual Model to Fill a Virtual Gap

Increasing numbers of nurses are using an array of emerging digital technologies in the expanding field of telehealth care as part of regular nursing practice. The rapid pace of adoption, and evolution, of new telehealth technologies has provided little time for nursing to support its practice in this emerging field with adequate research and knowledge to understand resulting changes to nursing practice (Nagel, Pomerleau & Penner, 2013). Given legal, ethical and professional imperatives of nurses to provide safe, appropriate and holistic care to individuals, research and generation of knowledge in telehealth nursing practice is essential to promote evidence-informed practice for nurses (Canadian Nurses Association [CNA], 2007; Doane & Varcoe, 2007). Such research and knowledge generation may help in understanding and addressing underlying tensions of telehealth technology use in nursing practice, such as the nature of delivering holistic care in a virtual environment, the competencies required of nurses for telehealth care delivery, and "the complex relationship between nurse, person and technology" (Nagel et al., 2013, p. 7).

To foster scientific discovery and knowledge development in areas of nursing practice, advancement of appropriate conceptual models, frameworks and theories is necessary to guide focused and rigorous lines of inquiry (Butts, 2011; Meleis, 2007; Polit & Beck, 2012). Few such conceptual entities specific to use of telehealth in nursing practice exist to date and, of those published, none appear to capture a comprehensive perspective of the broad scope of nursing practice and delivery of safe, appropriate and holistic nursing care using telehealth technologies. A survey of existing conceptual models, conceptual frameworks and theoretical frameworks specific to telehealth in nursing practice is presented here to illuminate progress in conceptual development in this field. As will be revealed, most current conceptual models and frameworks of practice in telehealth are specific to telephone interventions. Following a brief definition and discussion of telehealth and telehealth in nursing practice, a description and comparison of the existing telehealth models and frameworks of nursing care delivery in the context of telehealth is offered. Finally, given the paucity of comprehensive conceptual models for telehealth nursing practice, a conceptual model is presented for consideration, for further refinement and explication, and for potential use in future scientific inquiry to telehealth nursing practice.

2.1 Defining and Describing Telehealth

No singular definition exists for *telehealth,* however it generally denotes delivery of healthcare services to persons by distance using a range of different technologies and modalities through a telecommunications system (CNA, 2007; Nagel et al., 2013). The term telehealth is often used in conjunction or synonymously with telemedicine, teleconsultation, telehomecare, *e*-Health and informatics (CNA, 2007; Nagel et al., 2013). For the purpose of this paper, telehealth is regarded as remote delivery of healthcare services using technology and digital communications for the purpose of assessment, information exchange, clinical decision making, interdisciplinary collaboration and/or providing healthcare interventions to individuals. It is important to note the ability for a healthcare provider to effectively engage in any or all of these activities in telehealth varies with differences in technology capacity, connectivity, scope of practice, the practitioner's knowledge and skill, and the service delivery model (Hebert, Korabek & Scott; 2006; Jerome & Zaylor, 2000; Parker Oliver, Demiris, Wittenberg-Lyles & Porock, 2009; Pecina et al., 2012).

Nurses have used telephone as a form of telehealth to deliver care for decades, and it remains an important and well-utilized modality by providers for a range of services such as: triage of health issues; consultation; providing advice, support, and health education; and, care coordination (Coyle, Duffy & Martin, 2007; Greenberg, 2009; Larson-Dahn, 2000; Looman et al., 2012; Purc-Stephenson & Thrasher, 2010). A wider range of telehealth technologies are used today, such as remote patient monitoring (RPM), videoconferencing (VC), and other computer-mediated communications (CMC) like e-mail (Jerome & Zaylor, 2000; Looman et al., 2012; Matusitz & Breen, 2007; Miller, 2002; Pecina et al., 2011).

RPM is used to monitor and support individuals with health challenges, such as diabetes and cardiovascular conditions, and demonstrated to have effective patient self-management and clinical outcomes (Holtz & Lauckner, 2012; Miller, 2002; Meystre, 2005; Paré, Jaana & Sicotte, 2007; Pecina et al., 2011). In RPM, applications through Internet or mobile devices, such as cell phones, allow individuals to input physiological data like blood glucose, blood pressure, weight, and other information, such as activity regimen or medication usage, that the provider uses to assess wellness or progress in health status (Holtz & Lauckner, 2012; Meystre, 2005; Paré et al., 2007; Pecina et al., 2011). VC technologies, such as videophones and teleconferencing units,

facilitate digital face-to-face interactions between individuals and have been widely used in mental health and by specialists in telemedicine to provide clinical assessments, consultations and direct care, such as therapy in telepsychiatry, for patients (Backhaus et al., 2012; Hilty et al., 2002; Looman et al., 2012; Parker Oliver et al., 2009).

CMC technologies move access to, and provision of, health care beyond traditional boundaries of formal healthcare systems, such as face-to-face encounters for care, to more informal virtual settings (Hawn, 2009; Kreps & Neuhauser, 2010; Matusitz & Breen, 2007; Miller, 2002). CMC engagement ranges from direct email communications to web portals for health promotion activities to social networks, such as Twitter and Facebook, for dissemination of information, support and to influence health behaviours (Kreps & Neuhauser, 2010; Matusitz & Breen, 2007). Benefits of CMC technology include greater access to information and support, affordability, and ability to reach greater numbers of people (Hawn, 2009; Kreps & Neuhauser, 2010; Matusitz & Breen, 2007).

2.2 Telehealth and Nursing Practice

Advances in healthcare knowledge, requirements for efficient care delivery, healthcare reform, shortages of skilled healthcare workers, expectations of informed healthcare consumers and economic factors have led to increased utilization of technology in healthcare (Coyle et al., 2007; Nagel et al., 2013). Additionally, in many jurisdictions, geographical disparities in healthcare resources and demand for better access to care have influenced increased use of telehealth for delivery of healthcare (Coyle et al., 2007; Looman et al., 2012; Romero, Angelo & Gonzalez, 2012). In many countries nurses are more actively engaged in delivery of healthcare services in telehealth (Care, Gregory, & Chernomas, 2010), and CNA (2007) supports the role of nursing practice in telehealth service as part of an integrated primary health care system.

Further research and knowledge development is needed to generate requisite evidence to support the shift in nursing practice towards increased telehealth use and to promote ethical, safe, appropriate and holistic care of persons receiving services through telehealth (Nagel et al., 2013). While much literature articulates benefits, challenges and implementation of providing telehealth services, little empirical work has been done to reflect specific aspects of nursing practice in telehealth, such as professional communications through remote technologies, adapting current nursing practice to technology use, and knowing the person through technology media (Locsin,

2010; Nagel et al., 2013; Purc-Stephenson & Thrasher, 2010; Romero et al., 2012). A particular gap exists in development of conceptual models and frameworks related to telehealth and nursing practice that: highlight holistic person-centered care; illustrate characteristics of, and relationships between, elements of telehealth and nursing practice; serve to guide research in this area; inform practice and policy; and, contribute to the foundation of the nursing discipline and professional identity of the nurse (Butts, 2011; Meleis, 2007; Polit & Beck, 2012).

2.3 Review of the Literature

A review of the literature was conducted in the databases of CINAHL, Cochrane Reviews, EMBASE, Medline OVID, Medline ®, PsycInfo, PubMed and Web of Science to identify articles and other sources that articulate a conceptual model, conceptual framework or theoretical framework of nursing practice in relation to telehealth. In addition to a search of the databases, grey literature was also identified through a manual search of Google Scholar and other sources, including textbooks and known research projects. The main inclusion criteria of this literature review was presentation of a conceptual framework, conceptual model or theoretical framework that described the delivery of care to patients by nurses using a form of technology that fit within the definition of telehealth provided here earlier. In nursing literature, the terms conceptual frameworks, conceptual models and theoretical frameworks are often used interchangeably although there are various levels of abstraction and articulation of relationships between concepts associated with each of these entities (Butts, 2011; Fawcett & Desanto-Madeya, 2013; Meleis, 2007; Polit & Beck, 2012). For simplicity of discussion, *conceptual model* is used in this paper as an inclusive term as it most appropriately captures the broad essence of phenomena related to nursing care delivered using telehealth, and provides both an organizational framework and an abstract visualization of the related phenomena (Fawcett & Desanto-Madeya, 2013).

Combinations of the key terms “telehealth”, “telemedicine”, “telenursing” and “eHealth” individually with each of the key terms “conceptual frameworks”, “conceptual models” and “theoretical frameworks” were used in this search. No date restriction was applied to the search, and publications and sources up to July 2014 were included. Required criteria for review included availability of an abstract, being printed in English and accessibility of the source in full-text. Due to the extensiveness of findings in Google Scholar, only the first 10

pages of results for each of the combinations were reviewed; many articles reviewed from Google Scholar were redundant to articles already identified in the other databases.

Of 442 citations retrieved from the databases, 58 were removed as duplicates and 47 were removed due to lack of abstracts (Figure 2.1). Of the remaining 337 citations, 231 abstracts did not reflect explicit nurse involvement in telehealth care delivery and in 82 abstracts the conceptual model did not reflect delivery of care to patients by nurses through telehealth. The remaining 24 articles were individually reviewed for fit with the main inclusion criteria and of these an additional 16 articles did not reflect conceptual models specific to care delivery by nurses and 2 were not available in full-text.

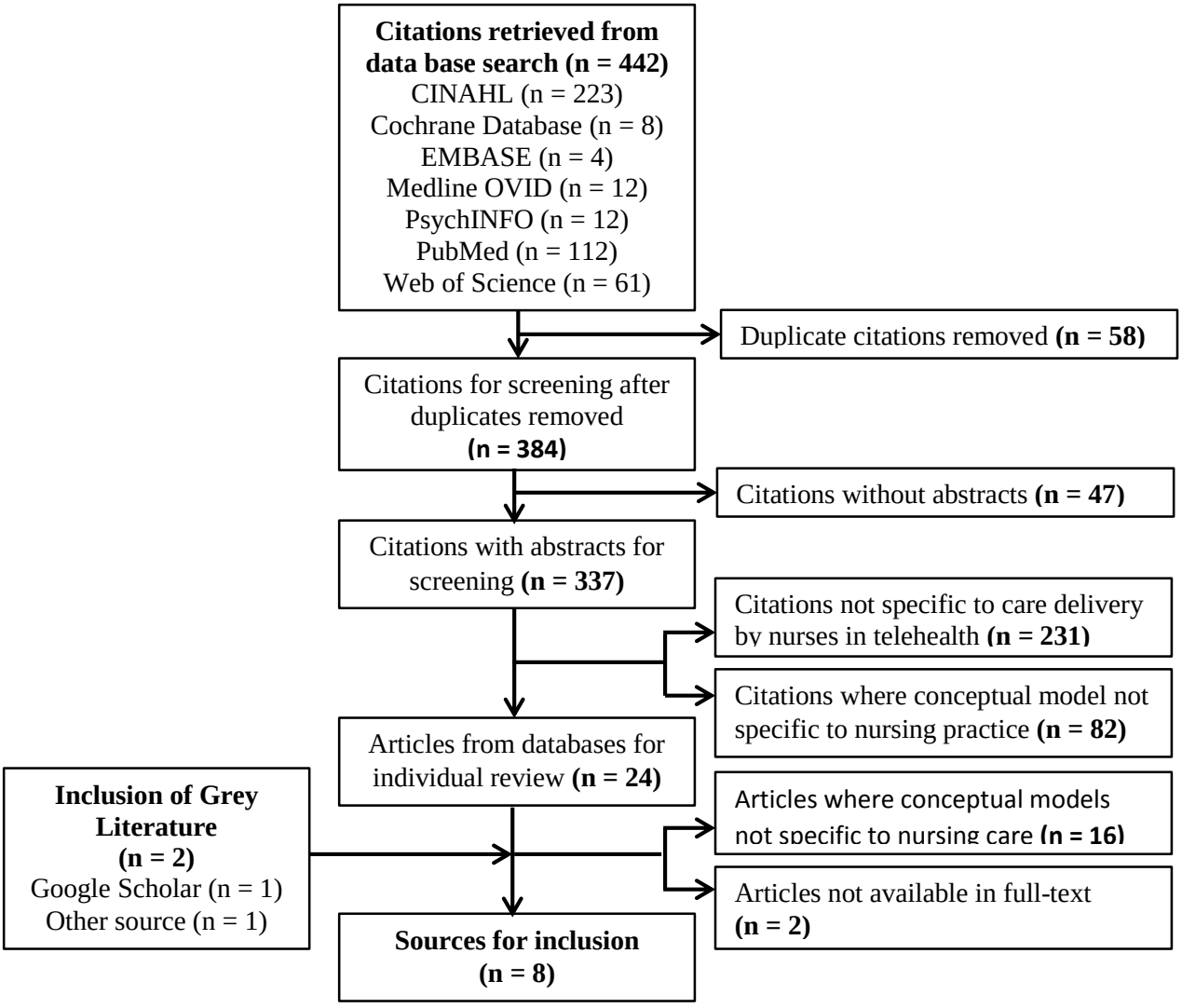

Figure 2.1 Process of literature search and review.

Further review of available "grey literature", including textbooks, conference presentations and online resources from telehealth and Canadian health profession agencies, yielded one additional appropriate source, and one article was identified through Google Scholar for a total of eight sources applicable to telehealth nursing practice (see Table 2.1). Of these sources: four were generated from qualitative research studies; six are specific to nursing practice; two reflect an interdisciplinary approach that includes nurses; and, five are specific to telephone use, while three reflect practice using a broader range of telehealth technologies.

2.4 Key Themes in Current Conceptual Models of Telehealth

Although few conceptual models related to telehealth and nursing practice have been identified, those available provide valuable insight to the complexity and challenges in describing a holistic care approach to provision of healthcare through telehealth. By its nature, use of technology risks reducing the whole of the person to parts, potentially creating a sense of distance, and objectifying and de-personalizing the individual receiving care (Barnard, 2009; Locsin, 2010; Sandelowski, 2002; Timmons, 2003). This runs contrary to the way nurses perceive and value delivery of their care (Nagel et al., 2013; Potter & Frisch, 2007; Sandelowski, 2002; Timmons, 2003). A review of the existing conceptual models revealed key themes that have application to nursing practice in telehealth and the potential to address the propensity for reduction of the person, including: (a) creating a picture of the person and context in which the person exists; (b) "knowing the person" and the notion of presence; (c) having pre-existing clinical knowledge and developing requisite competencies for telehealth, such as assessment, communication, and relational practice; and (d) decision-making processes with the person receiving care at the center of telehealth interactions.

2.4.1 "Building a Picture" Through Telehealth

In a meta-ethnography of nurses' experience with telephone triage, Purc-Stephenson and Thrasher (2010) present a theoretical framework for a decision-making process whereby nurses create "a mental image of the caller and their situation" (p. 490), to determine urgency of the issue and the advice to be provided to the individual. Using a holistic assessment approach in conjunction with strong nursing skills, particularly interpersonal communication and previous clinical knowledge, *Picture Building* is described as a process undertaken by the nurse to inform the final triage decision (Purc-Stephenson & Thrasher, 2010). Similarly, Romero et al. (2012)

Table 2.1 *Literature Review: Conceptual Models, Frameworks and Theories Specific to Telehealth*

	Authors	***Country***	***Literature Typology***	***Technology Focus***	***Contribution of Paper or Presentation***	***Relevance to Nursing Practice in Telehealth***
1	Arnaert et al. (2012)	Canada	Poster & Conference Presentation Qualitative study	Various eHealth modalities	Conceptual framework of inter-related categories and themes describing competencies required of nurses for telehealth practice.	Competencies and competency development in telehealth are integral to nursing practice in this field, as is adapting general nursing knowledge and skills to telehealth use.
2	Coyle et al. (2007)	USA	Discussion Paper	Telephone	Describes the role of nursing students engaged in telehealth in a community setting for the enhancement of self-efficacy and health promotion skills of individuals, using Bandura's Model of Self-Efficacy.	Education of nursing students in use of telephone to provide telehealth, and potential broader application for professional development and preparation of current nurse practitioners for telehealth use.
3	Greenberg (2009)	USA	Research Qualitative study (Grounded Theory)	Telephone	Model of the process of telephone nursing.	Components of nursing process, such as information-seeking, decision-making and planning.
4	Larson-Dahn (2000)	USA	Discussion Paper	Telephone	Proposal of a theoretical framework to articulate a practice model for providing nursing care by telephone.	Describes the complex process in nursing care provision by telephone, such as decision-making, assessment and the relationship aspect between nurse and patient.

	Authors	***Country***	***Literature Typology***	***Technology Focus***	***Contribution of Paper or Presentation***	***Relevance to Nursing Practice in Telehealth***
5	Looman et al. (2012)	USA	Discussion Paper/Case Report	eHealth records, telephone & videoconferencing	Description of a model of care coordination that includes use of telehealth technology by advanced practice RNs in the delivery of care to children with complex special health-care needs.	Highlights the integration of electronic health records with use of telephone and video-conferencing by advanced practice nurses, including aspects of nursing practice and management of information to enhance delivery of care
6	Parker Oliver et al. (2009)	USA	Review and synthesis	Videophones	Integration of a model of interdisciplinary collaboration and components of team process to inform use of videophones in hospice care.	Inform aspects of team process and interdisciplinary collaboration in telehealth nursing practice, which are key to conventional nursing practice.
7	Purc-Stephenson & Thrasher (2010)	Canada	Meta-ethnography	Telephone	Presents theoretical framework of decision-making process in telephone triage by nurses.	Decision-making of nurses engaged in telehealth practice.
8	Romero et al. (2012)	Chile	Research - Qualitative study (Grounded Theory)	Telephone	Development of theoretical model to describe interaction processes in the experiences of nurses and midwives who deliver care by telephone.	Highlights the “imaginative construction of care” and development of new communication skills to foster presence and support despite a sense of uncertainty given an absence of physical presence.

describe *Constructing Interaction with the User* in their grounded theory study of remote care by telephone, whereby the healthcare professional attempts to construct the person's reality and characterizes a psychological space "where an image of the context and the user him/herself replaces the physical space" (p. 696). This abstract dynamic provides the practitioner a greater sensitivity to the context of the person, while simultaneously creating a perception for the provider of being present to the person receiving the care by telephone (Romero et al., 2012).

Building a picture of the person through telehealth is an interactive process between provider and person, where the provider uses communication, exchange of information, and interpretations to create a more complete, or whole, essence of the person through combinations of technology, practice competencies and therapeutic use of Self in providing care (Chinn & Kramer, 2011; Locsin, 2010). Locsin (2010) theorizes integration of technology, competencies and nursing care in nursing practice as *Technology Competency as Caring in Nursing*. This theory articulates the "harmonious relationship of technological competency and caring in nursing" (Locsin, 2010, p. 461) as being essential for the nurse in knowing the person as whole and complete in the moment, and implies an imperative for the nurse to know the person when using technology. Thus, ability of the nurse to construct a holistic image of the person is an intentional act of care entailing more than just knowledge, skills and ability to use technology, assess, and communicate with the person - it requires active engagement with the person, sense of presence, synthesis of multiple data sources, and creativity (Locsin, 2010; Nagel et al., 2013; Purc-Stephenson & Thrasher, 2010; Romero et al., 2012).

2.4.2 "Knowing the Person" and Presence in Telehealth

In Greenberg's (2009) grounded theory of telephone nursing, *Getting to Know* the caller is regarded as important so "the nurse is able to grasp the situation and accurately interpret the caller concerns" (p. 2624), and knowing the caller, with respect to the caller's resources and support, is important for planning what needs to be done. In another qualitative study, "*Knowing the Person*", a facet of *Adapting Practice,* was identified as a required competency for nursing practice in *e*-Health (Arnaert, Beaulieu, Nagel & Gabos, 2012). In this study, "reading the patient" through telehealth was noted as part of a process, and the purpose of knowing the person was to determine fit of the person for technology use, and physiological indicators and patterns. Although neither *getting to know* nor *knowing the person* were explicitly stated in relation to *Building a Picture* (Purc-Stephenson & Thrasher, 2010), it is reasonable to conclude the main

objective in constructing the image of person and context is to represent what we know of that person; the act of constructing the image implies a process of knowing the person.

From these examples, *to know* and *knowing the person* have different connotations and serve different endpoints, however are deemed important to aspects of nursing practice. For Greenberg (2009), *to know* the person serves a specific purpose for assessing the caller's situation and determining the key issue, and *knowing the person* facilitates a decision-making process to address the caller's concern. For Arnaert et al. (2012), *knowing the person* appears to span *to know* the person in the immediate, as with determination of fit with technology, and a longer process to understand patterns which is an important aspect of knowing a person and part of a holistic caring process (Nagel et al., 2013; Potter & Frisch, 2007). As already noted, the more abstract cognitive process of *Building a Picture* seems to equate with *knowing the person* and results in an image *to know* the person. Indeed, Locsin (2010) makes a distinction between *to know* as demonstrating understanding in respect to a nurse's actions or activities, and *knowing* as the process of the nurse coming to that understanding. Common to *knowing* and *to know* the person in these conceptual models is a fundamental part of the nursing process, *assessment*, inter-related with the key concepts of *relational practice* and *communication*, which will be more fully discussed later as required competencies for telehealth practice.

Presence as Part of the Picture. The creation of a sense of presence, or *Becoming Present for the User* (Romero et al., 2012), is important given a potential perception of distance in telehealth. Presence is commonly referred to in nursing literature and nursing theories as being important to nursing practice, a key element for communication and a critical aspect of holistic nursing care (Fredriksson, 1999; Nagel et al., 2013; Potter & Frisch, 2007). Presence is also important for understanding interactions between people and technology in use of computer-mediated environments, since technologies and virtual environments impact how humans organize and interpret their environment (Lee, 2004; Lombard & Ditton, 1997). Ijsselsteijn and Riva (2003) describe presence as a "complex, multidimensional perception, formed through interplay of raw (multi-) sensory data and various cognitive processes" (p. 5). This is analogous to Lee's (2004) view of presence as "a psychological state in which virtual (para-authentic or artificial) objects are experienced as actual objects in either sensory or nonsensory ways" (p. 37). In both perspectives, presence is presented as a mental construct of individuals, akin to the psychological space Romero et al. describe in the context of telephone care service.

2.4.3 Clinical Knowledge and Competencies Requisite for Telehealth Practice

Most conceptual model sources reviewed here specifically articulate and/or infer competencies required of providers in telehealth care. These competencies appear to fall into two main categories: pre-existing *clinical knowledge* comprised of nursing knowledge and expertise, and *competencies requisite for telehealth practice*. Competencies are "the integrated knowledge, skills, judgment and attributes required of a registered nurse to practice safely and ethically in a designated role and setting" (Black et al., 2008, p. 173), where attributes includes attitudes, values and beliefs. Arnaert et al. (2012) identified core competencies, such as *Knowing the Person, Relational Practice and Decision-Making* that align with the expected competencies articulated by CNA (2007) for RNs in telehealth practice. Black et al. (2008) distinguish core competencies as being "essential knowledge, skills and abilities" (p. 172) for practice.

Purc-Stephenson and Thrasher (2010) revealed in their meta-ethnography of nurses using telehealth that "a strong clinical knowledge base was central when making assessments via telephone" (p. 486), and new communication and assessment skills were developed or enhanced in their roles as telenurses. Arnaert et al.'s (2012) research supports this, noting RNs build on *General Skills* from nursing education and clinical experience to develop competencies for *e-*Health practice by *Adapting Practice* (e.g. *communication* and *knowing the person*) and adding *New Skills* (e.g. *technological "know-how"* and *marketing*). Describing *Care Delivery to People through Telephone Care*, Romero et al. (2012) found "professionals gradually unveil skills for care delivery, gaining and recognizing tools and personal and professional skills" (p. 696), which speaks to both possessing pre-existing clinical competencies and acquiring new competencies for telehealth. Larson-Dahn (2000) and Looman et al. (2012) further highlight skills and knowledge necessary for the nurse using telehealth for relationship building, assessments, integrating data sources from multiple sources and clinical decision-making. These examples suggest competencies associated with general nursing practice are a valuable precursor and foundation upon which more specific competencies for telehealth may be developed.

Nurses *Building a Picture* benefit from having a strong clinical knowledge base drawn from prior nursing knowledge and experience since, in the absence of visual clues, this clinical knowledge and expertise facilitates creation of a mental picture of the person (Purc-Stephenson & Thrasher, 2010; Romero et al., 2012). For a nurse to build a picture, contextualize a person in

relation to health, and achieve a degree of holistic care and presence in telehealth, he or she must be knowledgeable in nursing practice, and possess a theoretical basis, intuition, expertise and creativity (Potter & Frisch, 2007). This underscores the necessity for nurses who deliver care using telehealth technologies to not only be well grounded in general nursing knowledge, theory and practice competencies, but to also have clinical experience, additional expertise using technology and a capacity to possess attributes of intuition and creativity to enhance provision of holistic care. Chinn and Kramer (2011) describe intuitive knowing within *personal knowing* as "the immediate knowing of something without the conscious use of reason" (p. 114), and creativity within *aesthetic knowing* as enabling "the artist to express unique possibilities that fit together" (p. 134), linking both as attributes for knowledge development in nursing and making meaning in encounters with patients.

Competencies Requisite for Telehealth Practice. In addition to the benefit of prior clinical knowledge and expertise, a number of additional competencies for telehealth practice were identified, including assessment, communication, and relational practice. Many of these competencies build on pre-existing general nursing knowledge and skills, and require adaptation for telehealth practice (Arnaert et al., 2012), however building on or adapting these knowledge and skills requires formal preparation (Greenberg, 2009; Purc-Stephenson & Thrasher, 2010; Romero et al., 2012). Purc-Stephenson and Thrasher observe that there seems to be a belief that assessment skills used in face-to-face encounters can be transferred to the telephone, however findings indicate "specific training in telephone consultation, assessment and decision-making" (p. 492) is required to develop these skills in telehealth. It is important to note that these competencies are not separate entities, but are intricately linked and integrated with each other, as will be demonstrated in the following discussion.

A. Assessment. Assessment is well identified in the reviewed conceptual models related to practice in telehealth, and is a well-established component of the nursing process (Potter & Frisch, 2007). Categorized as a *General Skill,* Arnaert et al. (2012) describe assessment as involving physical assessment, collection of vital sign data and assessing a patient's knowledge base. Assessment data also includes descriptions of physical symptoms, an appreciation of the person's context, as well as a sense of the caller (Greenberg, 2009; Larson-Dahn, 2000; Purc-Stephenson & Thrasher, 2010). Greenberg depicts assessment as information-seeking to collect specific information that focuses on the caller's concern, and Coyle et al. (2007) see assessment

as part of the evaluation of the client's progress. Romero et al. (2012) infers a sense of assessment that begins the process of *Construct an Image of the User's Reality*, whereby the provider gathers information to gain insight to the caller, interprets the users' signs and imagining him or herself in a new space with the caller to produce a "cognitive and emotional connection" (p. 698). This use of imagination and construction of space evolves through communication and relational practice strategies.

Assessment in telehealth, then, can be regarded similarly to traditional nursing practice, entailing a process of communication and data gathering to understand the person's health concerns, the context in which the person is situated, and engage in a holistic process of person-centered care (Potter & Frisch, 2007). The manner and extent that assessment may be executed in telehealth practice depends upon type and capacity of technology used, service delivery model in which telehealth care is provided, and the nurse's development of necessary competencies. Service delivery models impact sharing of information and coordination of resources by providers (Hebert et al., 2006), and communication skills are required to facilitate discussion and active listening with persons to collect information (Purc-Stephenson & Thrasher, 2010). Potter and Frisch describe holistic assessment as an ongoing information-gathering process that attends to all dimensions of a person's health patterns utilizing interpersonal interactions and sensory perception of the nurse to arrive at mutual nurse-person goals, where the person being assessed is considered the primary source of information and interpreter of meaning.

B. Communication. Purc-Stephenson and Thrasher (2010) describe picture-building as an iterative activity that relies on skill and expertise of the nurse, depends upon accuracy of information elicited from the person, and involves receipt of both verbal and non-verbal cues. Non-verbal physical cues in therapeutic interactions are instrumental in a nurse's understanding of the person, since often tacit dimensions of communication infer aspects of a person's physical or mental well-being, such as posturing with pain or eye contact with depression and dementia (Davidhizar & Giger, 2004). However, these forms of cues are limited or lost in telephone and RPM forms of telehealth in the absence of a visual reference. For instance, cues captured through telephone are limited to voice quality, tone and expressions, such as laughter (Miller, 2002; Purc-Stephenson & Thrasher, 2010; Romero et al., 2012). Equally lost to the person is non-contact touch by the nurse, such as eye contact and facial expressions, forms of non-verbal communication in nurse-patient relationships (Fredriksson, 1999). Coyle et al. (2007) cite lack

of verbal cues and inability to perform physical assessments as a challenge for nursing students entering a telephone practice experience, and describe preparation of students through practice interviews to develop self-efficacy and confidence to engage clients over the telephone.

While VC forms of telehealth offer greater opportunity for interaction and observation of physical non-verbal cues than does telephone, less non-verbal communication is observed in VC than face-to-face encounters (Hilty et al., 2002; Miller, 2002; Parker Oliver et al., 2009). VC technologies, for instance, offer a facsimile of face-to-face encounters, but the lack of sensory cues of in-person communication and perception of depth impede capturing subtleties of a glance or the intent of a sudden movement (Jerome & Zaylor, 2000). RPM and other forms of telehealth with digital text offer even less capacity for use of sensory cues between provider and person. While non-verbal cues and touch are important aspects of communication that provide a significant contribution to both sense of presence and what the nurse knows of a person (Fredriksson, 1999), these aspects are diminished or lost in use of telehealth. One benefit of VC described by Looman et al. (2012) is the ability to capture images of a symptomatic individual to share with other providers to facilitate clinical decision-making for symptom management.

Thus, additional communication skills to discern cues within interactions via technological mediums are essential, and experience and mental imagery may play an important role in gaining appreciation of the person in telehealth (Purc-Stephenson & Thrasher, 2010; Romero et al., 2012). Specific skills reflected in most conceptual models for telehealth practice are the practical tasks of communication, such as listening, facilitating conversation, questioning, redirecting, verifying and active listening (Greenberg, 2009; Purc-Stephenson, 2010). While these activities are important for aspects of the nursing process, such as engagement and assessment, the role of relational inquiry to build connections, contextualize the person's situation and provide holistic care (Doane & Varcoe, 2007; Potter & Frisch, 2007) is not well reflected in these models.

C. Relational Practice. The importance of relationships between nurses and persons receiving care, including family members, is highlighted in many of the models, such as within Coyle et al.'s (2007) *Faculty Supervising* and, more explicitly, with Looman et al.'s (2012) *Relationship with Child & Family*. *Relational Practice* as a specific competency was designated as a *General Skill* in Arnaert et al.'s (2012) study, encompassing elements of interpersonal skills

and emotional intelligence. Relational practice "focuses on the experience and evolution of connection between client and nurse" (Hartrick, 1997, p. 525), and reflects an intentional act of the nurse to foster development of respect, trust and mutuality in provision of care (Doane & Varcoe, 2007).

Establishing and maintaining relationships with individuals has long been viewed as central to nursing practice, spanning the important, but more superficial, connection of a "good relationship" between nurse and person to a therapeutic alliance that results in optimal health outcomes for the person (Doane & Varcoe, 2007; Hartrick, 1997; Potter & Frisch, 2007). Hartrick (1997) makes a distinction between the behavioural aspect of interpersonal practice which focuses on discrete and concrete communication skills, such as empathy, questioning and clarifying, and a more evolved model of human relating that reflects humanistic values, such as responsiveness, mutuality and synchronicity. These humanistic values are manifest in nursing practice through presence, collaboration, and therapeutic use of Self, to foster holistic person-centered care (Hartrick, 1997; Potter & Frisch, 2007), and are partially reflected in existing conceptual models for telehealth.

As noted, very specific skills of communication have been delineated in most conceptual models related to telehealth, emphasizing the more behavioural aspect of nursing practice. *Emotional intelligence,* identified by Arnaert et al. (2012), may be regarded as an attribute of humanistic values in telehealth, since it transcends behavioural interpersonal communication and assessment skills to enhance the nurse's self and social awareness in the nurse-person relationship, and informs the nurse's interactions and expressions of caring towards meeting a goal of health outcomes (McQueen, 2004). This is supported by Romero et al. (2012) who cite the need for "human depth, sensitivity and compassion when interactive with the user" (p. 698) and recognized the professional's high level of self-knowledge in telephone healthcare provision. Romero et al. also mention the need for cultural sensitivity and "cultural competency" when adapting practice to the context of telephone interventions.

2.4.4 Decision-Making in Telehealth Practice

Decision-making figured prominently in most of the conceptual models, either as a focus of the provider role (Arnaert et al., 2012; Greenberg, 2009; Purc-Stephenson & Thrasher, 2010) or a collaborative endeavour with the person (Coyle et al., 2007; Larson-Dahn, 2000; Parker

Oliver et al., 2009). Where provider role in the decision-making process was emphasized, consideration of caller needs, data interpretation, prioritization, and intervention planning were highlighted as key elements (Arnaert et al., 2012; Greenberg, 2009; Purc-Stephenson & Thrasher, 2010). Where the person receiving care was central to decision-making, autonomy for the person and mutual agreement on healthcare strategies and goals were emphasized in the process (Coyle et al., 2007; Larson-Dahn, 2000; Parker Oliver et al., 2009). Collaboration between the provider and person, family, interdisciplinary team or wider community was also referenced as important to the decision-making process (Arnaert et al. 2012; Coyle et al., 2007; Greenberg, 2009; Larson-Dahn, 2000; Looman et al., 2012).

Although there is lack of consensus on the concept of decision-making in nursing practice, the process is well described in the literature, and links between assessment, data gathering, interpretation, prioritization, clinical reasoning and clinical judgement in relation to nursing process have been established (Gillespie & Paterson, 2009; Hendry & Walker, 2004; Tanner, 2006). However the process and relationships of components of decision-making are not well described or understood in the context of telehealth, particularly in relation to providing holistic care. Inclusion of persons in decision-making processes leads to better health outcomes through increased engagement, shared responsibility in goal setting, and higher levels of perceived self-efficacy and empowerment (Coyle et al., 2007; Miller, 2002; Parker Oliver, 2009; Potter & Frisch, 2007). Shared decision-making is essential to better outcomes for individuals when more control is provided to the person, and the person is able to more fully participate with the provider in treatment and management of health issues (Miller, 2002). While the nurse has moral and ethical obligations to exercise prudent clinical reasoning and make effective decisions in clinical situations to facilitate positive nurse outcomes in care (Gillespie & Paterson, 2009; Tanner, 2006), positive health outcomes and client satisfaction are compelling reasons to foster holistic person-centered care through collaboration and mutual agreement (Coyle et al., 2007; Hendry & Walker, 2004; Miller, 2002; Potter & Frisch, 2007).

2.5 Limitations of Current Conceptual Models

While the current conceptual models provide valuable insight to key elements of nursing practice in telehealth, several limitations are evident in the preceding discussion. First, most models have a narrow focus on the type of technology they address, and were not designed for

application to a broader range of telehealth technologies. With the exception of Arnaert et al. (2012) and Looman et al. (2012), models are predominantly focused on the use of telephone and, while it may be possible to adapt these models to similar technologies, it may not be appropriate or practical to apply them if the capacity of technology and ability for the nurse to engage the person is significantly different. For instance, the frameworks of Greenberg (2009) and Purc-Stephenson and Thrasher (2010) are specific to telephone, and would be difficult to apply to RPM or CMC that rely on exchange of digital text data devoid of any verbal and physical cues.

Second, none of the existing models are comprehensive in conceptualizing the range of elements in nursing practice or describing the intricate relationships that exist between the nurse, the person and interface of telehealth technology. Arnaert et al. (2012) specifically focused on competencies required of nurses using *e*-Health technologies; this generated an understanding of knowledge and skills nurses require for *e*-Health and a conceptual model to demonstrate the levels of skills, but it was not intended to convey relationships between the competencies or to account for aspects of nursing practice and telehealth. Greenberg (2009) and Purc-Stephenson and Thrasher (2010) articulate processes of finite telephone interactions that describe important activities of the nurse and touched on, in various degrees, the depth of relationship between nurse and person. However, both of these frameworks are limited to singular transactions and do not reflect other dimensions of nursing practice in telehealth, such as relational practice, presence, role of interdisciplinary collaboration, and the nature of ongoing relationships between provider and person, as may happen with chronic disease management. Most existing models also present a linear conceptualization of the association between phenomena and concepts of nursing practice in telehealth, rather than a more integrated and iterative interaction of key elements and complex processes in telehealth care. An example from this discussion that highlights the complex nature of nursing practice in telehealth are the relationships between communication, relational practice and the interface of telehealth technology in creating a holistic approach to person-centered care.

Finally, provision of holistic and patient-centered care is an imperative of nursing practice and ethical obligation of the professional nurse (Doane & Varcoe, 2007; Potter & Frisch, 2007). In existing conceptual models of practice in telehealth the importance of the person as focus for care is often articulated in text, but the person is not reflected as central to decision-making processes or represented in the resulting model. Only Parker Oliver et al. (2009) depict

the patient and family unit as the nucleus of a theoretical model in the use of videophone technology, whereby relationships of communication processes of the health provider team and organizational context are interwoven in a reciprocal dynamic of collaboration. As previously noted, in a holistic model of care the person is not a passive recipient of services, but an actively engaged agent in all aspects of nursing care and is the central focus for outcomes.

2.6 A Proposed Conceptual Model for Telehealth Nursing Practice

The preceding discussion illustrates the complexities and challenges associated with conceptualizing clinical practice in telehealth, and underscores the gap of a comprehensive conceptual model to help illuminate elements of professional nursing practice and delivery of safe, appropriate and holistic care in the face of increasing use of a range of telehealth technologies. The existing conceptual models highlight foundational components for clinical practice in telehealth and, through comparing and contrasting these models, interrelated dimensions for nursing practice have been identified that can serve to inform holistic patient-centered care in telehealth. To that end, a *Conceptual Model for Telehealth Nursing Practice* (Figure 2.2) is proposed for consideration, further development and refinement in support of future research and knowledge generation to inform evidence-based practice in this area of nursing practice.

Although full explication of this proposed model and delineating relationships of dimensions and concepts is beyond the scope of this paper, the preceding review and discussion serves as a starting point for conceptualizing the emergent area of nursing practice in telehealth. The *Conceptual Model for Telehealth Nursing Practice* illustrates the relationships of key dimensions and related concepts inherent to nursing practice and delivery of care using telehealth identified in the synthesis of existing conceptual and theoretical models or frameworks specific to telehealth. The dimensions *Knowing the Person, Building a Picture, Clinical Decision Making,* and *Nursing Competencies* were demonstrated in the review as complex and interrelated entities that overlap with each other. Within each of these dimensions are the more specific concepts identified in the review, however it is recognized that these also overlap and are interrelated with other dimensions and concepts.

Given the imperative and ethical obligations of the professional nurse in providing care, the nurse's interactions and activities in telehealth are focused towards *Holistic Person-centered*

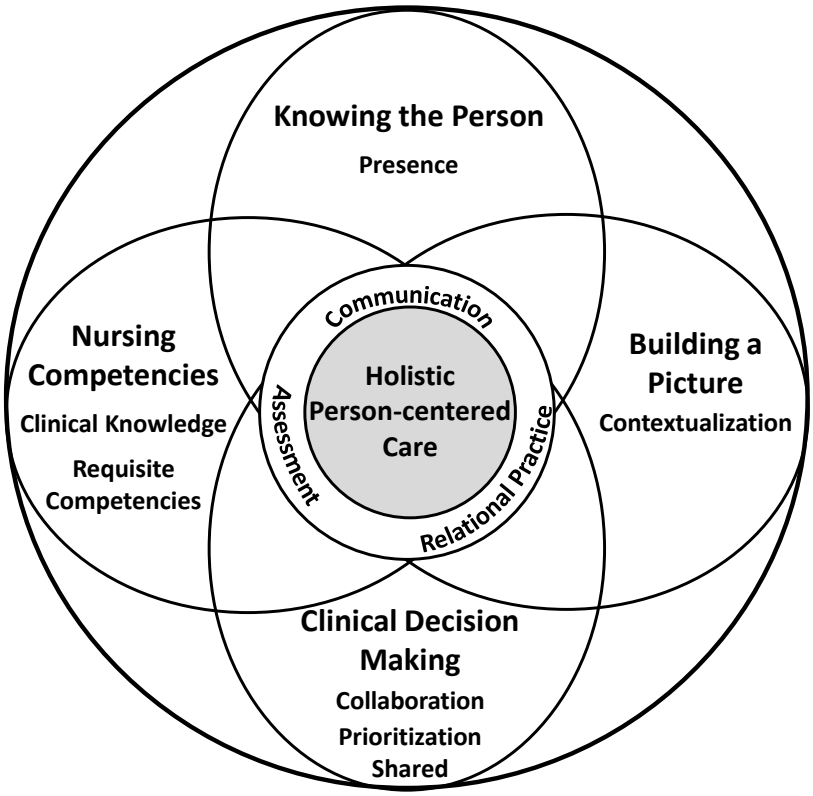

Figure 2.2 Conceptual Model for Telehealth Nursing Practice.

Care at the core of the model. The concepts of *Communication, Assessment* and *Relational Practice* that immediately surround this core are the specific *Requisite Competencies* within the dimension of *Nursing Competencies*, and are situated here to illustrate the overlap and interrelations between these concepts and the four dimensions. The iterative and dynamic nature of telehealth nursing practice is illustrated by the overlapping spheres of the four dimensions.

As use of telehealth expands in healthcare delivery, technologies continue to evolve, and nursing practice shifts to virtual environments, the nursing profession finds itself faced with the dilemma of supporting practice with evidence and the generation of knowledge for delivery of care in telehealth. Given obligations of the profession to promote appropriate use of technology, be prepared in competencies for telehealth practice and ensure safe care to clients (CNA, 2007), development of conceptual models and frameworks are necessary to guide research that will inform evidence-based clinical practice to meet these requirements. Thus, a *Conceptual Model for Telehealth Nursing Practice* is offered to help fill this virtual gap.

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Chapter 3

Knowing the Person in a Virtual Environment: Research Proposal for a Grounded Theory Study of Telehealth in Nursing Practice

This is the original research proposal for ethics application; it was subsequently revised and published in the International Journal of Arts and Sciences (Nagel, 2014).

Abstract

Background: Knowing the person is deemed requisite to establishing a professional relationship and guide clinical decision-making in nursing practice. Knowing entails appreciating complexities of an individual within the context of interrelated phenomena that influence healing and health, such as biological, psychosocial and environmental aspects of a person's wholeness. Currently little is understood about knowing the person through use of telehealth technology.

Purpose: The overall aim of this study is to determine how nurses come to know the person through use of remote patient monitoring (RPM) technology and my goal is to arrive at a theoretical conceptualization of basic social processes associated with the nurse coming to know the person in delivery of care through RPM.

Methodology: A qualitative research design based on the constructivist approach to grounded theory described by Charmaz (2010) will be used to guide this study.

Sample and Setting: To facilitate achievement of theoretical sufficiency, I will recruit 20 - 25 participants from several agencies in Ontario and one Atlantic province that provide RPM services and who have expressed interest in this study. Eligible participants are primarily registered nurses (RN) who use RPM in delivery of care.

Data Collection and Analysis: Data sources will primarily be interviews with RNs but also include other sources such as observation of RNs using RPM, clinical guidelines, education modules and policy documents. Other potential informants may include RNs who support care delivery through RPM, such as educators and managers, and RNs who use other modes of telehealth technology. Analysis techniques of constant comparison, coding and memo writing for conceptualizations and theory development consistent with Charmaz's grounded theory approach will be used for analysis and development of a substantive theory.

Relevance: This study will provide insight into how nurses come to know the person through RPM, as well as requisite skills, knowledge, and attributes for RNs to know the person when using this modality of telehealth technology. This knowledge will inform standard of nursing practice in the provision of appropriate, safe and holistic nursing care articulated by professional nursing bodies, such as the College of Nurses of Ontario and Canadian Nurses Association.

Knowing the Person in a Virtual Environment: Research Proposal for a Grounded Theory Study of Telehealth in Nursing Practice

In this proposal, I outline a grounded theory (GT) study to explore an aspect of nursing practice in the context of telehealth technology, the process of how the nurse comes to know the person[1] in a virtual environment when using remote patient monitoring (RPM). In nursing theory and research, *knowing the person* is identified as essential to a nurse's assessment, planning and clinical decision-making (Gillespie & Paterson, 2009; Tanner, 2006; Tanner, Benner, Chelsa & Gordon, 1993). Knowing the person entails appreciating complexities of the individual in the context of interconnected phenomena that influence healing and health, such as biological, psychosocial and environmental aspects that define a person's wholeness (Nagel, Pomerleau & Penner, 2013; Newman, 1997; Parse, 2002). Currently little is understood about knowing the person in nursing practice through telehealth, and research specific to this phenomenon has not been published to date.

The primary goal of this proposed study is to develop a theoretical conceptualization that illuminates the process of how the nurse comes to know the person when using telehealth technology with the aim of informing nursing practice, professional education, and both healthcare and educational policy. As telehealth encompasses a broad range of technologies and modalities, the main focus of this study will be RPM, however theoretical sampling, a feature aspect of GT, may direct my inquiry to other forms of telehealth care modalities. Before outlining the proposal's research design in detail, I first provide a brief background on key elements of the study, including: (a) telehealth technology, with a focus on RPM; (b) knowing the person in nursing practice; and (c) the conceptual framework that will inform this study. I also define key concepts foundational to the research question and the proposed design.

3.1 Background and Literature Review

Nurses have long used a variety of technologies to enhance assessment of persons receiving care, assist with planning care, facilitate communication, or serve as an adjunct to nursing care delivery (Nagel et al., 2013). Telehealth is one form of technology being more

[1] *Patient* and *person* are often used interchangeably in the literature. For the purpose of this proposal, *patient* is used to describe an individual receiving care in the context of a professional relationship with a healthcare provider and *person* refers to the human being as a holistic being.

widely adopted in provision of healthcare services, and more increasingly being utilized by nurses to: support persons with healthcare needs, such as monitoring and support for chronic disease management; facilitate specialist consultations and diagnosis; provide education; and, facilitate professional development (Arnaert & Macfarlane, 2011; Care, Gregory & Chermonas, 2010; Gartner Inc., 2011). Increasing use of telehealth in Canada is in response to healthcare reform, demands for better access to healthcare, geographical disparities in healthcare resources, shortages of skilled healthcare workers and other economic factors (Arnaert & Macfarlane, 2011; COACH, 2011; Gartner Inc., 2011; Nagel et al., 2013). The Canadian Nurses Association (CNA) recognizes the engagement of registered nurses (RNs) in delivery of healthcare services, and the role of RNs in telehealth as part of an integrated healthcare system (CNA, 2007).

3.1.1 Defining Telehealth & Virtual Environment

Telehealth encompasses many different types of technology and modalities of service delivery, and no singular definition exists for telehealth, however it generally denotes delivery of healthcare services, expertise and information by distance to persons using technology through a form of telecommunications system (CNA, 2007; Gartner Inc., 2011; Nagel et al., 2013). In this study, I regard telehealth as remote delivery of nursing care through technology for purposes of assessment, information exchange, clinical decision-making and providing nursing interventions.

RPM is used to monitor persons and support them in the management of health challenges, such as diabetes and cardiovascular disease, and has been demonstrated to be effective in both clinical and patient self-management outcomes (Holtz & Lauckner, 2012; Meystre, 2005; Paré, Jaana & Sicotte, 2007; Pecina et al., 2011; Rahimpour, Lovell, Cellar & McCormick, 2008; Yoon & Kim, 2008). In RPM, computer applications are used through Internet or mobile devices to input data, such as blood glucose, blood pressure, weight, oxygen saturation, medication use, exercise regimen and other information. (Holtz & Lauckner, 2012; Meystre, 2005; Pecina et al., 2011). RPM technology may involve use of peripheral equipment that connect to the device, such as a blood glucometer, blood pressure cuff or weight scale (Lamothe, Fortin, Labbe, Gagnon & Messick, 2006).

The provider receives and monitors a person's data through RPM to assess wellness and progress in health management, prioritize care and interventions, and plan care (Nagel, 2013). Some RPM technologies have pre-programmed digital messages to validate patient

progress or support patient management through education (Telus, 2012), and some RPM technologies allow the nurse and patient to communicate through short text messages (Holtz & Lauckner, 2012; Yoon & Kim, 2008). Data may be entered in real time by the person but the provider retrieves data and interfaces with the person intermittently; this is referred to as asynchronous or store-and-forward transactions (Barnett & Sheetz, 2003).

Care through RPM is delivered in a *virtual environment*, a space created with use of digital communications where transmission of data and communications occurs between individuals, and which is considered distinctly separate from what is usually regarded as the "real world" (Lombard & Ditton, 1997; Milgram & Kishino, 1994; Wilson, 1997). Wilson (1997) defines a virtual environment as:

> "...an environment other than the one in which the participant is actually present; more usefully it is a computer-generated model, where a participant can interact intuitively in real time with the environment or objects within it, and to some extent has a feeling of actually 'being there', or a feeling of presence" (p. 1058).

The concept of *presence* is particularly relevant, since in nursing literature it is often associated with knowing the person, usually in the context of face-to-face interactions between nurse and person (Nagel et al., 2013; Sandelowski, 2002). This is an important consideration, as technologies and virtual environments influence the way humans organize and interpret their environment, and computer-mediated milieu such as RPM may alter perceptions of presence and effect how the nurse comes to know the person (Lee, 2004; Lombard & Ditton, 1997; Sandelowski, 2002).

3.1.2 Knowing the Person, Presence and Telehealth

Knowing has been described in the context of how the nurse integrates knowledge into professional practice and how the nurse comes to appreciate the unique nature of the person receiving care (Locsin, 2010; Nagel et al., 2013). *Knowing the person* is associated with individualized, holistic care and health promotion through caring actions of sound clinical judgement and decision-making (Macdonald, 2008; Nagel et al., 2013; Tanner et al., 1993) and, serves to honor the uniqueness and wholeness of each person (Newman, 1997). Substantial knowledge of a person is considered necessary to situate and contextualize planning and delivery of nursing care (Swanson, 1993; Watson, 2002). As noted, knowing the person has historically

been linked to presence and face-to-face encounters, attributes valued by nurses in delivery of care and hallmarks associated with the professional identity of the nurse (Nagel et al., 2013).

However, telehealth technology creates a physical distance between the nurse and the individual receiving care (Barnard & Sandelowski, 2001; Rahimpour et al., 2008), which may impact perceptions of proximity and presence (Barnard, 2009; Nagel et al., 2013; Sandelowski, 2002). It has also been proposed that use of technology risks depersonalization, objectification and fragmentation of what is perceived of the whole person (Barnard, 2009; Sandelowski, 2002; Timmons, 2003). This may influence how the nurse comes to know the person or what can be known about the person (Locsin, 2010; Nagel et al., 2013). There is a dearth of empirical work in this area of nursing practice, and no specific research has been done on the phenomenon of the nurse knowing the person in virtual environments such as telehealth.

Much literature exists on challenges and benefits of providing telehealth services, however little empirical evidence reflects specific aspects of nursing practice in relation to technology and telehealth, and little research generally done on the phenomenon of knowing the person in nursing practice (Nagel et al., 2013). I conducted a literature search with key terms of *telehealth*, *telemedicine*, *e-health*, and *telenursing* together with *nursing* and *knowing* with unlimited dates in CINAHL, PubMed, Medline OVID, Medline ® and PsycInfo which revealed no peer-reviewed research articles specific to nurses knowing the person in the context of telehealth care delivery. An identical literature search substituting other healthcare professions in place of *nursing*, including physicians, social workers, physiotherapists and occupational therapists yielded no empirical knowledge development on knowing the person in this area.

3.2 Purpose of this Study

The purpose of this study is to advance our understanding of the process of how the nurse comes to know the person in virtual environments through use of telehealth technology, with a focus on RPM. Thus, the primary question underlying this study is, "How does the nurse come to know the person in a virtual environment?" Three secondary questions will further refine the focus of this study:

1. How does the process of communication and social interaction with the person change for the nurse when transitioning from traditional practice to the use of RPM?;

2. How does the nurse adapt knowledge and skills acquired through traditional nursing education and practice to delivery of nursing care using RPM?; and
3. How is the concept of knowing the person in provision of holistic nursing care changing with adoption of telehealth technology, such as RPM, in nursing practice?

3.2.1 Study Objectives

The objectives of this study are to: (a) develop a theoretical account of how the nurse comes to know the person in one form of virtual environment, RPM; (b) identify skills, knowledge and attributes required in the process of knowing the person when using RPM in nursing practice; and (c) contribute empirical knowledge to inform nursing practice, preparation of nursing professionals and health policy in relation to the use of telehealth technology.

3.3 Conceptual Framework for this Study

Typically an *a priori* conceptual framework or theory is not advocated in GT research, nor is extensive immersion in the literature, since development of a theoretical conceptualization is the goal of GT and preconceptions arising from *a priori* models and immersion in literature may constrain or limit the researcher's flexibility, creativity and representativeness in analysis and conceptual work (Charmaz, 2006; Corbin & Strauss, 2008; Glaser & Strauss, 1967; Strauss & Corbin, 1998). Thus, in keeping with the methodological principles of grounded theory, a conceptual framework will not be used to guide this study. However, I am not naïve to the phenomenon of interest in this study, and bring experience, knowledge and formal preparation to this project through clinical practice, previous research in telehealth, literature reviews to prepare the background of this study, and development of a conceptual model specific to telehealth nursing practice (Figure 2.1).

3.4 Methodology: Constructivist Grounded Theory

Provision of telehealth involves processes of communication between nurse and the person receiving care that precipitate actions through reciprocal and dynamic social interactions. These interactions require communication in a virtual environment, and may alter perception of presence and other processes for establishing a caring relationship. Charmaz (2006) describes *process* as consisting "of unfolding temporal sequences that may have identifiable markers with clear beginnings and endings and benchmarks in between" (p. 10). The initiation of the nurse-person relationship involving telehealth marks the start of such a process, with benchmarks

represented by interventions during delivery of care, and the endpoint denoted by termination of the professional caring relationship. Since the process of knowing the person using RPM is the focus of this investigation and because the goal is to develop a theoretical description of this process, I have selected GT as the methodological approach for this study.

GT evolved from theoretical perspectives of pragmatism and symbolic interactionism, and is based on assumptions related to symbolic representations and meanings (Charmaz, 2006; Corbin & Strauss, 2008). Engagement between nurse and person through telehealth relies on use of language and visual cues in an exchange of information where messages are interpreted and responded to according to perceived meanings. In this dynamic of communication, symbolic interactionism of information exchange via RPM may be examined through Blumer's (1969) premises that: (a) "human beings act toward things on the basis of the meanings that the things have for them", (b) "meaning of such things is derived from, or arises out of, social interaction that one has with one's fellows"; and (c) "meanings are handled in, and modified through, an interpretive process used by the person in dealing with the things he encounters" (p. 2).

Charmaz's (2010) approach to GT will be used to guide data collection and the analytical processes in this study (Figure 3.1). Charmaz situates her approach within the constructivist paradigm where, from an ontological perspective, reality is constructed, interpreted by the researcher and more than one reality may exist. From an epistemological perspective, a relationship exists between the knower and the known in constructivism, and the researcher and researched closely interact in a process of knowledge development (Denzin & Lincoln, 2000). I have considered these various perspectives given my relationship to the phenomenon, prospective connection to the participants, and the way in which I will collect and analyze data as this will have an impact on the integrity of the research process and how results may be regarded (Lincoln & Guba, 1985). As I will be intimately involved with all aspects of the research process in this project, the approach to GT articulated by Charmaz is ontologically, epistemologically and methodologically compatible with my phenomenon of interest, research questions, and objectives.

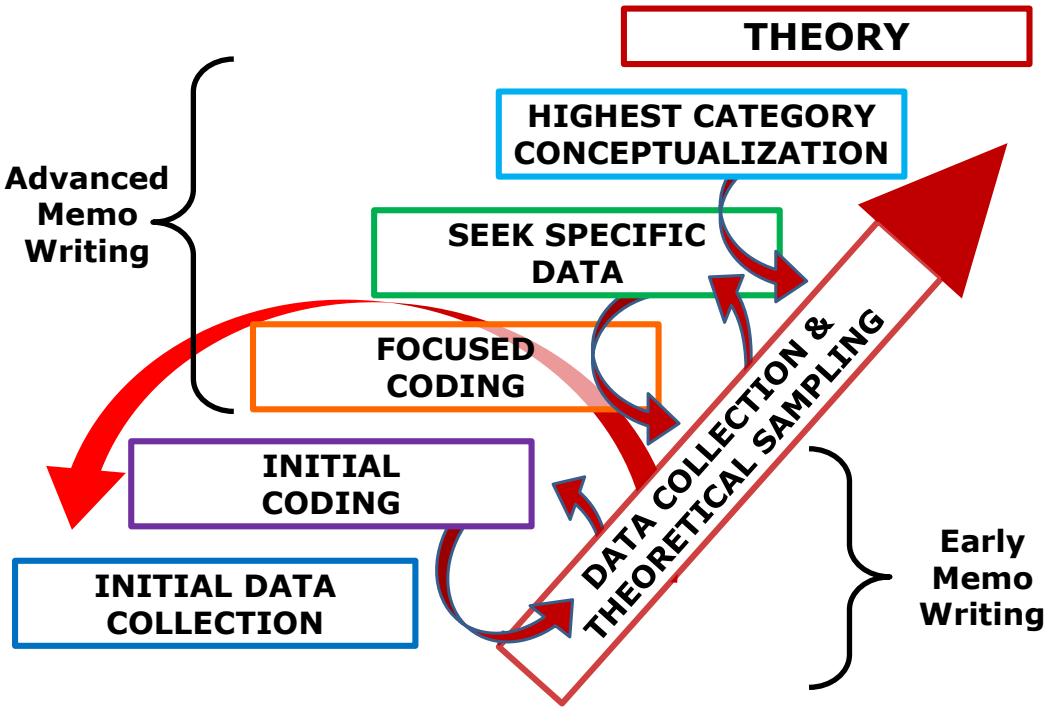

Figure 3.1 Conceptualization of ConGT research process. This conceptualization is based on Charmaz's (2006) description of the process for constructivist grounded theory. Although often perceived as a linear process, collection of data, theoretical sampling, coding, and analysis are very iterative in nature in a constructivist approach to grounded theory. The process of memo-writing is somewhat flexible as the research proceeds.

Charmaz (2006) opines theories are not merely discovered, but are constructed by the researcher through "past and present involvements and interactions with people, perspectives, and research practices" (p. 10). As previously noted, I come to this project with *a priori* knowledge, experience and familiarity with the literature, and I am also part of the nursing "world" being studied. Thus, I will be attuned to numerous *sensitizing concepts* that relate to my research focus and phenomenon of interest. Sensitizing concepts are those used within a discipline that provide a reference point when engaging in empirical explorations, and Charmaz (2006) views them as a starting point and tentative tool for the researcher when developing ideas in GT. For this study, examples of sensitizing concepts for me may include notion of presence, decision making, and other dimensions of nurse-person interactions noted in the conceptual

model. These sensitizing concepts will provide a frame of reference for me to pose initial questions, guide my inquiry as the study progresses, view the data and engage in analysis.

3.5 Methods and Procedures

3.5.1 Setting and Sample

My focus of inquiry is nursing practice that employs telehealth for delivery of care in a Canadian context, where an exchange of information and communication between nurse and person occurs through RPM. I have made contact with several healthcare authorities across Canada to determine feasibility of this study(Table 3.1), and all have indicated openness to participation in this proposed study. The physical setting will vary for actual data collection, since my principal means for collecting data will be through interviews with RNs involved with RPM in their practice. These interviews will be done primarily by telephone or Skype, however where permitted and practical I will go to agencies to conduct interviews and observational experiences of RNs engaged in telehealth practice.

Once ethics approval has been obtained, I will use purposive sampling to select participants likely to be most representative and informative of my phenomenon of interest (Polit & Beck, 2012). Initially, I will recruit RNs providing direct nursing care using RPM and, as research progresses, I will purposively select participants guided by *theoretical sampling* (Charmaz, 2006; Corbin & Strauss, 2008; Glaser & Strauss, 1967; Strauss & Corbin, 1998). Theoretical sampling is employed soon after data collection and initial coding begins to help determine next sources of data; it is a way to seek participants, information or events that provide data to "elaborate and refine categories…to develop the properties of your category(ies)" (Charmaz, 2006, p. 96). Data sources may extend to other informants, such as educators or managers who support telehealth training or oversee telehealth programs, or to RNs who use other forms of telehealth technology. Data sources may also include policies, clinical guidelines and educational modules specific to my inquiry.

A. Sample Size. Theoretical saturation is the benchmark for end of data collection in GT, and occurs when no further theoretical insight is derived from data sources and no additional properties of theoretical categories are revealed (Charmaz, 2006). The endpoint of data collection is satisfied when a rich description of the phenomenon, a range of viewpoints and a

Table 3.1 *Sample of Telehealth Services Delivered by Registered Nurses in Canada*

Province	Health Region or Agency	Telehealth Services	Technology Type		Nurse Educators & Managers	Estimated Number of Nurses
			Remote Patient Monitoring	Video-conferencing		
British Columbia[1]	Fraser Health Authority	COPD	3		2	5
	Interior Health Authority	CHF	40		1	41
	Vancouver Island Health Authority	CHF	3		1	4
Manitoba[2]	Provincial Health Contact Centre	Diabetes, CHF		7	1	8
	Telehealth Program	Renal, Pre-op		4	2	6
Ontario[3]	OTN - Telehomecare	Diabetes, CHF	16		7	23
Quebec[4]	CSSS de la Pointe-de-l'Île (Montreal)	Diabetes	2			2
	CSSS Îles-de-la-Madeleine	Diabetes	2			2
	University de Montreal RUIS	Telehealth Program Support			2	2
New Brunswick[5]	Saint John Regional Hospital	Post cardiac surgery	8		1	9
	Fredericton Regional Hospital – Extra Mural Program	CHF COPD	30		1	31

Information Source

[1]Provincial Telehealth Office (BC Ministry of Health)
[2]MBTelehealth (Winnipeg Regional Health Authority)
[3]Ontario Telehealth Network (OTN)
[4]McGill RUIS, McGill University Health Services & Centres de Santé et de Services Sociaux (CSSS)
[4]Horizon Health Network

variety of contexts have been achieved to adequately define categories and their properties (Charmaz, 2006; Corbin & Strauss, 2008). A sufficient sample size is necessary to demonstrate rigor of the study and is largely dependent on the nature of the phenomenon and the research question (Charmaz, 2006; Polit & Beck, 2012). Polit and Beck suggest a sample range of 20 to 30 participants and Charmaz indicates a minimum of 25 interviews may be sufficient for a small project, although she does not define the scope of a "small project". As second interviews will be included in the design for this study, recruitment of 20 to 25 should be sufficient and, based on my inquiry of Canadian telehealth services (Table 3.1), would be feasible for this study.

B. Inclusion & Exclusion Criteria. Potential candidates for this study must: (a) be a RN; (b) provide direct, or support, nursing service with telehealth technology to persons over 18 years old requiring support for health maintenance; (c) speak English; and (d) be capable of providing written consent for participation in the study. Nurses providing services to persons under 18 years old will not be included based on assumptions of parental involvement in care and that communication patterns with youth may significantly differ from those with adults.

C. Recruitment. Once access to organizations has been arranged, I will provide a participant recruitment invitation (Appendix A) describing the study for distribution by managers and educators to RNs who use RPM in care provision. I will seek permission from managers or educators to contact prospective participants directly should they have questions about the study or wish to enroll in the research project. Contact will be arranged by email or telephone, as determined by potential participants. For enrolment to the research project, a consent form (Appendix B) will be sent to the participant electronically or by fax. The signed consent form will then be faxed or scanned and sent electronically back to me, at the discretion of the participant.

3.5.2 Data Collection

Data collection will primarily consist of interviews. Once enrolled and signed informed consent has been obtained, each participant will complete a participant demographic information sheet (Appendix C), signifying the initiation of data collection and GT research process (Figure 3.1). This demographic sheet will be completed at the time of the first interview, if the interview is conducted face-to-face. If the interview is done by telephone or Skype, I will send the

demographic electronically or by fax to the participant, and have the sheet then faxed, scanned and emailed or mailed back to me, at the discretion of the participant.

Interviews will be semi-structured and initially follow a study interview guide (Appendix D) developed by the researcher based on the study's primary question. In GT, questions and probes evolve as codes and categories are defined, and theoretical sampling guides the researcher in refining the questions as coding evolves and the researcher strives to delineate properties of the categories (Charmaz, 2006; Wimpenny & Gass, 2000). Theoretical sampling may prompt re-examination of earlier interview transcripts and follow-up interviews with original participants to facilitate clarification, elaboration and refinement of categories, their properties and dimensions.

Initial interviews will be approximately one hour duration, and any subsequent follow-up interview will be 30 to 60 minutes, depending on participant's availability and contribution of data. Interviews will be scheduled at a time convenient to the participant, conducted in a setting of the participant's choice, and conducted in a format chosen by the participant: face-to-face, by telephone or by Skype. Skype interviews are regarded as effective as telephone interviews, but with the benefit of cost effectiveness and synchronous face-to-face interactions with participants (Hanna, 2012). Recordings will be done on a high quality digital recorder and professionally transcribed verbatim, and I will review them for accuracy (Poland, 1995).

Other forms of information that may provide insight to my phenomenon of interest and data analysis include clinical guidelines, education modules, telehealth vendor training programs and policy documents. Glaser (2002) states "all is data", however Charmaz (2006) maintains it is essential to ensure data is useful, of quality, and relevant to the interpretation analysis and development of the theory. I will determine relevance and utility of other data sources based on theoretical sampling principles and my findings, and I will use coding strategies discussed later to analyze this information. Charmaz cautions the researcher to be mindful that documents, records and other data are constructions by individuals, thus I will be mindful of contexts in which potential data sources were generated when coding and proceeding with analysis.

I will seek opportunities to observe work environments of participants and, where feasible, request permission to observe the participant utilizing the telehealth technology at their healthcare agency. Such observations may provide insight to workflow, internal communication channels, engagement with patients and other information to help contextualize the nurse-person

telehealth interaction in relation to participant interviews and other data sources (Charmaz, 2006). An observational guide (Appendix E) will be used to record these observations, and my focus will strictly be on the RN's actions and engagement with the technology. I will not use patient information, telehealth data or patient-related observation data in this study.

I will record fieldnotes during the research process to note observations and document the context for each interview. In GT, fieldnotes focus more on the phenomenon or process of study, rather than describing the environment and setting (Charmaz, 2006), therefore attention will be paid more to participant's language, actions in the setting, and interactions in relevant processes. Where observational experiences are possible, fieldnotes will be used to elaborate on information collected in the observation guide, including key ideas for analysis and highlighting processes of the nurse in relation to use of the telehealth technology (Charmaz, 2006).

3.5.3 Data Analysis

Coding in GT "is the pivotal link between collecting data and developing an emergent theory to explain these data" (p. 46), and involves two major phases referred to as *initial coding and focused* coding (Charmaz, 2006). A conceptual schematic of the analytical process for ConGT is presented in Figure 3.2. Initial coding entails labelling each word, line or section of data, and is well suited to data collected through interviews and observation (Charmaz, 2006). During initial coding I will consider what the data suggests, the point of view that is represented by the data, and what potential theoretical category the data may indicate (Charmaz, 2006; Glaser & Strauss, 1967; Straus & Corbin, 1998).

Throughout the analytical process, I will use *constant comparative methods* to contrast data and codes across each level of analysis to identify similarities and differences (Charmaz, 2006; Glaser & Strauss, 1967; Straus & Corbin, 1998). I will use *memo-writing* to reflect on emerging themes, relationships of the data to code and beginning conceptualizations of categories (Charmaz, 2006). *In vivo* codes, expressions in the words of the participants that effectively portray meanings or the essence of the process, may be used in the analysis, however I must look for the participant's "implicit meanings and attend to how they [the participant] construct and act upon these meanings" (Charmaz, 2006, p. 55).

The second major phase of coding, focused coding, is where initial coding is synthesized into more conceptual and selected codes, and a shift is made from line-by-line coding to a higher

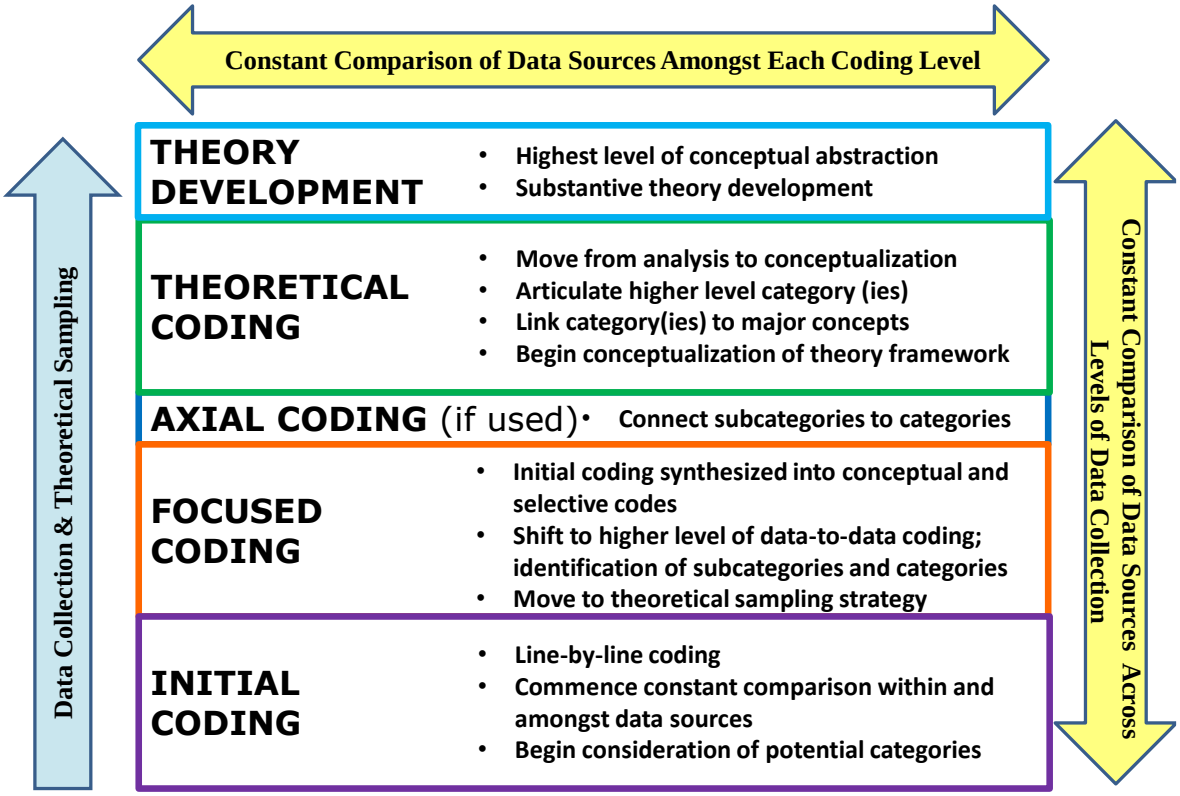

Figure 3.2 Conceptualization of ConGT analytical process with constant comparison. This conceptualization draws mainly from Charmaz's (2006) description of the analysis process in the constructivist approach to grounded theory, however elements from Glaser and Strauss (1967), Strauss and Corbin (1998), and Corbin and Strauss (2008) have been synthesized into this schema to more fully explicate each of the steps in coding and theory development. Charmaz suggests that *Axial Coding* may be employed at the researcher's discretion, believing that having it as a frame "may extend or limit [the researcher's] vision" (p. 61).

level of data-to-data coding (Charmaz, 2006). Glaser (1978, in Charmaz, 2006) advocates the use of gerunds, action forms of words that provide a mental imagery of process and are useful as codes at this point of analysis as it keeps the researcher close to the data. Use of gerunds will also help foster *theoretical sensitivity*, the ability to detect nuances in the data that contribute to the researcher's conceptualization and development of theory, since in GT the gerunds give a sense of action to the processes (Charmaz, 2006; Glaser & Strauss, 1967). The analytical process is iterative, therefore I will continue to use constant comparison to evaluate and compare new data to those ideas which emerged through the earlier analysis (Charmaz, 2006).

Charmaz (2006) does not use *axial codes* in her work as is done by Strauss and Corbin (1998) as she believes this level of coding prematurely creates an analytic framework that the researcher might be encouraged to apply to the data. Axial codes connect subcategories to categories, help define the properties and dimensions of each category, and starts linking categories together to provide structure to the emerging analysis (Charmaz, 2006; Strauss & Corbin, 1998). Charmaz suggests students who work best with more structure or may be challenged by ambiguity may prefer using a framework. As a novice in GT, I will consider the use of axial codes for clarification or defining a framework as data analysis progresses, being mindful of the potential inflexibility this technological approach may have (Charmaz, 2006).

The final step in the process of GT is to use *theoretical coding* to move beyond the analysis level to conceptualizing a theoretical framework that results in one high-level category connected to major concepts (Charmaz, 2006). Strauss and Corbin (1998) refer to this as the central, or core, category which is an abstraction from the data, and what Glaser (2002) describes as at "least the third level of conceptual analysis" (p. 30). At this point I will articulate the highest level of category, identify the major concepts connected to this category, and then clearly demonstrate the relationships of the concepts, properties and dimensions to the highest order category by integrating data from the memos, fieldnotes and data (Chamaz, 2010; Glaser, 2002; Strauss & Corbin, 1998). It is at this point a substantive theory will have been developed.

3.5.4 Memo-writing and Writing Strategies

Memo-writing is integral to GT and begins following the first interview, drawing on data from interview transcripts and fieldnotes to start the analytical process (Charmaz, 2006). *Early memos* facilitate exploration of data and identification of focused codes and, as data collection progresses, *advanced memos* will start to inform the structure of categories, the relationships between the data and categories, and a process of comparison (Charmaz, 2006). I will engage in memo-writing from the first interview, integrating thoughts from interviews, observational experiences, notes from observational guides and other data sources. The memo-writing process will guide my theoretical sampling strategies, inform revision of interview questions, and refine my focus on substantive areas for development and refinement of codes, categories, and their properties (Charmaz, 2006; Corbin & Strauss, 2008; Strauss & Corbin, 1998).

In support of memo-writing, I will employ pre-writing strategies suggested by Charmaz (2006) to exercise creativity in the analytical process and to "liberate [me] from linear logic and organization" (p. 86). *Clustering*, an exercise similar to conceptual mapping, promotes notation of central concepts and connected ideas in a free-hand form to diagram relationships between concepts or concepts and their properties (Charmaz, 2006). *Freewriting*, as the name implies, allows the researcher to freely write ideas that come to mind to stimulate thought and engage in a form of free association related to the research process (Charmaz, 2006). Freewriting can spark ideas, prepare the researcher for analysis and conceptualization work as research progresses (Charmaz, 2006). Both clustering and freewriting can be used flexibly and informally during the analysis process to help motivate, refocus and stimulate me during the analytical process.

Further, memo-writing and the writing strategies are a means for me to engage in *reflexivity*, a critical scrutiny and reflection of my relation to the research process (Charmaz, 2006; Schwandt, 2007). In bringing experience and knowledge to this project, I am obligated to take measures to minimize personal bias when collecting data and making interpretations during the analytical process (Charmaz, 2006; Corbin & Strauss, 2008; Schwandt, 2007). Through these writing activities I will convey rationales for decisions in the research process, including critical examinations of how I gather, code and interpret the data; it will also leave an audit trail demonstrating my reflexive stance, and facilitate a degree of quality and rigor in this proposed study (Polit & Beck, 2012; Schwandt, 2007). This is of particular importance due to the close relationship I will have with participants and data during the research process, and the potential of conscious and sub-conscious influence of my background and perspectives in handling the data (Corbin & Strauss, 2008; Schwandt, 2007).

3.5.5 Methodological Rigor

Corbin and Strauss (1990) articulated that retention of "good science" is essential in GT, and GT should adhere to scientific canons that "include significance, theory-observation compatibility, generalizability, consistency, reproducibility, precision, and verification" (p. 4). To that end, I will adopt the widely accepted strategies of credibility, dependability, confirmability, and transferability outlined by Lincoln and Guba (1985) to enhance the integrity and quality of both the process and product of this study.

Credibility, the truth value and believability of the study's findings, (Carnevale, 2002; Lincoln & Guba, 1985) is enhanced by how research is conducted and study results are represented (Polit & Beck, 2012). I will use *in vivo* codes, where appropriate, as category names to bring participant's voice to the theoretical development and articulation of research findings (Charmaz, 2006; Chiovitti & Piran, 2003; Strauss & Corbin, 1998). As well, a form of member-checking, where participants provide input on emerging interpretations, will be used to include participant viewpoints and solicit additional interview data to solidify category designations and properties (Polit & Beck, 2012; Charmaz, 2006). Finally, by adhering to methodological principles, aims and established methods for GT I will enhance the credibility of this study and the findings, since deviation from these principles "undermines its methodological veracity" and risks mixing of qualitative methods (Cutcliffe, 2005, p. 423).

Dependability directly affects credibility of the study as it essentially reflects how reliable the research findings are, and also demonstrates whether same or similar findings would be achieved if the study were repeated (Lincoln & Guba, 1985; Polit & Beck, 2012). To enhance dependability of this study, I will maintain an audit trail to facilitate evaluation of the consistency of the research process, demonstrate how conceptualizations were formulated, and provide guidance in replication of the study (Chiovitti & Piran, 2003; Sandelowski, 1986). The audit trail for this study will consist of: (a) a master log recording each step of the research process; (b) maintenance of all fieldnotes, observation guides and memos; and (c) all other documentation related to the study (Carnevale, 2002; Chiovitti & Piran, 2003). In addition, I will seek to attain theoretical saturation to enhance thoroughness of data collection and reduce the chance of new findings, whereby data from additional sources would not significantly increase understanding (Carnevale, 2002; Charmaz, 2006; Chiovitti & Piran, 2003).

Confirmability "refers to objectivity or the potential congruence between two or more independent people about the data's accuracy, relevance or meaning" (Polit & Beck, 2012, p. 539), and data and interpretations must represent the information provided by participants. For this study, I will strive for confirmability by seeking theoretical sufficiency through a minimum of 20 participants and other data sources, use of *in vivo* codes, and utilization of participant narratives to enhance reporting of the study findings. Confirmability will also be supported through the audit trail, allowing the reader to draw conclusions about the veracity of my interpretations in relation to information from the participants (Carnevale, 2002).

Transferability is the extent that findings can be transferred or used in other similar environments or contexts (Carnevale, 2002; Lincoln & Guba, 1985, Polit & Beck, 2012). I will enhance potential for transferability by presenting demographic information of the participants, description of study settings, clear articulation of all sources of data, and thorough accounts of observations to contextualize findings and interpretations from the study.

3.6 Conclusion

With the dearth of empirically based knowledge development in the domain of telehealth in nursing practice, understanding the process of knowing the person in a virtual environment, such as RPM, is a step towards further inquiry in related areas of clinical decision-making, nursing practice competencies and holistic care. It is anticipated that the contribution of a theoretical conceptualization of knowing the person will lay a foundation for further research in telehealth to inform nursing practice and guide development of nursing education curricula for the professional development of existing practitioners and preparation of new nursing graduates. Knowledge from this study and future research will also help articulate the evolving nature of nursing practice in the context of technological advancement, and guide formulation of practice, education and public policy towards provision of holistic person-centered care in telehealth.

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Chapter 4

Getting a Picture: A Grounded Theory of Nurses Knowing the Person in a Virtual Environment

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Abstract

Delivery of care by nurses in virtual environments is rapidly increasing with uptake of digitally mediated technologies, such as remote patient monitoring (RPM). *Knowing the person* is a phenomenon in nursing practice deemed requisite to building relationships and informing clinical decisions, but has not been studied in virtual environments. **Purpose of Study**: The intent of this study was to explicate the processes of how nurses come to know the person using RPM, one form of telehealth technology used in a virtual environment. **Study Design and Methods**: The study was informed by Charmaz's (2014) constructivist grounded theory, and included 33 interviews and five observational experiences of nurses using RPM in seven different settings. **Findings**: *Getting a Picture* evolved as the core category to a theoretical conceptualization of nurses knowing the person through use of RPM and other technologies, such as telephone and electronic medical records. *Getting a Picture* reflected a dynamic flow and integration of seven processes, such as *Connecting with the Person* and *Recording and Reflecting*, to describe how nurses strived to attain a visualization of the person. **Conclusions:** While navigating disparate and disconnected information and communication technologies, *Getting a Picture* was important for providing safe, holistic person-centered care.

Getting a Picture: A Grounded Theory of Nurses Knowing the Person in a Virtual Environment

With increasing use of technology to support access to healthcare, there is an expanding role for nurses in utilization of telehealth technologies. The benefits of providing care using telehealth technologies is well recognized and includes increased access to healthcare, better health outcomes, and more cost effective service delivery (Holtz & Lauckner, 2012; Inglis et al., 2011; Paré, Jaana, & Sicotte 2007; Polisena et al., 2009). However, little is understood of how nurses incorporate telehealth into clinical practice. *Knowing the person* was identified as integral to nursing care, such as for relational practice and clinical decision-making (Gillespie & Paterson, 2009; Tanner, Benner, Chesla, & Gordon, 1993). However, this phenomenon has not been directly explored in use of telehealth technology that entails a shift from traditional face-to-face interactions between the nurse and the person to encounters in a virtual environment (VE) where the exchange of information is digitally mediated (Nagel & Penner, 2016; Nagel, Pomerleau & Penner, 2013).

Given the imperative for nurses to provide appropriate, safe and holistic care in clinical practice (Nagel et al., 2013), it is necessary to explore care delivery in the context of telehealth and VEs. The intent of this grounded theory study was to explicate the processes of how nurses come to know the person with remote patient monitoring (RPM), a form of telehealth technology. In this paper, we present a brief background and summary of the related literature and provide a description of our methodological approach informed by Charmaz's (2014) constructivist grounded theory (ConGT). We then present our study results and situate the findings within the current literature. Finally, we highlight important considerations for nursing practice, including competency development for nurses using RPM technologies, human factors in use of technology and propose future directions for research and knowledge development.

4.1 Background

Uptake of telehealth technologies by nurses is increasing due to rising healthcare costs, early discharge from hospital, human resource constraints, demands for better access to care, and geographical factors (Arnaert & Macfarlane, 2011; Care, Gregory & Chernomas, 2014; Schlacta-Fairchild et al., 2014). As a result, more nurses are using a range of telehealth technologies in a variety of settings to remotely provide clinical care and support to persons with a diverse range

of healthcare needs. For example, individuals with chronic heart failure, chronic obstructive pulmonary disease, diabetes and hypertension can be monitored using telehealth and assisted in self-management (Holtz & Lauckner, 2012; Inglis et al., 2011; Paré et al., 2007; Polisena et al., 2009).

Transmission of data through telehealth technologies occurs in an electronically mediated space commonly referred to as a VE, a space that is perceived as distinctly separate from what is regarded as the "real world" (Lombard & Ditton, 1997; Milgram & Kishino, 1994; Wilson, 1997). The concept *telehealth* is often used interchangeably with other terms such as eHealth, telemedicine, and telenursing, and is not consistently defined in the literature (Nagel et al., 2013; Schlacta-Fairchild et al., 2014; World Health Organization, 2010). For this study, telehealth was defined as the "remote delivery of nursing care through technology for purposes of assessment, information exchange, clinical decision-making and providing nursing interventions" (Nagel, 2014, p. 392). Telehealth encompasses many different forms of information and communication technologies that facilitate exchange of data between nurses and persons, such as telephones, computers and video cameras (Canadian Nurse Association [CNA], 2007; Schlacta-Fairchild et al., 2014).

RPM is an example of telehealth technology, and typically utilizes information and communication technologies that are connected by telephone or digital cable networks to monitors in a person's home or community environment for the purpose of providing support in management of disease conditions (Holtz & Lauckner, 2012; Schlacta-Fairchild et al., 2014). Blood glucometers, blood pressure cuffs and weight scales can be connected to RPM units to capture and record biometric information that is transmitted in a VE to the healthcare provider (Honeywell, 2015; Telus Health, 2014; Schlacta-Fairchild et al., 2014). As well, RPM technologies may have the capacity to allow persons to answer pre-programmed questions (e.g. close-ended "yes" or "no" inquiries) selected by the healthcare provider or to facilitate the exchange of short text messages between the person and provider (Honeywell, 2015; Telus Health, 2014; Schlacta-Fairchild et al., 2014). Data transmission with RPM may occur synchronously, when the provider and person are connected in "real time". More often transmission is asynchronous where the person inputs data at one point in time and the provider reviews it later (Barnett & Scheetz, 2003; Schlacta-Fairchild et al., 2014).

The physical distance created between the nurse and the person in RPM has been theorized to have implications in establishing a sense of presence that has traditionally been achieved through face-to-face encounters (Nagel et al., 2013; Sandelowski, 2002). Presence is often associated with *knowing the patient*, a concept regarded as core to therapeutic relationships and essential to clinical decision-making and provision of care in nursing (Gillespie & Paterson, 2009; Macdonald, 2008, 2009; Tanner, 2006). In this study, *knowing the person* was used to reflect an appreciation of a holistic and comprehensive understanding of the individual that transcends physiological and emotional aspects of care and includes broader influences in health, such as social structures, environment and agency of the person. Knowing the person has been described as an intentional act of caring (Hartrick, 1997) and, specific to use of technology, is suggested to be a competency required by the nurse (Locsin, 2009).

Although some empirical work has been published in relation to nurses knowing the person in traditional clinical practice settings (Macdonald, 2008, 2009; Radwin, 1995; Tanner et al., 1993), there is a dearth of research on this phenomenon in telehealth clinical practice for nursing (Nagel & Penner, 2016; Nagel et al., 2013). As Macdonald (2008) noted, *knowing the patient* has been a theme of earlier research in clinical practice but was not the intended focus of inquiry. Thus, the intent of this study was to specifically explore how knowing the person occurred in nursing clinical practice with use of telehealth technology and to create a theoretical conceptualization to answer the research question "How does the nurse come to know the person in a virtual environment?"

4.2 Research Methodology

Charmaz's (2014) constructivist grounded theory (ConGT) was selected to inform this study for three reasons. First, the phenomenon of focus can be viewed as a social process within nursing care (Nagel, 2014; Nagel & Penner, 2016), and grounded theory has been well established as an appropriate qualitative approach to explore psychosocial processes (Charmaz, 2014; Corbin & Strauss, 2008; Glaser & Strauss, 1967). Second, the paradigmatic and philosophical orientation of the lead investigator aligns with both constructivism and symbolic interactionism (Nagel, 2014). Finally, an *a priori* exposure to literature, flexibility for data collection and analysis, and previous knowledge and experience brought to the project fit with ConGT (Charmaz, 2014). The research protocol was published *a priori* (Nagel, 2014). Ethics

approval was received from the University of Ottawa Office of Research Ethics and Integrity (Appendix F) and participating research sites.

4.2.1 Description of Context: Settings, Participants and Technologies

Twenty-two nurses from seven telehealth programs in either acute care facilities or community health agencies from Ontario and one Atlantic province in Canada were included in this study. This provided a broad range of interview and observation data sources representing variability of characteristics amongst diverse settings, participants and technology.

A. Settings. Telehealth services were provided to people in their homes or communities in both rural and urban areas. Five telehealth programs provided either assistance to persons in self-management of chronic diseases (e.g. chronic heart failure and chronic obstructive pulmonary disease) or supported transitional care of the person following interventions (e.g. cardiac catheterization and angioplasty). One of these five programs provided immediate post-operative support for seven days following hospital discharge. Another telehealth program provided pre-operative assessments, while one other telehealth program provided education and logistical support to affiliated agencies. There were no settings where nurses used RPM exclusively to engage in care activities as nurses in the study also used other forms of technology to exchange information in VEs, such as telephone, electronic medical records (EMRs) and video cameras. In half of the programs, RPM was used in conjunction with face-to-face home visits in community or clinic settings.

B. Participants. Eligible participants were registered nurses using RPM technology in the delivery of care. All nurses in the study were female and ranged in age from 28 to 57 years. Eleven nurses were in community settings, 10 were in hospital-based telehealth programs, and one worked for a separate telehealth support agency. Of the participants, 15 nurses provided direct care, four were managers or educators who provided support to nurses who used technologies, and three were nurse managers who also provided direct care. Education credentials of the nurses were: (a) seven with nursing diplomas; (b) eight with baccalaureate nursing degrees; (c) two with nursing diplomas but baccalaureate degrees in other disciplines; and (d) five with masters degrees. Time in the nursing workforce ranged from 6 to 38 years, and time having used telehealth technology ranged from 1 to 10 years. Only three nurses had prior experience with telehealth before being employed in their current position. In three sites, nurses

received formal education sessions and orientation in the use of RPM technologies prior to clinical practice; the remaining nurses received support through orientation, training by technology vendors, and/or train-the-trainer programs.

C. Technology. All sites providing direct care used RPM to facilitate transmission of biometric data from the person to nurse using peripheral devices for blood pressure, weight, oxygen saturations, heart rate and/or 2-lead ECG rhythms. The type and amount of data collected through RPM depended on the mandate of the program and the capacity of the technology. Parameters for biometric data, such as optimal range for blood pressure, were programmed into the RPM system by the nurse. These parameters were usually determined in consultation with the primary care provider (e.g. physician or respiratory therapist) or in accordance with clinical protocols; in the absence of these resources, nurses used clinical judgment to determine parameters based on available information. Transmitted biometric values outside these programmed parameters triggered an alert or "red flag" in the RPM system.

The RPM modalities used by five programs had programmable questions; similar to biometric data, answers that fell outside of an expected response triggered an alert. Although protocols often guided programming of requisite questions, many nurses had flexibility to select questions based on the health status of the person. For instance, a person who developed respiratory problems might be asked "Is your breathing more difficult today than yesterday?" One site used a form of RPM called Interactive Voice Response (IVR), where only programmed questions were asked of persons through an automated telephone system at specified time intervals. With IVR the person used the number pad to key in answers and no biometric data was collected.

Nurses used the telephone to follow-up when an alert was triggered in the RPM system, for health coaching to promote self-management or as backup when the RPM system failed. Where video cameras were used with RPM, the nurse could ask questions of the person and visually assess the individual in real-time. One RPM system permitted communication similar to text messages from the person to the nurse. In one site, EMRs were completely integrated into the RPM system for documentation. However, in five sites a separate computer application for documentation was used, and in one site a parallel paper charting was used for documentation.

4.2.1 Methods and Procedures

Data sources included 22 initial interviews, 11 second interviews, five observational experiences, and program policies and clinical guidelines. After signing consent, purposive sampling was initially used to recruit the nurses and then theoretical sampling was used as analysis progressed. Interviews followed a semi-structured guide with two broad questions related to the overarching research question:

1. Please describe your work using telehealth technology in nursing practice and in providing care to patients; and
2. Please describe a patient care situation using remote patient monitoring where you felt you really knew the patient.

The first two interviews used these questions with probes to gain an in-depth understanding of responses, and in subsequent interviews nurses were also asked what *knowing the person* meant to them. With each successive interview, the direction of questions and probes were refined based on theoretical sampling as codes and categories evolved. In second interviews, questions specifically explored parameters and properties of evolving categories. As categories evolved, feedback on early conceptual models was obtained from participants.

All interviews were recorded, transcribed verbatim, reviewed for accuracy and identifying information replaced with alphanumeric codes. Memo writing and analysis began immediately with initial coding of first interviews, and continued concurrently with data collection throughout the study. A literal line-by-line coding approach that used gerunds and *in vivo* codes was employed in initial coding for the first five interviews to enhance immersion in the data and to capture nuances of participant descriptions (Charmaz, 2014; Glaser, 1978). There were a total of 1,434 initial codes at this stage that were refined to 58 focused codes using constant comparison within and between the first four interview transcripts.

Early categories evolved during the next analytical step of theoretical coding, and higher category conceptualizations were achieved as constant comparison, memoing, clustering and free writing progressed (Charmaz, 2014; Nagel, 2014). Although the core category *Getting a Picture* was not formalized until 18 first interviews had been analyzed, a theme of having an image or visualizing the person in a holistic sense was frequently represented in participant descriptions as *in vivo* expressions such as “painting a picture”, “looking at the whole picture” and “put[ting] a

puzzle together". A final theoretical model was developed with integration and abstraction of categories through constant comparison, sorting and resorting key components of the conceptual model.

4.2.1 Reflexivity and Qualitative Rigor

Memoing, free-writing and methodological notes were used to capture thoughts during data collection and analysis, and to reflect on our relationship with the data and phenomenon of interest. These strategies served as an audit trail to support credibility, dependability and confirmability of this study (Carnevale, 2002; Lincoln & Guba, 1985). Credibility was supported through a form of member-checking where, mainly in second interviews, nurses were asked for perspectives on evolving categories and early conceptual models (Carnevale, 2002; Charmaz, 2014). Theoretical sufficiency was attained to enhance credibility through exploration of category properties in later interviews. Theoretical saturation was reflected in thoroughness of data collection, number of interviews and through theoretical sampling to enhance dependability (Carnevale, 2002; Charmaz, 2014; Chiovitti & Piran, 2003). Transferability of findings was facilitated through in-depth description of participants, settings and technologies reflected in this study, including demographic information of the nurses.

4.3 Findings

Getting a Picture evolved as the core category, originating from the nurses' descriptions of knowing the person when using RPM and other forms of technologies to deliver care in a VE. *Getting a Picture* was comprised of seven main processes and 21 sub-processes, and reflected complex and dynamic activities the nurses undertook to know the person (Table 4.1). The main processes are the key concepts depicted in the theoretical model *Getting a Picture* (Figure 4.1) and represent integrated and iterative processes nurses engaged in to develop a contextualized and holistic mental representation of the person.

4.3.1 Knowing the Person in a VE

Where RPM was the primary technology used in VEs, *knowing the person* was often framed by nurses as an attempt to get a holistic sense of the individual that extended beyond receipt of biometric data and answers to programmed questions. This included other dimensions of health, such as mental well-being, and environmental factors that affect the person, such as

Table 4.1 *Summary of Properties and Dimensions for Sub-processes in "Getting a Picture"*

Main Processes	Sub-Processes	Properties and Dimensions
Entering In	Recruiting and Admitting to Program	• Referrals were initiated either formally (e.g., electronic or faxed form) or informally • Informal referrals were typically from nurses or healthcare providers within collaborative healthcare settings • Nurses in some settings actively recruited patients to the program
	Obtaining Consent	• Consent for RPM service provision was either signed or informal (i.e. verbal or implied) • During consent nurses often assessed the person's fit to program criteria such as suitability for technology use; some programs had third-party non-nurses assess the person
Connecting With the Person	Having a Face-to-Face	• Some programs augmented RPM service with face-to-face encounters between nurse and person through home or outpatient clinic visits, and/or with video cameras in the home
	Making the Connection (Plugging In)	• RPM systems transmitted data (e.g., biometric) to other technologies • Connectivity was required between computer programs and peripheral devices • Knowledge, skill and ability to use technologies were required by nurse and the person
	Building and Maintaining Relationships	• Enhanced nursing skills were required to facilitate effective communication, establish a therapeutic relationship and assess the person through technology particularly when face-to-face visualization not possible (e.g. lack of non-verbal cues)
	Being in Synch	• Real-time exchange of data (e.g., biometric values) facilitated clinical decision-making • Asynchronous exchange of data delayed receipt of information and decision-making process
Sharing and Reviewing Information	Reading the Person	• Computer monitors (e.g. RPM displays and EMRs) were used to view the person's data • Some used parallel paper documentation systems and external information added to VE
	Programming Parameters and Questions	• Programmed ranges for acceptable biometric data and questions were guided by clinical protocols and/or physician consultation • Discretion to adjust ranges and select questions varied according to program mandate

Main Processes	Sub-Processes	Properties and Dimensions
Sharing and Reviewing Information (continued)	Collaborating With Others	• External collaboration of nurses mainly occurred with physicians, specialists or other nurses • Internally nurses collaborated with other health providers • Information sharing often occurred using other technologies (EMRs, fax, emails, telephone)
	Having Faith in the Information	• Trust in veracity of information transmitted by the person was deemed essential to practice given it informed clinical judgments and decision-making • Information accuracy was influenced by technology errors (e.g. device calibration), human factors (e.g. correct use of technology), and timing (e.g. consistency in transmission of data).
Recognizing Trends and Patterns	Establishing Baselines	• At admission, usual values for person's biometric data and general health were established • Not always static; required evaluation and adjustment with changes in the person's health
	Comparing and Contrasting	• Dynamic process to identify changes in biometric values, health and behavior over time • Relationships between person's data, events and context were evaluated • Findings were used as part of clinical decision-making and often triggered alerts
	Responding to Alerts	• Priority setting and decision-making for system alerts were informed by previous knowledge of the person, type of alert (e.g. BP, weight), number of alerts, and/or other information.
	Doing a Re-Check	• Biometric data was retransmitted by the person to re-evaluate verify accuracy of previously transmitted data when there was, a failed transmission or change in the person's health
Recording and Reflecting	Contextualizing the Person	• The person was considered in a broader context of determinants of health (e.g. home environment, social structures, knowledge level and motivations)
	Imagining the Person	• Formation of a mental image of the person (e.g. appearance, physical location) • Nurses pictured the person's broader health and wellness status

Main Processes	Sub-Processes	Properties and Dimensions
	Documenting Interactions and Activities	• Trends, interactions, interventions and other aspects of care for the person were recorded • EMRs facilitated documentation in many settings with some having parallel paper charting • Used as reference in planning care, decision-making, and sharing information with others
Putting Pieces Together Over Time	Knowing Over Time	• *Getting a Picture* of the person evolved over time • Influenced by program mandate (e.g. time in programs ranged from 7 days to 6 months) and the type and capacity of technology (e.g. video camera, real-time encounters)
	Navigating Technology	• RPM was often used with other technologies (e.g., fax, telephone, emails) and at least one other computer system (e.g. EMR) requiring use of more than one computer monitor • Nurses required technological skills and knowledge to navigate various systems
Transitioning Out	Transferring Care	• Care of person is either temporarily or permanently transferred to other healthcare providers (e.g. emergent referral to hospital) or to another telehealth program (e.g. geographical move) • Temporary transfer may result with person (re-) *Entering In* at another time
	Discharging from Program	• Discharge occurred when health goals were attained (e.g. ability to self-manage chronic illness), care was permanently transferred or the person died • Person was deactivated from the RPM program with final notations made in RPM system, the EMR, and/or paper chart

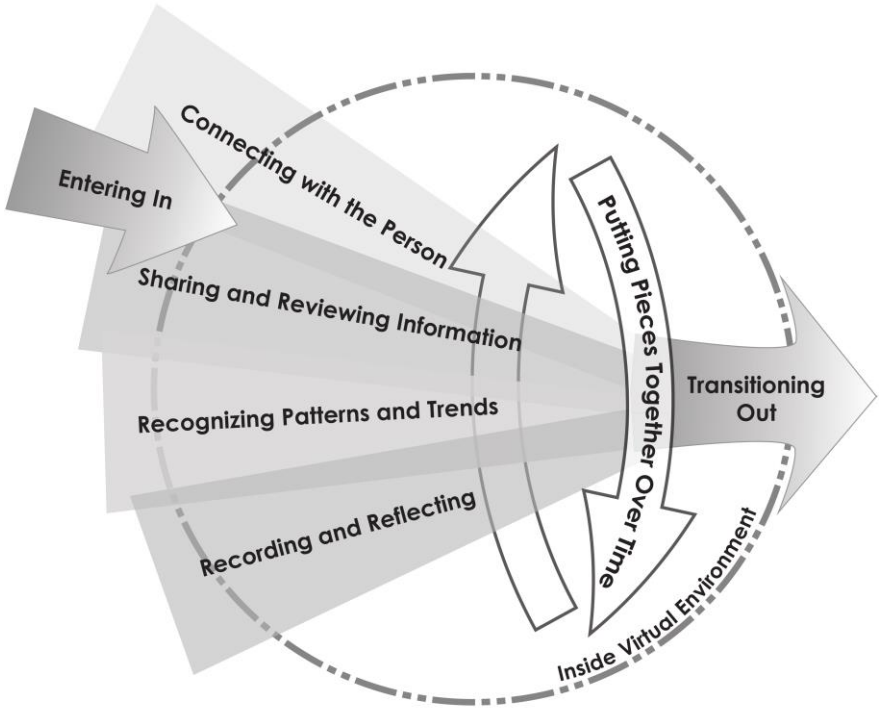

Figure 4.1 Theoretical model of grounded theory entitled *Getting a Picture: Nurses Knowing the Person in a Virtual Environment*

home and community. In a number of situations, nurses stated that discerning specific determinants of health that impact the individual was important to knowing the person, including socioeconomic status, education, social support and geographical location. As described by one nurse:

> Knowing the person to me is having a good understanding or a visual of all aspects of that person…you know, their physical, their mental, their psychosocial health. Who do they have in that family that is supportive of them? Are they alone? What are their finances?

In relation to appreciating the person as a whole and knowing the person, either having a visual sense or getting a mental image of the person was deemed important. A

nurse who used RPM in conjunction with the telephone, but had no visualization of the person, stated:

> …for all my patients I have this image I make and when you're asking those questions - it's like a puzzle…you're asking those questions and you put one and another piece in the puzzle and eventually one day it will be complete.

Nurses identified knowing the person as important to facilitating person-centered care and in creating collaborative partnerships with the person to support the person's self-management of his or her health condition. This was reflected in mutually negotiated goal-setting for making lifestyle changes, such as increasing physical activity or modifying diet, and fostering self-monitoring of biometric parameters and medication management. As one nurse described "…our care is patient-centered so they are the goal drivers and the directors of their care…we want a partnership where you're helping us keep yourself out of the hospital and keep yourself as well as you can." Nurses also identified knowing the person as being essential to making clinical decisions in nursing practice, such as to how and when to plan a nursing intervention. Another nurse stated:

> I'm assessing what's important to them. Is this the right time to share information? Is this the right time to do an intervention? Is this the right time to get them to tell me you know what their concerns are and what they've learned?

4.3.2 Getting a Picture: A Core Process for Knowing the Person

Visualizing a holistic and contextualized mental image in *Getting a Picture* involved a dynamic exchange of information between the nurse, the person and other sources within and from outside the VE. However, the process of knowing the person could not be isolated as strictly occurring within the VE since often information was gained collaterally to the use of technology. For instance, face-to-face interactions between the nurse and person occurred in outpatient clinics or during home visits, and information from these interactions were usually recorded in, and shared through, an EMR. The need to attain a visualized sense of the person within the context of his or her situation was represented throughout most interviews with nurses where RPM-specific technologies were employed, whether or not video camera capacity or face-to-face encounters were a part of telehealth service delivery. References to either

assembling a puzzle or creating a picture were frequent themes described throughout the interviews. One nurse stated "I want to know their haemoglobin just so I know if they're weak or dizzy. I can kind of paint a better picture if I know the other pieces of the puzzle before I talk to them."

The amount and depth of information available to the nurse in *Getting a Picture* varied across telehealth programs and was influenced by the mandate of the program, capacity of the technology and length of time the person was in the program. For instance, a RPM program to monitor individuals on post-operative discharge would only follow the person for seven days, limiting the time in coming to know the person, but had the benefit of a video camera to provide a real-time visualization of the person. Nurses identified that achieving a whole, or complete, sense of the person was requisite to *Getting a Picture*, and clarity of the picture was essential to provide appropriate nursing care when using RPM and other technologies. Thus *Having a Clear Picture* evolved as one property of *Getting a Picture*. One nurse stated "It all paints a clearer picture because I'm just having a few thoughts. We see their respiration rates are up and their pulse is up and their sat [oxygen saturation] is low and they're having more shortness of breath."

Achieving a complete and clear picture also entailed *Having all the Pieces* to inform clinical-decision making and to guide nursing interventions. In the words of a nurse who used RPM within the context of an interdisciplinary team "It's like all the puzzle pieces…you can sit around this table at rounds and just get such a picture that you can't get in the hospital." This statement also illustrates how processes in *knowing the person* shifts between inside and outside of the VE as information gleaned at rounds would supplement information being shared by the person through RPM. This information would often also be recorded in an EMR.

Getting a Picture of the person in a VE was a very iterative and complex undertaking that required nurses to access various pieces of data, seek additional information, and engage skills of clinical reasoning to synthesize a mental visualization of the person. Within each of the seven main processes for *Getting a Picture* were a number of sub-processes that the nurse further undertook to attain the visualization.

4.3.3 Entering In

Entering In is the first step in the process of knowing the person in a VE, and was realized through sub-processes of *Recruiting and Admitting to Program* and *Obtaining Consent*.

Entering In spans the main processes of *Connecting with the Person* and *Sharing and Reviewing Information* (Figure 5.1), since the nurse may have had a prior relationship with the person (e.g. homecare nursing visits), met the person in a clinical visit, or received information about the person before making a connection with him or her. Major considerations that needed to be satisfied during *Entering In* were fit of the person with the program mandate, appropriateness of RPM for the person, and securing consent of the person before using RPM and other technologies.

In *Recruiting and Admitting to Program*, either a referral process would occur whereby a request was made to have a person followed by RPM or the nurse would actively seek individuals to participate in the RPM program. Receipt of a referral was one beginning point to knowing the person on admission, as the nurse would receive some initial information on the person. However, the amount of information received was quite variable, ranging from basic demographics to a more robust health history on the person. As one nurse noted:

> It depends where the referral is coming from. If it's from a family doctor's office or the hospital we really don't have much information on the referral form but if they're coming from the [agency], the rapid response nurses, then we have much more information.

In all situations the nurse evaluated suitability of technology for the person as part of *Entering In*. Ability of the person to use the technology and safety of the person when using the technologies in the home was articulated across interviews. One nurse stated:

> There's different things that we have to consider…I notice people who have to step onto the scale have been a falls risk issue so we really have to look at the whole person to figure out who would be best suited to use the [remote] monitors.

Most frequently an initial assessment to determine eligibility for a RPM program and *Obtaining Consent* were done by telephone, particularly in rural areas – this is one example of the overlap of *Entering In* with *Connecting With the Person*. Where home visits were part of the RPM program, the nurse would do an assessment of the person and home environment to ensure fit and safety of technology use. However, in some programs the assessment of the person for fit and safety was conducted by a third party who was not a nurse or other health professional, such as an auxiliary support person or a technician.

4.3.4 Connecting With the Person

Nurses described *Connecting With the Person* in literal and figurative terms as a process achieved through four interconnected sub-processes: *Having a Face-to-Face*, *Making the Connection* (*Plugging In*); *Building and Maintaining Relationships*; and, *Being in Synch*. These sub-processes relied on a blend of interpersonal engagement between nurse and the person, an intact link through technology, and requirements of skill and knowledge to use technology by both the nurse and person. A sense of the interplay between these sub-processes was described by one nurse who used RPM with a video camera:

> I go into the audio and if they're using their computer I can do the video and the audio at the same time in sync. I can see them and I can talk with them at the same time so when I'm looking at them on the screen I can see their body language. I'm asking them questions I'm looking at the way that they respond to me.

One literal connotation for *Connecting With the Person* was *Having a Face-to-Face*, where the nurse used RPM with video camera capacity and/or met the person in either the clinical settings or during home visits as part of admission to the program. *Having a Face-to-Face* could occur during *Entering In* or throughout on-going care. But there were programs where nurses never had any face-to-face interaction with the person. Although many nurses regarded having a face-to-face encounter at some point during care provision as ideal when using RPM, some nurses said a holistic sense and mental image of the person could be achieved over time with use of other technologies and through other collateral information. One nurse, who combined RPM with home visits, said:

> …we do have the best of both worlds in terms of having virtual and obviously a live environment to go into and that's where we really do gain a lot of our knowledge and insight into what's going on with these patients.

Other literal connotations of *Connecting With the Person* were establishing connections with the person through technology represented by transmission of information through RPM, face-to-face encounters mediated through a video camera, and/or conversations by telephone. These connections in VE were influenced by a number of factors, including type of technology used, function of the equipment, quality of data transmission, and timing or synchronism of the information exchange. For example, the infrastructure available to support technology, such as in

rural and remote areas, often limited the type of RPM system used since older models of equipment reliant on landlines had limited capacity for data collection. In these situations use of video cameras might not be possible and, further, breaks in landlines prevented or delayed transmission of data.

The figurative connotation of *Connecting With the Person* represents interpersonal elements of the therapeutic relationship between nurse and person that spanned from the initial interaction through to discharge from the telehealth program. While an initial interaction may take form as a face-to-face encounter outside of the VE, in many programs the first connection was through use of telephone or video camera. Types of technology, telehealth program model and timing were described as important to establishing a relationship with the person, particularly in terms of developing trust and sense of presence. As one nurse stated:

> …I think about what 'knowing' the person is aside from the environment in which I work or the remote monitoring capabilities of the environment in which I work. I personally think 'knowing' the patient requires a presence. It requires mutual exchange of communication - by communication I mean the use of words.

The sub-process *Being in Synch* particularly underscores a crucial temporal aspect to knowing the person in a VE with respect to timing of transmission and receipt of information by the nurse. Timing influenced the chronological flow of clinical decision-making, such as priority setting and interventions. For instance, whereas a few nurses had video and audio real-time connections with the person, most RPM services did not have these components and nurses received the information at some point after the person submitted it. As one nurse stated in relation to programmed questions "It's because the questions that we ask are about the previous day… like the last 24 hours, so by the time I talk to this guy he's already having some shortness of breath for 24 hours."

4.3.5 Sharing and Reviewing Information

The exchange and appraisal of information within the VE, whether through RPM or other information and communication technologies, is a key process to *Getting a Picture* since it is this data that become the "puzzle pieces" needed to form a holistic and accurate mental image of the person. This key process is *Sharing and Reviewing Information*, and is reflected in the sub-processes of *Reading the Person*, *Programming Parameters and Questions*, *Collaborating with*

Others, and *Having Faith in the Information*. With RPM, the main source of information is provided by the person in the form of specific biometric data and/or questions programmed in the RPM by the nurse. Other information may be shared by healthcare professionals when a referral is made to the telehealth program, by a person's caregiver through a telephone conversation, or by the person in a clinic visit. Thus the exchange of information can be multimodal, flow between the inside and outside of the VE, and have a temporal element. Once information is received, the nurse would: (a) retrieve and view the information; (b) review RPM system alerts; (c) make a determination as to appropriate parameters for system alerts; (d) share information as necessary with other healthcare providers; and (e) judge the accuracy of the information.

In relation to programming biometric parameters as part of *Programming Parameters and Questions*, one nurse noted "…if a person typically is 90/50 you wouldn't want that alerting every time because that's their normal blood pressure. So in that case I would have to set the parameters lower." Another nurse described application of clinical judgement and flexibility when programming questions:

> It might be "Are you more short of breath than usual? Are you more tired? Are you coughing more?" You know, problematic questions for them that they need regarding their symptoms. So you sort of decide depending on each patient.

Without an actual visualization of the person, the nurse is dependent on the person and/or caregiver to ensure data transmitted through RPM is collected in a consistent manner each time and originates from the person receiving care. As recalled by one nurse, the "…patient had weighed himself and he had a huge weight gain and when they called him, it was Easter weekend and he was wearing a bunny suit (laughing). So they pieced together what his big weight gain was." One nurse described collaboration with a caregiver in the home where RPM included use of a video camera, saying "We'll ask the caregiver if they can check for swelling…we can watch them on video to make sure they're doing it right and we can kind of see it ourselves, too."

4.3.6 Recognizing Patterns and Trends

Nurses described various integrated steps for comparing biometric data at various collection points in time, determining timing and sequences of events in relation to transmission of biometric data and answered questions, and deciding the need for further assessment.

Together, these integrated steps are conceptualized as *Recognizing Patterns and Trends*, and are reflected in the sub-processes of *Establishing Baselines*, *Comparing* and *Contrasting*, *Responding to Alerts* and *Doing a Re-Check.* The iterative aspect of these sub-processes was evident as nurses articulated how *what* they already knew of the person was considered in the context of changing data values over time. For example, the nurse might make an association between a person's increased weight and blood pressure on Monday morning to a routine of having pizza dinners on Saturday nights. This example illustrates recognition of a pattern, where a change in biometric data or other dimension of health status may often be linked as an outcome to some event or situation; nurses noted that such patterns would be mapped out over time. In comparison, a trend was described by nurses as a change of data over time. As one nurse said:

> …seeing [weight] trending go up then that's something I need to connect with the patient about. "We're seeing your weight slowly increasing. Can you tell me what you've been eating? What do you have in your food? What's in your fridge?"

To identify patterns and trends, all nurses described processes of evaluating biometric data, answers to programmed questions and other sources of information by comparing and contrasting values at different time intervals. Most often comparisons were made to an established baseline, but also to other points in time, such as when there might have been a change in health status, a change in medication or a significant life event. As one nurse said:

> …we watch their vital signs and we watch - it's like a telemetry - their heart rhythm for a few minutes just to make sure everything looks good and we compare it day-to-day. We watch their weight as well so if their weight continues to increase then we would intervene with that.

In all situations where RPM was used, values of biometric data and programmed questions that fell outside the set parameters would trigger an alert. These alerts would prompt decision-making and potential actions by the nurse reflected in *Responding to Alerts*. Although a scheduled time was arranged with each person to transmit data, occasionally an alert or some other situation would require re-evaluation. For instance, a change in the person's health of biometric values, such as blood pressure or oxygen saturations, or a failure in data transmission might prompt the nurse into *Doing a Re-check*. As one nurse noted "We frequently get a person

who is rushing to get to the monitor. Well, they're going to throw off their vital signs so they seem abnormal. Then I'll call the patient and ask them to repeat it."

4.3.7 Recording and Reflecting

Throughout the various steps in coming to know the person in the VE, nurses described how *Recording and Reflecting* occurred with receipt of information, documentation and interactions with the person for *Getting a Picture*. Many nurses described forming a mental image of the person, whether or not there had been a face-to-face with the person at some point during delivery of care. Some of the reflecting process occurred in the moment when reviewing transmitted information, while other times reflecting occurred during documentation or after work hours. These elements of *Reflecting and Recording* are categorized into three sub-processes: *Conceptualizing the Person*, *Imagining the Person* and *Documenting Interactions and Activities*. As described by one nurse who uses RPM in conjunction with telephone:

> …my reflecting actually comes usually after I've done my recording because usually I'll talk to them and then I'll write what happened and what we've discussed. And then I go back and I'm looking at what I've written and then I start to really think about needs and what else can we offer this patient. I find sometimes on the phone it's hard to think like that when you're having a conversation with people so I reflect after I've written it...

All nurses expressed a need to consider the person in a more holistic way than might be appreciated through RPM and other technologies in the VE. Although much knowledge of the person could be gained through technologies, many nurses spoke to limitations of being able to appreciate other important factors, such as home environment, social structures and the person's knowledge level or motivations. A number of nurses described an act of visualizing the person's context by incorporating previous knowledge of the person. One nurse stated:

> …it's really about me visually thinking about where they're living and what's going on. And also categorizing them into some sort of category that I have in my head about what kind of supports they may need based on my previous experience with patients who I think are similar.

In contrast, one nurse who had no previous face-to-face with a person was able to meet the individual in person later, said "I recently actually had a gentleman that I had made my image

and when I saw him I'm like 'Oh my God, it seems like I already knew him." This same nurse compared her current practice, where she had no face-to-face contact, to a previous time when home visits were part of care delivery:

> …when we were doing the home visits it was so easy to know the patient and where they're coming from. You can almost visualize them – where they are standing right now when they're talking to you because you know where the monitoring equipment is…when we just stopped the home visits, it was a little bit more challenging to know the patient.

4.3.8 Putting Pieces Together Over Time

The main process of *Putting Pieces Together Over Time* builds on the analogy of assembling a puzzle articulated by some nurses, as well as other comments referring to "connecting the dots" and "painting a picture". *Knowing Over Time* was illuminated as one key sub-process in *Putting Pieces Together Over Time* and nurses universally identified that putting pieces together required, and occurred over time. *Navigating Technology* was the second sub-process identified through nurse accounts and observations of their practice, as putting the pieces together most often entailed use of more than one form of technology; in most situations the technologies used by nurses were disparate and disconnected from each other.

One quote by a nurse who used both RPM and telephone illustrated *Putting Pieces Together Over Time* was "…you have to start to think to their religion and their practices so it's just getting those extra pieces of puzzle with each conversation you have on the phone." Another nurse using RPM to provide health coaching over six months exemplified the integrative and iterative nature of knowing the person, saying "You're always circling back, too, like you're always reviewing their information that you receive because you receive information through the 6-months that I'm with them. So it's a constant loop back to reviewing and reflecting again." Both these accounts highlight the temporal nature to the process of knowing the person.

To find and retrieve requisite information through RPM and other technologies in VEs, *Navigating Technology* was an instrumental process for nurses to: (a) connect with the person for exchange of information; (b) retrieve and review records; (c) monitor data trends; and (d) for documentation of interventions and encounters. In some settings, nurses used two computer monitors to view information from separate computer systems, while in other programs there

was a parallel paper charting structure for documentation. As described by one nurse "… I start my day by logging into three technologies. So the first one is my telehome monitoring system that's web-based, my e-mail and my electronic medical record information system and those are the three things I toggle through every day."

4.3.9 Transitioning Out

Transitioning Out represented the final step of knowing the person in a VE, and involved the sub-processes of *Transferring Care* and *Discharging from Program*. *Transitioning Out* was generally signified by reaching an endpoint in care. Most nurses described the ideal endpoint using RPM to be when goals of care had been met and there was a mutual negotiation between nurse and person to discontinue the telehealth support. However, there were situations when the person's care with RPM was either temporarily disrupted, such as an emergency admission to hospital, or permanently handed off to another telehealth program or healthcare provider. In these situations, *Transferring Care* occurred from the nurse to the hospital or new providers.

While time for *Transitioning Out* was largely determined by the mandate of the telehealth program, there was flexibility in most settings to decide when the RPM would be discontinued. For example, if a person's condition was stable and he or she was comfortable in self-managing the disease, then RPM support might be discontinued earlier. Conversely, if a person needed more time and support in self-management, a clinical decision or recommendation by the nurse might be made to keep the person on RPM. There were exceptions to this, such as post-operative follow-ups where the person was followed strictly for seven days and persons with chronic obstructive pulmonary disease with permanent home oxygen therapy who are followed for an indefinite period. Nurses also described circumstances where the person might be kept on RPM for palliative measures or surveillance, including end-stage chronic heart failure or when a person felt dependent on technology for a sense of security. In regards to optimum time on RPM, one nurse noted:

> …there's no evidence out there for the optimal duration of remote monitoring - there's none - nobody knows. We picked three months because we're looking at three months' optimization for beta-blockers and ACE inhibitors, and the ECHO is repeated at three months but there's no evidence for that. Our transitioning is fairly flexible and also very individualized.

The final process in *Getting a Picture* is *Discharging from Program* where the person leaves RPM services. While steps of discharge varied between care delivery programs, generally all nurses would record final notations into the EMR and/or paper charting documents and deactivate the person from the electronic database for the RPM program. In most settings there was communication of the person's discharge with other healthcare providers, whether formally with prepared discharge summaries, by other means of electronic communications, or verbally through telephone conversations. Nurses described situations where the person may be re-admitted back to the RPM program after *Transferring Care* to the hospital, and so the person would re-enter the VE beginning the process with *Entering In* again.

4.3.10 Getting the Wrong Picture: Limitations to Knowing the Person

In addition to the theoretical model, nurses described getting a mental image or sense of a person that was not accurate. In one situation a nurse met a person face-to-face after months of providing service through RPM and telephone calls and discovered that the person's physical condition was more deteriorated than what the biometric data and answers to questions indicated. In another situation, a nurse realized not knowing the person's ethnicity and culture had implications for dietary and lifestyle counselling. In retrospect, this nurse said she would have changed her approach to assessment and health education focus had she known these details of the person, and illuminates a significant limitation of *Getting a Picture* purely through mental imagery. *Getting the Wrong Picture* was represented by one nurse who said:

> …definitely developing a picture and it is mental in a lot of ways. If I'd never met someone I actually think I know what they look like and then I'm so shocked when I do actually see them (laughing). They're nothing at all like what I thought they'd be like.

In cases where assessment of the person and home environment was outsourced to a third party who was not a healthcare professional the nurse may never have a face-to-face with the person and was dependent on this party's judgment of the person's suitability for the RPM program. A main concern expressed by nurses was verifying safety and appropriateness of technology for the person. Another nurse highlighted the limitation of RPM and lack of being able to know the person when covering the caseload of other nurses and healthcare providers (e.g. respiratory therapists), saying, "If you could get a visual then to me that's huge…on the

weekends if you don't know the person and you're looking at these numbers and you're looking at the questions and the alerts, what does that really mean?"

4.4 Discussion

In our grounded theory, *Getting a Picture* evolved as the core category for nurses coming to know the person in the VE when using RPM and other technologies. This study built upon knowing the person as a theme in other studies to more directly explore knowing the person as a specific phenomenon in the provision of care using telehealth technology. *Getting a Picture* encompassed a dynamic and iterative integration of seven main processes and 21 sub-processes, whereby nurses synthesized various sources of data to generate a mental image of the person. The importance of knowing the person in nursing practice through building a therapeutic relationship to facilitate decision-making was affirmed by nurses using RPM and other technologies in this study. Knowing the person was defined by participants as gaining a holistic sense of the person that transcended biometric data and other physiological aspects of the individual to include additional determinants of health, such as socioeconomic status, culture and education level. Nurses also expressed that not getting an accurate visualization when coming to know the person with RPM had negative implications in providing care, such as affecting clinical decision-making that could potentially compromise the well-being of the person.

Forming a visual image of the person when using technology has been previously reported in the context of providing care using telephone (Romero, Angelo, & Muñoz Gonzalez, 2012; Röing, Rosenqvist & Holmström, 2012; Purc-Stephenson & Thrasher, 2010). Similar to *Getting a Picture*, nurses developed some form of a mental image of the person based on data received through technology, whether or not an actual face-to-face encounter occurred. For example, in their grounded theory study, Romero et al. identified *Constructing Interaction with the User* as being where nurses and midwives "construct the image of the user's reality" (p. 696), recognizing that the provider and person meet in a psychological space. Röing et al. also found that nurses developed a mental picture of their callers in telephone communications as a means to enhance patient safety in telenursing. Purc-Stephenson and Thrasher's theoretical framework for a decision-making process from a meta-ethnography of nurses' experience with telephone triage outlined how nurses create "a mental image of the caller and their situation" (p. 490) to determine urgency of the issue and advice to be provided to the person.

Locsin (2009) spoke to "painting a clear picture" that enables "mutual knowing of persons as participants in their care rather than objects of our care" (p. 378) when he presented a conceptual model of technology use in nursing practice and articulated *technological knowing* as a requisite competency for nurses. The clear picture Locsin described includes information of the person availed through technology that "cannot be appreciated as real when using human sensory mechanisms" (p. 387). Nurses who use RPM and similar technologies rely on transmission of accurate digital data, such as blood pressure and oximetry measurements, to facilitate *Having a Clear Picture* of the person. However, these aspects of the person provided to nurses through technology, such as biometric data and ECG rhythms, are only a representation of the real (Locsin, 2009). Thus, the nurse's capacity to construct the person's reality in a holistic mental image depends upon being both able to interpret technological representations and to derive an abstraction of the person. This supports the requirement of competencies for use of telehealth technologies, such as RPM, in clinical nursing practice. Adapting pre-existing nursing skills, and acquiring new knowledge and skills for use of RPM and other technologies becomes imperative to facilitate nurses *Getting a Picture* and knowing the person (Arnaert, Beaulieu, Nagel, & Gabos, 2012; Locsin, 2009; Nagel & Penner, 2016; Purc-Stephenson & Thrasher, 2012).

In *Getting a Picture*, nurses valued knowing the person as part of a holistic person-centered approach to care and regarded digital biometric data as a discreet piece of a larger puzzle or picture. Particularly, nurses who used RPM to support persons in the management of chronic disease described having a holistic image of the person essential to developing trust and presence to facilitate goal-setting and negotiate interventions with the person. This was highlighted in the main process *Connecting With the Person* where nurses strived to establish interpersonal connections through relational practice to actively engage the person in decision-making and self-management of their health concerns. These actions by the nurse support the person being a participant in his or her care (Locsin, 2009). For instance, in our study RPM was used by nurses to support health coaching in two telehealth programs. Health coaching is a strategy to engage and motivate individuals in changing lifestyle behaviors to promote health and wellness, and is predicated on a client-centered partnership and mutually negotiated, health-focused goals (Kivelä, Elo, Kyngäs & Kääriäinen, 2014; Olsen, 2014). Nurses in our study

described using what they knew of the person, such as the person's goals and social supports, with RPM data to enhance the person's capacities in managing his or her own health concerns.

A strong temporal element to *Getting a Picture* was also expressed by nurses, specifically the importance of time required to assess and appreciate multiple dimensions of the person. Two particular aspects of this temporal element were the duration of each discrete encounter in the VE and knowing the person over time to get all the pieces of the picture. This finding is congruent with perspectives from the literature that highlight the need for time to build relationships based on trust, or to obtain sufficient information for clinical decision-making when technologies are used to remotely engage and assess the person (Purc-Stephenson & Thrasher, 2012; Röing et al., 2012; Shea & Effken, 2008). While Locsin (2009) theorized that knowing the person well is predicated on the amount of time nurses interact with the person and the perception that technologies are used "in order to know patients more fully as persons" (p. 385), findings in *Getting a Picture* illustrated some constraints to knowing the person related to mandated duration of care in RPM programs and limited capacity of many RPM technologies. Optimum timeframes for RPM as an adjunct to nursing care and the relationship of this to the varied capacities of RPM technologies to achieving a mental image of the person need to be further explored to better facilitate *Putting Pieces Together Over Time*.

4.4.1 Competency Development for Nursing in a Virtual Environment

Development of knowledge and skills for nurses to use RPM and other technologies is essential for nursing practice in telehealth since these technologies promote a fundamentally different form of care delivery (Nagel & Penner, 2016; Romero et al., 2012). Nurses in this study described navigation of technology, making interpersonal connections and developing a mental image when *Getting a Picture* of the person; these activities required development of knowledge and skills through education, training or other support. Locsin (2009) describes technological competency as an imperative to knowing the person, and is exemplified by a harmonious use of technology use with nursing care as an expression of caring. While competencies broadly encompass knowledge, skill, judgement and attributes required of nurses in the execution of safe and ethical practice (Black et al., 2008), scant literature exists on understanding how these competencies apply in the context of knowing the person in VEs, particularly as it relates to interpretation of digital data and the development of a mental image.

Romero et al. noted there was an impetus for professionals to strengthen care in delivery of services using telephone by adapting skills to better convey sensitivity and a sense of presence, which was facilitated by replacing the physical space with a constructed image. This psychological space can be seen as a parallel space to the VE, both spaces which the nurse must draw a figurative "meeting" of the person and the person's data to construct the mental image.

Although many competencies for telehealth practice can be based on pre-existing general nursing knowledge and skills, adaptation of these knowledge and skills requires formal preparation for the nurse's transition to telehealth practice (Arnaert et al., 2012; Greenberg, 2009; Purc-Stephenson & Thrasher, 2010; Romero et al., 2012). Purc-Stephenson and Thrasher noted that assessment skills used in face-to-face encounters could be transferred to care by telephone, however they found "specific training in telephone consultation, assessment and decision-making" (p. 492) was required to develop the necessary skills in telehealth. Further research is required on competency development for interpretation of digital data, mental imagery and technology use by nurses to support practice with RPM and other telehealth technologies. In addition, further research and development is required to better understand the relationship of human factors and nurse interactions with technology to enhance *Getting a Picture* in the delivery of care in a VE.

4.4.2 Intersection of Nurse and Technology: Human Factors Engineering

According to the nurses in this study using RPM, *Getting a Picture* as the process to knowing the person in a VE required *Having all the Pieces* and *Having a Clear Picture*. These dimensions were dependent on the nurse's competency to navigate the technology, but also on her capacity to draw on fragmented data sources from numerous disparate digital technological systems. This fragmentation is related to lack of *interoperability*, a term defined as "the ability of people, organizations, and systems to interact and interconnect so as to efficiently and effectively exchange and use information" (Baird, 2007, p. 223). Specific to *Getting a Picture*, semantic interoperability, where RPM systems seamlessly connect and "speak" to other technologies (Baird, 2007; Ganguly, Ray & Parameswaran, 2005), seemed to present a challenge to nurses by requiring them to shift between various technologies to get information necessary to know the person. Lack of interoperability between technologies is believed to have an impact on quality of care and health outcomes for the person due to increased potential for missed

information and placing demands on both the cognitive and social/behavioral performance of healthcare providers (Karsh, Holden, Alper & Or, 2006). Karsh and colleagues note cognitive and social/behavioral performance in relation to technology include elements such as searching (e.g. for information), imaging, analyzing, interpersonal communication and decision-making that play a role in affecting patient safety and quality of care.

This relationship of human performance and technology is a major dimension of human factors engineering, also referred to as ergonomics, an area of science that focuses on studying and improving the design of technology for use by people (Carfazo & St-Cyr, 2012; Gurses, Ozok & Pronovost, 2012; Russ et al., 2013). The aims of human factors engineering are to understand the relationship between humans and technology, support human performance when using technology and reduce risk of errors when using technology (Carfazo & St-Cyr, 2012; Gurses et al., 2012; Russ et al., 2013). *Getting the Wrong Picture* in our study is an example where there was a risk for error when the nurse's performance in using RPM is limited by knowledge, workflow, and capacity of technology (e.g. interoperability and design). These factors influence the nurse's ability to navigate technologies, interpret digital data and connect with the person to develop a clear and accurate image of the person (Karsh et al., 2006). This underscores the interplay between requisite competencies for nursing practice with technology, the design of technologies as it relates to human factors engineering, and the interoperability of technologies in the healthcare settings.

4.4.3 Refining the Picture of the Person in a VE

Getting a Picture provides a grounded theory to inform current nursing practice specific to knowing the person primarily with use of RPM for delivery of care in a VE. With a view to enhancing care using RPM and other telehealth technologies, and to advance the clarity and accuracy of visualizing the person in a VE, further research and knowledge development is imperative to support nursing practice, education, and optimization of technology design. *Getting a Picture* currently reflects knowing the person within the domain of direct nurse-patient care in a clinical context, however nursing encompasses a broader scope of practice and activities where knowing the person occurs in a VE. For example, nursing education increasingly uses digital technologies to provide courses through web-based online seminars and digital classrooms where facilitation of a personal connection through face-to-face interactions is

often desired (Lasater et al., 2014). Teleconferencing and videoconferencing technologies are frequently used in the research and leadership domains of nursing practice to facilitate communication and collaboration in nursing initiatives. It can be reasoned that *Getting a Picture* has applicability and utility in these areas of nursing practice, where knowing the person extends to include students and other nursing colleagues.

While *Getting a Picture* can be further explored in other contexts of nursing practice, it should also be more fully studied in clinical practice settings where other types of digital technologies are used in a VE, such as email communications, telephone, videoconferencing and, potentially, social media. RPM was the main focus in our study and, while there was crossover with other communication modalities and EMRs, more formal explorations of *Getting a Picture* in the context of these other technologies can be done to determine fit, usefulness and resonance (Charmaz, 2014). As a grounded theory, *Getting a Picture* can be foundational for formal theory development that transcends knowing the person in the realm of nursing practice to encompass other healthcare professions and, potentially, beyond healthcare (Corbin & Strauss, 2008; Glaser, 1978; Glaser & Strauss, 1967).

Getting a Picture highlighted a number of key elements for care delivery in a VE that can inform curriculum, education, and practice guideline development to promote and support competency acquisition in nursing practice. Examples of these elements include relational practice in *Connecting With the Person*, required technological knowledge in *Navigating Technology*, and creating a mental image or visualization of the person from digital artefacts. As nurses have an obligation to provide safe, appropriate and optimal care, many jurisdictions have articulated competencies for use of telehealth in clinical practice (CNA, 2007; College of Registered Nurses of Nova Scotia [CRNNS], 2014; Schlacta-Fairchild et al., 2014). While some competencies, such as therapeutic nurse-client relationships and critical thinking, may be adapted from general nursing education (CNA, 2007; CRNNS, 2014), many competencies specific to *Technological "Know-How"*, *Knowing the Person* and different communication skills require adaptation or advanced preparation (Arnaert et al., 2012; Schlacta-Fairchild et al., 2014).

Additional research is also required to understand the relationship between nurses and use of telehealth technologies, particularly in the area of human factors engineering. A cursory review of the literature reveals scant publications and empirical studies reported specifically on

human factors engineering or human-computer interactions related to nurse use of RPM and other telehealth modalities. Yet to successfully support performance of users and address issues of interoperability in human factors engineering requires involvement of stakeholders, such as nurses, and research collaborations between stakeholders and human factors engineering researchers (Carfazo & St-Cyr, 2012; Gurse et al., 2012; Karsh et al. 2006) Achieving a clearer, more accurate focus in *Getting a Picture* will require more attention to human factors engineering from the nurse-as-user perspective, addressing issues of interoperability and combining all of this with adequate support in developing the nurse's knowledge, skill and attributes in the use of RPM and other related technologies.

4.5 Conclusion

Nurses described *Getting a Picture* as a complex and dynamic process in the provision of appropriate, holistic and safe care when using RPM technologies. *Getting a Picture* requires competencies over and above those currently provided in general nursing education, technology that works to enhance the nurse's performance and integration of technology systems to help bring pieces of information together to form a clear, accurate and whole picture of the person. In the dearth of empirical studies to explore nurses knowing the person with digitally mediated telehealth technologies, *Getting a Picture* offers a grounded theory that illuminates processes and considerations for provision of nursing care in a VE with RPM. While previous studies have importantly identified knowing the person as a theme in the context of telehealth in nursing practice (Arnaert et al., 2012; Greenberg, 2009), this study makes a novel contribution by focusing specifically on what it is to know the person with RPM. Furthermore, the findings from this study offer insights related to knowledge, skills and resources required for use of technology in nursing practice, and the intersection of human factors engineering as it pertains to nurses. Given the imperative for registered nurses to provide ethical, safe, and evidence-based care, *Getting a Picture* can be used to inform nursing practice, guide education and policies that support nurses who use RPM and other technologies, and guide directions for further research in technology development.

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Chapter 5

Explication of an Approach to Constructivist Grounded Theory:

The Process for *Getting a Picture*

Formatted for submission to the International Journal of Qualitative Methodology.

Abstract

Many perspectives have been offered on methods and procedures in grounded theory. Although there is literature that describes operationalization of analytical processes for well-established approaches to grounded theory, few describe methods and procedures for Charmaz's (2014) constructivist grounded theory (ConGT). ConGT draws on the works of Glaser, and Strauss and Corbin, however Charmaz presents an alternative to other grounded theory research traditions, which emphasized flexibility, creativity, the researcher's relationship to the research process and interpretation of the data. The purpose of this paper is to explicate how ConGT processes were implemented in our study, *Getting a Picture*, a grounded theory of nurses knowing the person in a virtual environment. We describe our methods and procedures for ConGT, highlighting differences to other forms of grounded theory.

Our operationalization of ConGT involved a series of five steps in the analytic process to visualize and conceptualize *Getting a Picture*. These steps included Initial Data Collection, Initial Coding, Focused Coding, Theoretical Coding and Theory Building. We present a revised schema of our ConGT processes, and provide exemplars for the steps in analysis. We also describe how reflexivity was employed in the study to reflect our influence in the research process. Key learnings for us were the degree of flexibility and creativity that can be adopted in ConGT. Sharing our perspectives and exemplars may help researchers new to ConGT in planning and conducting this approach to grounded theory research.

Explication of an Approach to Constructivist Grounded Theory: The Process for *Getting a Picture*

Constructivist grounded theory (ConGT) was proposed by Charmaz (2000) as an alternative paradigmatic methodology to grounded theory, offering a flexible, creative and dynamic approach to this qualitative research tradition. With foundations in the original works of Glaser and Strauss (1967), classical grounded theory (Glaser, 1978), and the work of Strauss and Corbin (1990), ConGT embraces a constructivist stance that highlights an interpretative element to analysis and recognizes the researcher's relationship to all aspects of the research process (Charmaz, 2014). When choosing ConGT as an appropriate methodology to explore the phenomenon of nurses knowing the person in a virtual environment (Nagel, 2014), there were few available examples describing methods and procedures for ConGT aside from Charmaz (2006). Given this gap in the literature, our study explored an important phenomenon in healthcare and provided exemplars of methods and procedures from our ConGT study that can be adopted in future studies.

The purpose of this paper is to explicate our approach to implementing ConGT processes in our study, *Getting a Picture*, a grounded theory of nurses knowing the person in a virtual environment (Nagel et al., 2016). In doing so, we provide details about the ConGT approach while highlighting how it differs from traditional grounded theory approaches. We present a brief background of ConGT in relation to other forms of grounded theory and a revised schematic of the methodological process for ConGT first advanced in the original study protocol (Nagel, 2014). We then provide a brief overview of the theory that evolved from our research to contextualize the ConGT processes used in our study. The iterative and integrated procedures used for sampling, data collection and analytical processes in our ConGT study are then described, including strategies and techniques that informed conceptualization and identification of the study's core category, *Getting a Picture*. Finally, we describe how reflexivity in the analytical processes for our study was employed.

5.1 Background to ConGT

Grounded theory is a commonly used methodological approach in qualitative studies. Since the foundational work of Glaser and Strauss (1967), various perspectives on grounded theory have evolved from the two main branches of grounded theory: Glaser's (1978) classical

grounded theory and Strauss's (1987) approach to qualitative data analysis. Glaser's classical grounded theory and the work of Strauss and Corbin (1990, 1998) have been perceived to align paradigmatically with a post-positivist view, where an objective and singular reality can be discerned by the researcher through emergence of categories from the data (Bryant, 2003; Charmaz, 2014; Staller, 2012). In contrast, Charmaz (2000, 2006, 2009) proposed ConGT as a distinct alternative to earlier forms of grounded theory that assumes a socially constructed nature of reality through co-creation of theory between the researcher and participants. ConGT also accounts for the interpretive aspects brought to analysis by the researcher, the potential for more than one perspective or basic social process, and the role of symbolic interactionism in creating meaning (Charmaz, 2014).

There are divergent views on the merits of ConGT from both philosophical and methodological perspectives, particularly by Glaser (2002a) who argued that interpretive and constructed elements of qualitative data analysis are incongruent with grounded theory. However, a major challenge in critically appraising these viewpoints is that analytic processes employed in ConGT studies have not been well described outside of Charmaz's own work. For instance, during the planning stage for our study and writing the proposal in 2013, there were few published articles that detailed methods and techniques on data collection, coding of data and other processes in analysis for ConGT. While at the time Charmaz (2006) provided some detailed description of methods for ConGT, there were scant other exemplars available (e.g. Hoare, Mills & Francis, 2012a, 2012b) that articulated how methods and processes might be operationalized. Further, there was variation in approaches to ConGT and what we read of others using this methodology compared to Charmaz (2006); this may be related to the interpretative nature inherent to a constructivist methodology to research and the flexibility advocated for ConGT (Charmaz, 2006, 2014).

5.2 Revised Schematic of Methodological Processes for *Getting a Picture*

To assist in visualizing the sequencing and interplay of data collection and analysis during development of the proposal, we created a schematic of the data collection and analytical processes for ConGT based on Charmaz's (2006) book. This schematic helped outline our intended plan for the research process and illuminated key elements of data collection and analysis for project stakeholders, such as reviewers for ethics applications who often are

individuals with quantitative research backgrounds (Luckerhoff & Guillemette, 2011; Staller, 2012). However, our data collection and analysis evolved differently than initially envisioned, and necessitated a revision to our original schematic. The revised schematic (Figure 5.1) informed our explication of the methodological process for our ConGT study, *Getting a Picture*.

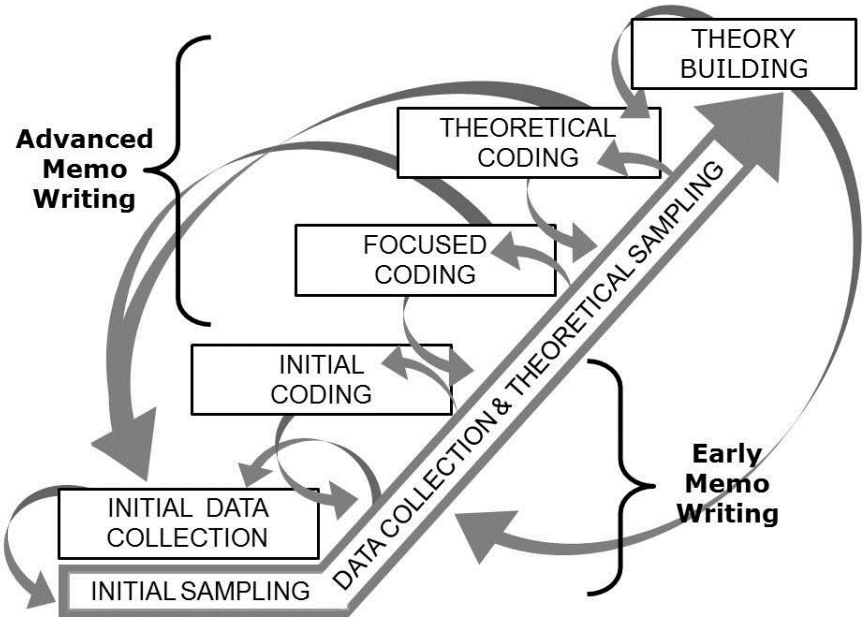

Figure 5.1 Conceptualization of the data collection and analytical processes for ConGT.

5.3 Overview of the Theory of *Getting a Picture*

Getting a Picture explored the phenomenon of nurses knowing the person in a virtual environment and primarily focused on registered nurses using remote patient monitoring, a form of telehealth technology. Primary data sources for this study were 33 interviews with 22 participants and five observational experiences (Nagel et al., 2016). *Getting a Picture* evolved as the core category in our study and described the complex and dynamic processes by which nurses developed a mental image of the person being cared for as requisite in the provision of holistic, safe and appropriate care. The theoretical model of *Getting a Picture* (Figure 4.1) illuminates an integrated and iterative interplay of seven processes and incorporates 21 sub-processes (Table 4.1) based on the accounts of nurses who described forming a mental image of the person being cared for.

5.4 Sampling and Data Collection in ConGT

Many of the methods for sampling and data collection in ConGT are similar to those in other forms of grounded theory, including a theoretical sampling approach to data collection (Charmaz, 2006, 2014). Although sampling and data collection in grounded theory are intimately linked together and, in turn, are interconnected with the analytical process (Charmaz, 2014; Etowa, Sethi & Thompson-Isherwood, 2009; Glaser, 1978; Strauss & Corbin, 1998), we only appreciated the integral relationships between these methodological processes once engaged in the early stages of the study. We now detail steps used for sampling and data collection in our study, beginning with *Initial Sampling* that Charmaz (2006) introduced as the starting point for data collection in ConGT (Figure 5.1).

5.4.1 Initial Sampling

Charmaz (2006, 2014) proposed Initial Sampling as a step in ConGT to precede theoretical sampling, since identification of data sources is required before theoretical sampling can begin. As Cutcliffe (2000) noted, prior to first data collection in grounded theory "the researcher has no evolving theory that can act as a guide for further theoretical sampling" (p. 1477). Charmaz described Initial Sampling as the process in which the researcher establishes sampling criteria before entering the field, makes informed decisions on what sources would meet this criterion and formulates plans on how to access these sources. This is similar to purposeful sampling, in that it requires the researcher to have a sense of where best to initiate data collection that fits the sampling criteria and informs the study (Coyne, 1997; Cutcliffe, 2000). However, the main function of Initial Sampling is to get the grounded theory started and to help orientate the researcher to concepts associated with the study focus (Charmaz, 2014).

A priori, we established inclusion criteria and identified telehealth programs that might potentially yield potential participants who would satisfy requirements for data collection. We also determined that interviews and observational experiences would be our initial data sources, given the nature of our inquiry. Although a large number of potential participants would have been ideal to select from in Initial Sampling, an *a priori* survey of healthcare agencies across Canada indicated the pool of nurses using remote patient monitoring technology would be relatively small; approximately 133 nurses from 11 established programs (see Table 3.1).. Following a site visit at one healthcare agency to present our research project, three potential

participants who met the inclusion criteria volunteered for the study; these individuals had varied levels of experience with remote patient monitoring and worked in different healthcare settings. These participants provided the first data through interviews and an observational experience to start our grounded theory.

5.4.2 Initial Data Collection

Charmaz (2014) was not explicit on the relationship of data source in Initial Sampling to actual data collection; the focus of her description was on the identification of materials and sources that might yield data. Thus, we included the intermediary step of *Initial Data Collection* (Figure 5.1) in our study. Initial Data Collection formed a link between Initial Sampling and *Data Collection & Theoretical Sampling*, and included audio recordings of the first three interviews, fieldnotes for each interview and the first observational experience. These would constitute the primary methods of data collection throughout our study.

A. Audio Recordings and Transcripts. Charmaz (2014) supports audio recording and transcription of interviews to preserve details of participant accounts for later review as codes develop and since rich data "can generate many research questions" (p. 136); later this would serve to help frame questions in relation to theoretical sampling. In contrast, Glaser (1998) suggested that written notes were sufficient and stated "theoretical completeness only requires those notes be written down after an interview to be later used for constant comparison" (p. 107). However, from a practical perspective we found transcripts to be essential for line-by-line coding in early analysis and served as an additional source of data for theoretical sampling during the analytical process. We also found that transcripts enhanced constant comparison during analysis by allowing us to link codes to participant narratives that facilitated evaluation of the context from which the codes originated. Although Glaser (1998) contended that recording and transcribing interviews are a waste of time, redundant and risk the loss of data, we found later in analysis that reviewing transcripts and recordings allowed us to periodically re-immerse in the data.

B. Fieldnotes. Fieldnotes are commonly used in qualitative research, and utilized across many approaches to grounded theory (Charmaz, 2014; Corbin & Strauss, 2008; Patton, 2002). Charmaz (2014) does not address specifics for use of fieldnotes or writing observation notes in ConGT, however she does emphasize the necessity of selecting data collection methods

appropriate to help answer the research question and employing techniques to gather rich data. A priori, we anticipated data collection would include fieldnotes to capture descriptive details of the settings and non-verbal attributes of the participants during interviews, and observation notes of nurses using technology in practice. Although Charmaz (2006) suggested that fieldnotes in grounded theory focus more on the phenomenon or process of study rather than describing the environment, we found later in analysis that details of participants' interactions during interviews and actions in the setting contributed to understanding processes relevant to knowing the person with use of technologies. For instance, many interviews took place in practice settings and during the interview the participant would gesture at a computer or mimic a physical process. These details would not be reflected in the audio recording or transcript, yet would comprise an important data source for analysis.

C. Observation Notes. On five occasions during the study an observational guide was used when participants physically demonstrated use of remote patient monitoring equipment and other technologies in a different care setting. Observations can be useful as a data collection strategy to complement narrative data from interviews, facilitate understanding of physical processes and to help the researcher identify new concepts to guide further data collection (Charmaz, 2014; Corbin & Strauss, 2008; Patton, 2002). Observational experiences in our study provided insight to how participants navigated technologies, internal communication channels within practice settings and provided other information to help contextualize nurse-person interactions associated with knowing the person. The documented data captured temporal and sequential aspects of participants' actions in knowing the person, which Charmaz (2006) noted "reveal visibly telling and consequential scenes and actions" (p. 50).

The fieldnotes and observation notes from the first interactions with participants were used to refine and add to the question guide for subsequent interviews; we elaborate further on this in a following section. The fieldnotes and observation notes also stimulated ideas for potential data sources to reflect other types of services and environments where nurses used remote patient monitoring. Refining the research questions, seeking participants in other settings and including variation in technology use were examples of how theoretical sampling helped us adjust our study and marked the beginning of the analytical processes.

5.5 Analytical Processes in ConGT

Hoare et al. (2012a) compared the GT analytical process to a dance with data, and this metaphor was a fit for our study. There was an iterative and dynamic interplay throughout our analytical processes as theoretical sampling and constant comparison informed collection of data and progression through three levels of coding (Figure 5.1). Theoretical sampling, constant comparison and memoing play an integral role in the analytical process for ConGT as with other forms of grounded theory (Charmaz, 2014; Corbin & Strauss, 1990,2008; Glaser, 1978). Also key in grounded theory is commencement of analysis as data collection begins, since the analytical process guides theoretical sampling and subsequent collection of data (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 1978). Our dance with data commenced with first interviews, fieldnotes and the observation note to refine interview questions and identify direction for subsequent interviews and observations. We now describe how theoretical sampling and memo writing evolved core elements of our analytical process, and explain the methods and procedures we used to navigate the levels of coding for ConGT in our analysis.

5.5.1 Theoretical Sampling

Theoretical sampling is recognized as a main feature of grounded theory and is a strategy whereby the researcher seeks data sources relevant to theory development for the study (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 1978; Glaser & Strauss, 1967). Charmaz (2014) defines theoretical sampling as the process where "…the researcher aims to develop the properties of his or her developing categories or theory, not to sample randomly selected populations or to sample representative distributions of a particular population" (p. 345). A key principle to theoretical sampling is that direction of inquiry originates from the findings collected in the data and takes place as the analysis progresses (Glaser, 1978; Glaser & Strauss, 1967).

Theoretical sampling in our study was employed immediately following Initial Data Collection when data reflected participants' belief that gaining a holistic sense of the person was important to knowing the person. For example, two of the first three participants explicitly identified understanding determinants of health that affected the health of individuals, such as education and income, as essential to both knowing the person and caring for the person. This prompted us to add a question to the interviews as to what knowing the person meant to the participant. In addition, probes were added to investigate why knowing the person was

important to the participant. Patton (2002) described the purpose of probes as being "to deepen the response to a question, increase the richness and depth of responses, and give clues to the interviewee about the level of response that is desired" (p. 372, Patton, 2002). Theoretical sampling through questions and probes helped us gain insight of knowing the person and to later expand on early categories that evolved as coding progressed. Charmaz (2014) regarded evolution of interview questions and probes as a strategy to saturate categories and delineate properties in ConGT. Theoretical sampling also guided us to re-examine transcripts, fieldnotes, observation notes and other sources we had already collected for additional insights later in the analytical process.

As our study advanced, it became important for us to determine whether knowing the person was perceived the same in different nursing practice settings and when participants were using other types of technologies in addition to remote patient monitoring. Theoretical sampling thus informed selection of participants from various agencies with different models of service delivery to explore the process of knowing the person in a broader range of virtual environments that included telephone and electronic medical records. In keeping with the intent to inductively build a grounded theory, theoretical sampling was used to develop and evolve codes, categories and the theory as the study progressed (Charmaz, 2014; Glaser, 1978, 1998). As categories began to evolve through theoretical sampling, *theoretical sensitivity* played an important role in development of theory as we gained deeper insight to the phenomenon under investigation (Charmaz, 2014; Glaser, 1978; Glaser & Strauss, 1967).

Theoretical sensitivity was defined by Glaser (1978) as the process of entering "the research setting with as few predetermined ideas as possible" and remaining sensitive to the data without filtering it through preconceived "hypothesis and biases" (p. 3). Strauss and Corbin (1990) later defined theoretical sensitivity as "the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which isn't" (p. 42). Corbin and Strauss (2008) spoke more specifically to *sensitivity*, defining it as "the ability to pick up on subtle nuances and cues in the data that infer or point to meaning" (p. 19). In comparison, Charmaz (2014) defined theoretical sensitivity as "the ability to understand and define phenomena in abstract terms and to demonstrate abstract relationships between studied phenomena" (p. 161). While theoretical sensitivity is a complex philosophical topic, common elements across the various definitions included a requirement that the researcher

be sensitive to the meaning of the phenomenon and remain open to the direction in which theoretical cues in the data guide the study.

Charmaz's (2014) view on theoretical sensitivity in ConGT is that the researcher brings his or her background and experience to the research process, and that pattern recognition and interpretation are inescapable features of socially constructed meanings that influence theoretical sensitivity. This was illustrated by our team's recognition that knowing the person, as expressed by participants in the first interviews, was potentially important to nurses gaining a holistic appreciation of the person. Such interpretation of participants' accounts related to our own educational preparation and experiences as nurses, since knowing the person as a whole multi-dimensional being is part of the nursing process (Tanner, 2006).

Role of Observation. Similar to the account of Hoare et al. (2012b), whose grounded theory adopted an ethnographic approach with observation early in their study, we found the observational experiences helped inform theoretical sampling and stimulated theoretical sensitivity in development of our grounded theory. In addition to five formal observational experiences there were other occasions to observe environments and technology when interviews took place either at, or in close proximity to, the participant's work station. Observations provided an appreciation of the work environments and ways technology were used, and guided us to theoretically sample for data sources where nurses used other types of technologies to provide care, such as telephone and video camera. Participant observation during interviews in our study also helped us to further refine or add interview questions and enhanced our theoretical sensitivity specific to the phenomenon of knowing the person.

An example that illuminates these aspects was an early observation experience where a participant navigated multiple technologies not confined to a single virtual environment; this participant used email and electronic medical records in addition to, and separate from, the remote patient monitoring technology. This participant also described use of collateral information sources outside the technology (e.g. paper documentation) and verbal interactions with colleagues which suggested to us that knowing the person moved fluidly between inside and outside the virtual environment. Through observations like this, the interplay of theoretical sampling and theoretical sensitivity became integral to identifying and graphically representing the fluidity of information flow for nurses knowing the person. With the corroborating data from

interviews, we came to understand the flow of information between inside and outside the virtual environment; our understanding of this flow became reflected in our conceptual model for *Getting a Picture* (Figure 4.1) by the overlap of main processes across the broken circle.

5.5.2 Memo Writing

Charmaz (2014) describes memo writing as being an essential element in grounded theory analysis to capture comparisons, promote active engagement with the data and "engage in critical reflexivity" (p. 163). Flexibility in memo writing with respect to style, length and focus is encouraged in ConGT; the aim is to find a method or format that works for the researcher, and to make the memos more analytical as the research process progresses (Charmaz, 2014). Charmaz distinguished *Early Memo Writing* as the stage when there is "less data and fewer codes" (p. 169) and where memos are more tentative; in comparison, *Advanced Memo Writing* would be more analytical and theoretical. From a practical perspective, the transition from early to advanced levels of memo writing was not explicitly clear during our analytical process; it occurred at some point during Focused Coding.

a. Early Memo Writing. Early memos captured reflections beginning with the first interviews and observations, and were generated from both fieldnotes and observation notes recorded in these encounters since interview transcripts were not immediately available to begin coding. Most early memos were very short notes of immediate ideas and impressions and often quite discreet, focusing on singular aspects of the data from the interviews. For example, an early memo compared use of the terms "patient" and "person" in the study:

> *In originally choosing to use "person" versus "patient" in this study, there was much back and forth as to which conceptual label to use. Clearly most of the earlier research focused on the "patient", but as Macdonald (2009) noted this label often refers to the individual in a medicalized, health concern focused way rather than in a larger holistic perspective. And this was a concern when it comes to nursing practice - we often talk about assessing and understanding the individual in a much broader holistic sense that includes the determinants of health.*

This early memo illustrated how terminology and potential labels might influence the interpretation or understanding of a concept – in this case there is a reflection of data from both

interviews and the literature. The memo also figured in the decision to add the question about importance and meaning of knowing the person to interviews.

b. Advanced Memo Writing. As coding progressed, memo writing became more detailed and sophisticated memos as they reflected relationships identified through patterns in the data and conceptualizations to higher levels of abstractions. This *Advanced Memo Writing* captured immediate thoughts that arose with constant comparison, but also posed questions and inferences from analysis to help explore concepts and early theoretical ideas in more depth. The following excerpt from an advanced memo was written during *Focus Coding* and reflects the role of observation experiences given as an example earlier in relation to theoretical sensitivity:

> *Drawing on earlier memos…I considered those focus codes which stood out as more directly related to the primary question, the relationships between these codes and the temporal sequencing in which they seem to occur. The connection to the primary question, knowing the person in a virtual environment, precludes any knowing of the person that happens outside of the technology use; certainly this knowing* [from outside], *as would happen with* ***Sharing Information*** *through* ***Collaboration with Others*** *as may happen in a "hallway consult", for instance, is very important. However, it is not occurring within the context of a virtual environment with the exception of when the nurse may retrieve information from a database, such as electronic records where documentation occurs.*

In this example, advanced memo writing captured our understanding of the fluidity of information exchange between inside and outside virtual environments; it also highlighted use and sharing of information across various technologies.

5.5.3 Navigating Levels of Coding in ConGT

Coding, constant comparison and conceptualization are key components for data analysis in grounded theory (Charmaz, 2014; Glaser, 1978; Strauss & Corbin, 1998), however these components of the analytical process are conceived differently given the constructivist paradigm Charmaz (2014) advocates. For example, Charmaz (2014) views coding in ConGT as a creative, iterative and organic endeavour by the researcher spanning three distinct levels of coding to arrive at "interpreted renderings" (p. 111). These levels of coding are *Initial Coding*, *Focused Codin*g and *Theoretical Coding* (Charmaz, 2014). In contrast, Glaser emphasized *emergence* of

categories through a meticulous process of analysis over two main levels of coding where the researcher "suspends what he knows" (Glaser, 1998, p. 81) and where latent patterns in the data become apparent from the data independent of the researcher (Glaser, 1978, 1998, 2002a). Strauss and Corbin's (1990, 1998) approach to coding is also different, as it involves an elaborate series of analytical processes that includes axial coding to link categories to subcategories and formulation of conditional or consequential matrices. We now explicate our navigation of the coding levels for ConGT as we proceeded with our analysis and provide an example of how levels of coding evolved for one main process in our study, *Entering In* (Figure 5.2).

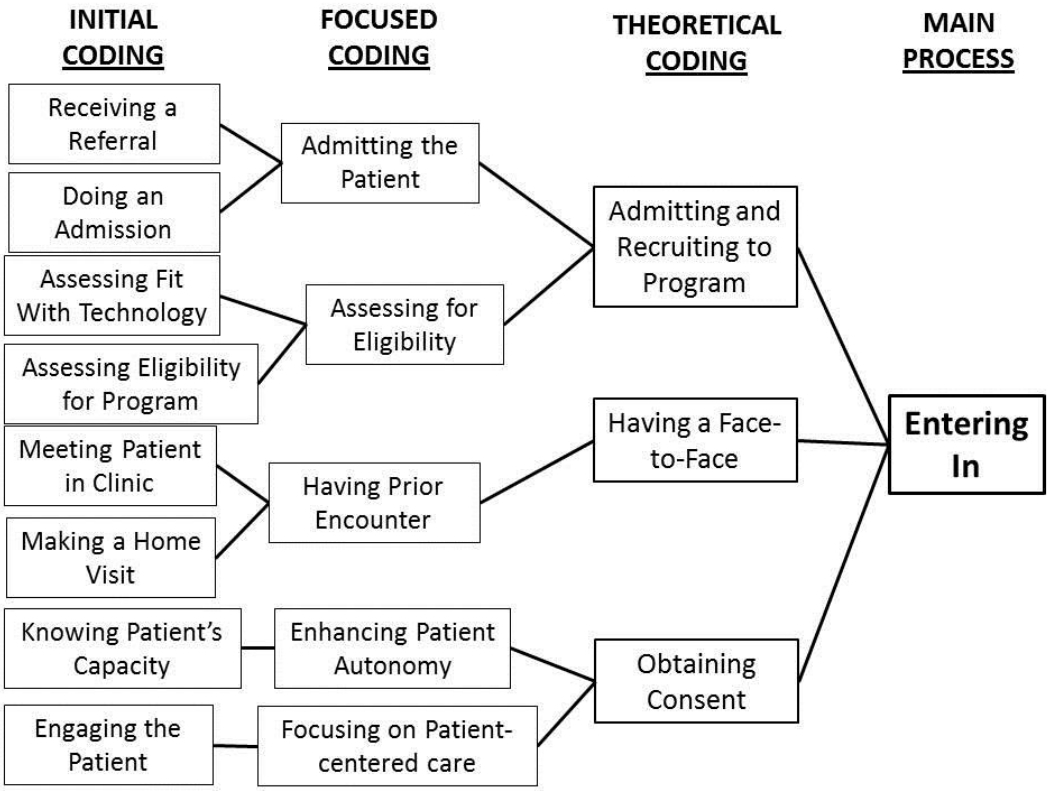

Figure 5.2 Exemplar of progression through coding levels for *Entering In*, highlighting a small sample of initial and focus codes used in the analytical process for *Getting a Picture*.

A. Initial Coding: Engaging the Data. In grounded theory, codes are foundational theoretical building blocks derived from raw data of transcripts and other sources to begin constructing theory (Charmaz, 2002, 2006, 2014; Corbin & Strauss, 1990). *Initial Coding* is the

labeling of data with codes in the first phase of the analytical process in ConGT, and where the researcher begins coding data word-by-word, line-by-line or incident with incident (Charmaz, 2014). There is no consensus across grounded theory literature as to which data unit should be used to start the coding process; Glaser (1978, 1998) speaks to both line-by-line and incident with incident, while Strauss and Corbin (1998) suggested breaking down data into "discrete incidents, ideas, events, and acts…" (p. 105). However, Charmaz (2014) suggests line-by-line coding is well suited when examining fundamental processes at the start of analysis, as it "encourages researchers to think analytically about their data and…encourages active engagement with data" (p. 343). Since a goal in our analysis was to remain close to the data, line-by-line coding of the data was seen as an appropriate fit for Initial Coding in our study.

Line-by-line Coding. To begin the Initial Coding process, the first four transcripts were coded line-by-line. In addition to keeping us close to the data, line-by-line coding gave us a sense of how line-by-line coding would evolve and an initial appreciation for the volume of codes before deciding how best to manage the coded data. Literal line-by-line coding often fragmented the data to more than one code per line, and occasionally there was one code for a whole sentence or segment (Figure 5.3).

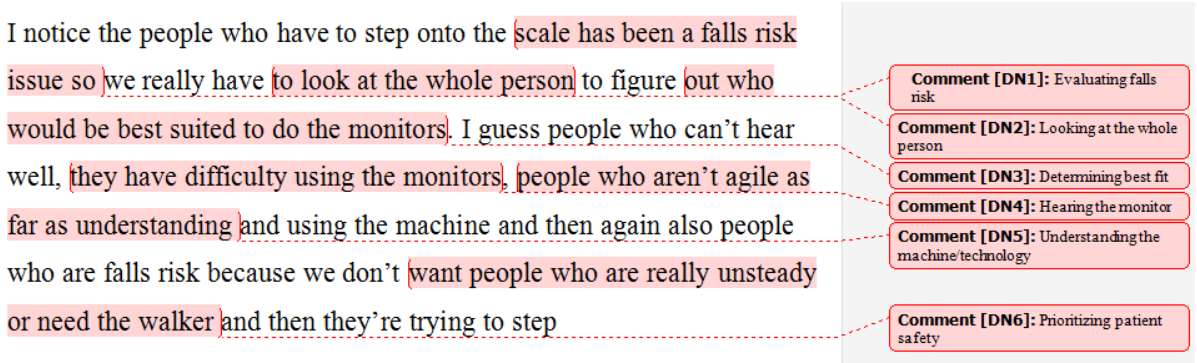

Figure 5.3 Example of initial coding using Microsoft Word™ and the *Comments* feature to conduct line-by-line coding.

Fragmentation of the data is how Charmaz, 2014 describes coding at this level, a process that is also referred to as fracturing the data (Glaser, 1978) or breaking the data apart (Corbin & Strauss, 2008). Reducing the data into smaller fragments is the paradoxical deductive first step to inductively developing a grounded theory and is a strategy to keep the researcher close to the data (Boeije, 2002; Charmaz, 2014; Corbin & Strauss, 1990; Holton, 2007). We found the

smaller fragments particularly useful during Initial Coding for constant comparison, since the fragments made it easier to compare and contextualize what was going on with the data between various incidents and across various contexts, such as program design and setting. Line-by-line Initial Coding yielded 1,434 individual initial codes across the first four transcripts that were each approximately 60 minutes in length.

For coding throughout the analytical process we used *gerunds*, the verb form of words used as a noun, to help portray a sense of action that is common to all forms of grounded theory (Charmaz, 2014; Glaser, 1978; Corbin & Strauss, 2008). Examples of gerunds in line-by-line coding include "*Evaluating falls risk*" and "*Looking at the whole person*" in Figure 5.3 and evolution of codes from Initial Coding through to the main process *Entering In* demonstrated in Figure 5.2. Charmaz (2014) advocated use of gerunds to create a sense of movement and process, but also to create topics and categories.

When working through the next levels of coding in the analytical process the action reflected by gerunds helped us make decisions as to which codes would earn their way into the theory through constant comparison and associating the action to the phenomenon of knowing the person. The example of Initial Codes *Receiving a Referral* and *Doing an Admission* in Figure 5.2 reflect actions participants undertook towards *Admitting the Patient* to a telehealth program, although at this point a connection of these Initial Codes to the phenomenon of nurse knowing the person had not yet been established. Initial codes were also helpful in defining properties and dimensions for categories as higher level conceptualizations and theoretical properties evolved (Charmaz, 2014; Glaser, 1998), and were re-visited often to refine elements of the final theory and model later in analysis.

***Constant Comparison*.** Constant comparison in the analytical process, along with coding, is a hallmark of grounded theory and integral to ConGT (Charmaz, 2014; Corbin & Strauss, 2008; Etowa et al., 2009; Glaser, 1998). Constant comparison is the fundamental analytic strategy for comparing units of data with each other early in analysis, and then for comparing categories, properties and dimensions as theoretical components evolve (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 1978; Glaser & Strauss, 1967). Charmaz (2014) defines constant comparison as "a method of analysis that generates successfully more abstract concepts and theories through inductive processes of comparing data with data, data with code, code with

code, code with category, category with category, category with concept…" (p. 342). Data, codes and categories were constantly compared within and across data sources (e.g. transcripts, field notes, observation notes) throughout the analytical process in our study with careful attention to the context in which the comparison was made.

In the study protocol, we presented a schematic to depict the anticipated interplay of constant comparison in ConGT within and across units of data and through levels of coding during data collection (Nagel, 2014). However, a number of departures from our original schematic occurred during data collection and analytical processes in *Getting a Picture*. For example, consideration of potential categories did not evolve until the *Focused Coding* stage due, in part, to a conscious effort for us *not* to become prematurely attached to early codes. As well, we elected not to use *Axial Coding* since the flow of our analytical processes through the other coding levels did not require it; this differentiated our approach in coding from other authors, such as Hoare et al. (2012b) who found axial coding useful in their analysis. Charmaz (2014) regarded Axial Coding as optional for researchers who wished to maintain flexibility in analysis and who were able to "tolerate ambiguity" in the research process (p. 148). We present a revised schematic (Figure 5.4) that reflects how constant comparison was incorporated into our analytical processes. The white arrows in Figure 5.4 depict the process of constant comparison within and across the levels of coding, while the dark arrow represents progression of coding from Initial Coding through to Theory Development.

B. Focused Coding. Through constant comparison and immersion in the data during Initial Coding, we became aware of patterns within the initial codes and began making associations between pieces of fractured data in relation to knowing the person. This became our transition point to *Focused Coding*. Charmaz (2014) described Focused Coding as the process where decisions are made about potential categories by noting which initial codes appear more frequently in the data and determining which of these codes seem to have more significance. This decision-making process sets ConGT apart from the grounded theory philosophies of Glaser (1998), and Strauss and Corbin (Strauss & Corbin, 1990; Corbin & Strauss, 2008), since Charmaz highlights the inevitability of judgements made by the researcher in analysis and construction of grounded theory. These judgments are influenced by researchers' values and "assumes that any theoretical rendering offers an *interpretive* portrayal of the studied world, not

an exact picture of it" (Charmaz, 2014, p. 17).

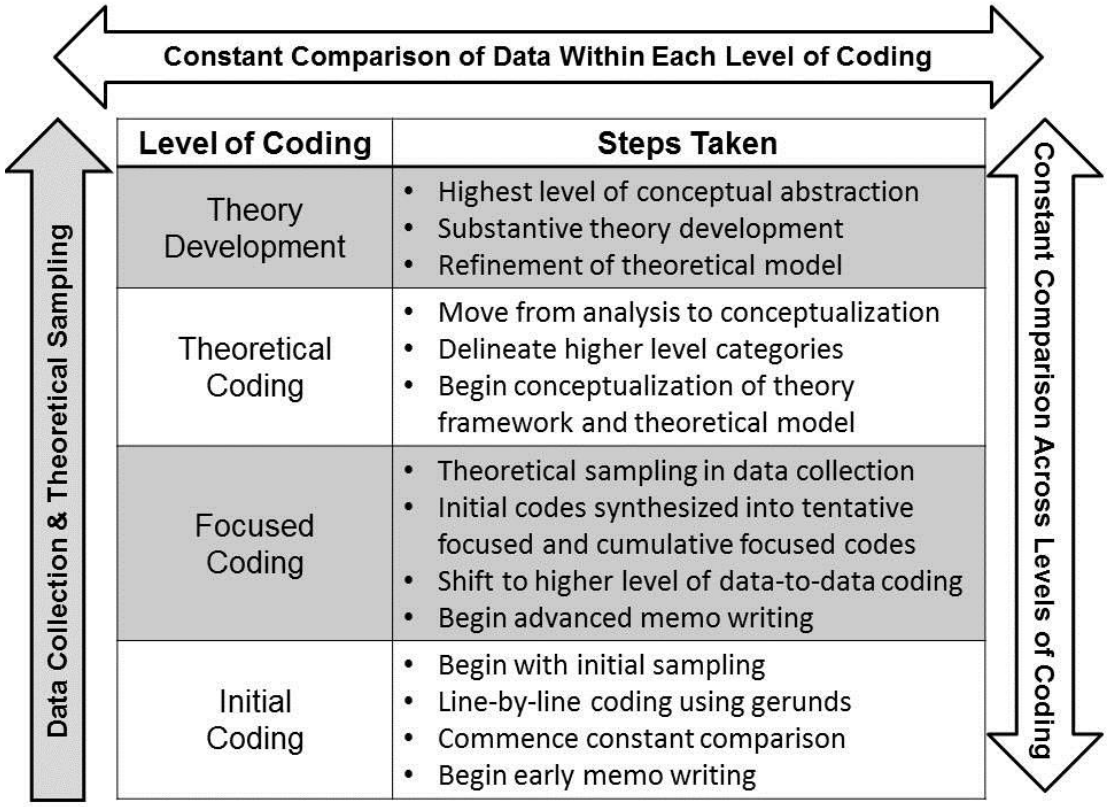

Figure 5.4 Constant Comparison within and across each level of coding.

Charmaz (2014) stated "focused coding is usually straightforward and proceeds quickly" (p. 140). However, we discovered the process of working through this phase to be iterative, intense and time consuming given the volume of initial codes. Charmaz offered broad suggestions as to how Focused Coding might be approached, such as coding the initial codes and treating focus codes in a tentative manner. At first, the broad guidelines proposed by Charmaz, the scant availability of exemplars for coding in ConGT and our volume of initial codes made the prospect of Focused Coding daunting. However, Charmaz encouraged researchers to be flexible and creative, permitting us leeway to navigate this part of the analytical process by trying various strategies including *clustering* and *free-writing* to facilitate organizing the data and refine coding. This resulted in us working through three steps in Focused Coding to develop *tentative focus codes*, *cumulative tentative focus codes* and our "final" *focus codes* (Figure 5.5) that ultimately reduced the volume of focus codes to 58.

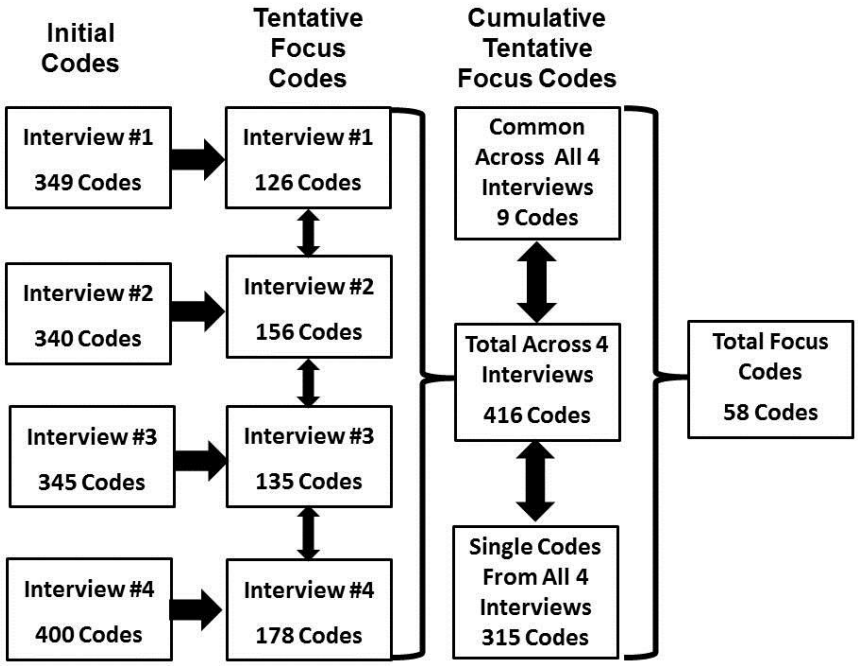

Figure 5.5 Reduction of volume of codes from Initial Coding through Focused Coding.

Clustering. Clustering is similar to conceptual mapping, where links between concepts and themes related to a phenomenon are graphically depicted in a way to provide the researcher with a visualization of relationships (Charmaz, 2014). Drawing on initial codes and early themes, we used clustering to begin mapping connections between initial codes to gain a visual sense of how pieces of the fragmented data linked together (Figure 5.6). Clustering became a strategy we used at various points of the analytical process as we progressed through the levels of coding.

In the preceding example of clustering, we had used different size circles and bold font to highlight prominent codes when mapping out potential relationships amongst the initial codes. Arrows were used to indicate direction of relationships, while solid lines denoted stronger potential relationships compared to broken or dotted lines.

Free-Writing. Free-writing is a strategy for the researcher to use free association to write about anything that comes to mind with the intent to stimulate thought, open the mind and use as a warm-up exercise (Charmaz, 2014). Whereas Charmaz viewed free-writing as being a separate exercise "…for your eyes only, like a secret journal …" (p. 186), we occasionally incorporated

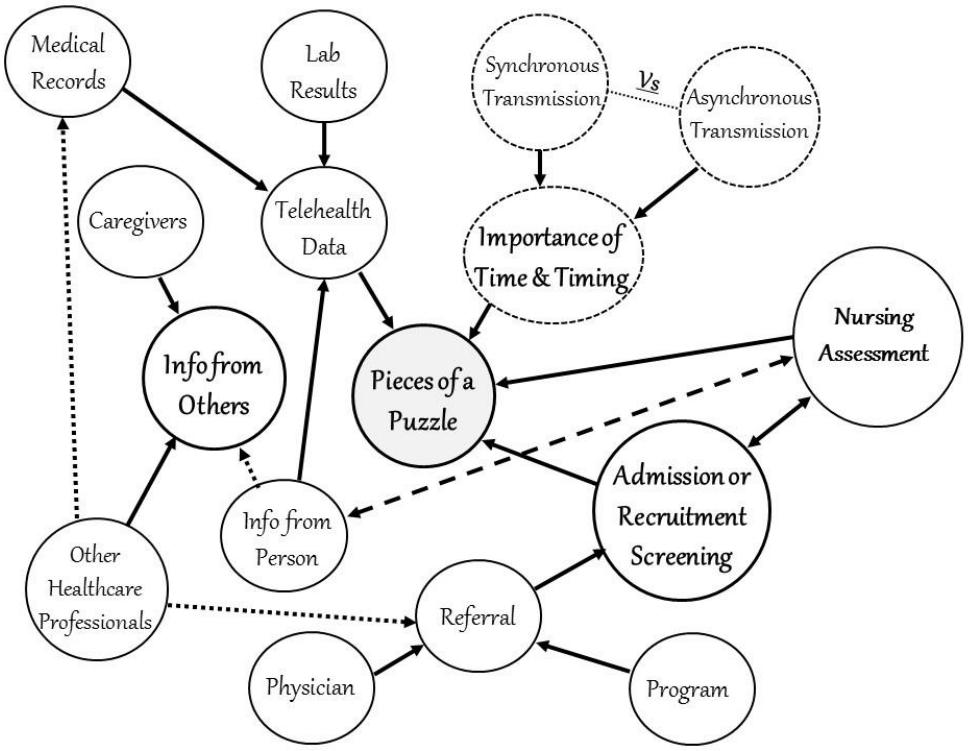

Figure 5.6 Clustering that illustrates potential relationships between initial codes, data fragments and themes at transition point to Focused Coding.

free-writing into memos, where an intended short memo would result in a longer note on ideas originating from the data and coding process. Free-writing was usually spontaneous that had a liberating and creative quality that Charmaz advocates for ConGT. Charmaz recommended that free-writing might be used in conjunction with clustering, such as when seeking to articulate a relationship between concepts.

C. Tentative Focus Codes. The strategies of clustering and free-writing complemented memo writing in navigating Focused Coding, and were utilized over a series of steps beginning with formulation of tentative focus codes. Through constant comparison, similar initial codes within and across each of the transcripts were grouped together and the fit of codes was evaluated within each group. At this point codes were often descriptive, which Charmaz (2014) noted is expected since initial codes are immediately reflective of the raw data. With constant comparison, the context was rarely exact from one incident to the next, and the action and wording of the assigned initial codes were not always precise. Where initial codes reflected similar actions within the context of participant's responses and had a similar meaning, the code

name that best fit the group was used or a new code name was conceived to re-label the group. An example was one group of initial codes *Evaluating falls risk*, *Monitoring vital signs* and *Doing a nursing assessment* that became *Assessing the person*. We found this first step of grouping codes very provisional and referred to the product in this stage of Focused Coding as tentative focus codes.

This step in coding significantly reduced the total number of codes we were working with from 1,434 initial codes to 595 tentative focus codes. We then reviewed the tentative focus codes for frequency within and across the first interview transcripts. Frequency is often used to demonstrate rigor and support the validity of a study (Polit & Beck, 2012). However, in ConGT frequency may provide a clue to the importance or relevance of codes, concepts and categories, and assist in demonstrating theoretical saturation has been reached (Charmaz, 2014). Charmaz (2014) defined theoretical saturation as "the point at which gathering more data about a theoretical category reveals no new properties nor yields any further theoretical insights about the emerging grounded theory" (p. 345). A select sample of tentative focus codes and their frequency in four interviews are presented in Table 5.1.

Table 5.1 Example of Frequency of Tentative Focus Codes Within Each Interview

Tentative Focus Codes	Interview Transcript and Code Frequency			
	#1	#2	#3	#4
Admitting the patient	2	1	2	1
Assessing the patient	18	3	24	19
Doing a "re-test" or "re-check"	3	3	4	4
Enhancing patient autonomy	3	4	6	9
Having criteria for the program	10	7	1	12
Having visualization of patient	1	1	11	2
Not knowing the person	1	4	3	1
Observing trends in data	7	4	1	4
Sharing patient information	10	2	1	2
Triggering alarms/"red flags"	5	2	1	1
Collaborating with other HCPs*	16	0	8	8
Completing documentation	1	0	3	6
Following up on alerts	4	5	0	0

*Healthcare Providers

D. Cumulative Tentative Focus Codes. Our next step was to further group the tentative focus codes to generate a higher level of conceptualization that we refer to as *cumulative tentative focus codes*. This step in our analytical process involved comparison and collapsing tentative focus codes within and across the first four transcripts in a similar fashion to how we grouped initial codes to tentative focus codes. Constant comparison was used to evaluate context of where tentative focus codes occurred and at the same time we noted the frequency of the occurrence. We were also able to discern and evaluate relationships and patterns of tentative focus codes, and grouped similar tentative focus codes together where there was similarity in action or process. These became the cumulative tentative focused codes and the code label for each was elevated from an existing code if it fit, although often the code label was either modified for a better fit or a new and higher level conceptual label was applied. For example, tentative focus codes *Doing an admission*, *Receiving a referral* and *Self-referring to the program* culminated in a new focused code of *Admitting the patient*. This process further reduced the number of codes to 416 cumulative tentative focus codes.

E. Elevation to Focus Codes. The last step in Focused Coding was to determine the "final" focus codes; "final" reflected the ongoing provisional nature of the focus codes. Many of these focus codes would evolve to higher levels of conceptualization and potential theoretical codes through constant comparison. Many cumulative tentative focus codes did not have a direct relationship to the phenomenon, but had other qualities germane to knowing the person in a virtual environment. One such example was the code *Enhancing patient autonomy*, which appeared often and spanned all four interviews. Although this code did not earn its way into our theory as a category or sub-category, E*nhancing patient autonomy* seemed relevant to knowing the person early in the analytical process.

Some cumulative tentative focus codes earned their way to being a focus code, either as already conceptually labeled or with some modification of the code. Examples of this were *Assessing the patient*, which remained the same, and *Doing a "re-test" or "re-check"*, which eventually became a sub-process in the final model as *Doing a "re-check"*. The majority of the cumulative tentative focus codes were not directly relevant to knowing the person in a virtual environment, and were set aside for review later in the analytical process or potential future use. Refining, modifying and setting aside cumulative tentative focus codes resulted in 58 focus codes that remained provisional and subject to further refinement moving forward to *Theoretical*

Coding. A fresh look at the first 4 interview transcripts and coding of additional transcripts resulted in adding new focus codes and modifying or setting aside others, but the number of focus codes remained fairly constant until remaining interviews were complete.

At this point in the analytical process we gave consideration to how conceptualization of higher level categories and the next stage of *Theoretical Coding* would progress. Charmaz (2014) indicated identification of potential categories for theory development could begin during Initial Coding, while Glaser (1978; 1998) suggested the researcher could start looking for categories early in analysis. However, we believed it prudent to avoid prematurely considering potential categories until Focused Coding was complete and additional data collection occurred with theoretical sampling for variations in technology and use of technology in clinical practice settings.

5.5.4 Theoretical Coding and Theory Building

The final level of coding described by Charmaz (2014) in the analytical process for ConGT is *Theoretical Coding* where focused codes are elevated to higher levels of abstraction as *theoretical codes*. Theoretical codes are the units of analysis the researcher uses to theorize connections and relationships from the data to inductively construct a contextualized, analytic story or theory (Charmaz, 2014; Corbin & Strauss, 1990). Thus, the primary aim of Theoretical Coding is to conceptualize and delineate the main categories that form components of the theoretical model and framework for the written theory. In our schematic of the analytical process (Figure 5.1), we identify *Theory Building* as the end point in the analytical process where the categories are integrated into the theory. We discovered during this phase there was a very dynamic and iterative interplay with Theoretical Coding since Theory Building required us to revisit theoretical code labels and relationships often as we sorted memos and used diagrams to visually represent links between categories. In her book, Charmaz (2014) uses both the term "Theory Building" (p. 18) and *reconstructing theory* (p. 225) in reference to developing the theory; our decision to use Theory Building was semantically driven, as "reconstructing theory" seemed to infer having started with a theory at some point during the study.

Charmaz (2014) did not fully explicate the process of Theoretical Coding in her textbook, noting the ambiguity as to whether this level of analysis is a methodological application or an emergent process as perceived by Glaser (2005) and Stern (1980). Charmaz suggested the

researcher might use Glaser's (1978) coding families and analytic categories as a guide, however we saw this as a departure from a constructivist stance in terms of having a preconceived or prescribed format to direct the coding practice. Instead, we viewed the value of frameworks such as Glaser's coding families as potentially helpful in evaluating the completeness of the theory at the end of the process. We approached Theoretical Coding in a similar way to earlier stages of analysis in ConGT with constant comparison to group focus codes into categories, and included *sorting* and *diagramming* to move focus codes to higher level conceptualizations.

A. Sorting. Both Charmaz (2014) and Glaser (1978, 1998) viewed sorting as the end point of analysis where conceptualization and theory development occurs at the highest level of abstraction (Charmaz, 2014; Glaser, 1978, 1998). Charmaz (2014) describes sorting as giving "…a means of creating and refining theoretical links" (p. 216), and relates it to a process of organizing and compiling memos to construct the theory. For us this involved reviewing the memos, grouping the memos together and often revisiting our earlier lists of codes. Charmaz (2014) identified sorting memos as essential in grounded theory, since at this phase the work relates more to ideas from the data rather than the data itself. We found it necessary to occasionally go back to the original data to compare contexts in which these ideas arose, thus constant comparison remained an integral part of the sorting process.

Although Charmaz (2014) and Hoare et al. (2012b) offered some practical insights for sorting, such as manually compiling the memos and turning off the computer, we had maintained most of our memo materials (e.g. written memo, cluster schemas, free-writing notes, etc.) in an electronic format. To facilitate sorting electronic data and codes we used data tables to summarize and cross-reference the information across coding and memo materials. For instance, a table was used to sort theoretical codes with supporting quotes and examples from fieldnotes. In another situation, we developed a matrix in table format to map the overlap of sub-categories across the main categories that would form the theoretical model (Figure 5.7). We regularly created coding summaries as each level of coding progressed and discussions in team meetings became integral to the sorting process. Hard copies of memos, diagrams and coding summaries were also used for manual sorting and focal points in team discussions; from this theoretical codes and categories were identified and refined. The process of sorting resulted in writing additional advanced memos to capture new ideas, elaborate on the categories and more explicitly delineate properties and dimensions of the processes that ultimately would become *Getting a*

Picture. In conjunction with sorting we used diagramming as part of the Theoretical Coding and Theory Building in analysis.

Key: **X** - category/sub-category relationship **X** – significant relationship X – "minor" relationship (overlap)

	Main Categories in Model						
Sub-Categories	**Entering In**	**Connecting With the Person**	**Sharing & Reviewing Information**	**Recognizing Trends & Patterns**	**Recording & Reflecting**	**Putting the Pieces Together**	**Transitioning Out**
Recruiting & Admitting to Program	**X**					**X**	
Having a priori face-to-face	**X**	X				**X**	
Obtaining Consent	**X**	X				**X**	
Building & Maintaining Relationships		**X**				**X**	
Making the Connection (Plugging In)		**X**	X			**X**	
Being in Synch		**X**	X	X	X	**X**	
Programming Parameters and Questions		**X**	X	**X**	X	**X**	
"Reading the Patient"		X	**X**			**X**	
Navigating Technology		X	**X**		X	**X**	
Collaborating with Others			**X**	X	X	**X**	

Figure 5.7 Example of matrix table used to map overlap of sub-categories across main categories.

B. Diagramming. At various stages in the analytical process diagramming helped to stimulate conceptualization of codes, concepts, categories and prospective relationships between elements of our evolving theory. Charmaz (2014) stated that diagrams "can offer concrete images of our ideas" (p. 218), provide a visualization of connections amongst categories, and show a sense of direction and strength of relationships amongst the categories. We found diagramming was particularly useful in moving us to higher levels of conceptualization through "playing" with the codes in analysis, and instrumental in development of draft theoretical models in Theory Building. Throughout Theoretical Coding and Theory Building, we generated several diagrams, such as the schematic in Figure 5.8. Each diagram was incorporated into our memo writing and became an efficient means of visually recording our progression through analysis. To refine the final iteration of our theoretical model for *Getting a Picture* (Figure 4.1), we engaged the services of a graphic artist to help organize the visual representation of the main categories derived from our analytical processes; this was particularly useful in helping capture the movement and direction of processes of nurses knowing the person in a virtual environment.

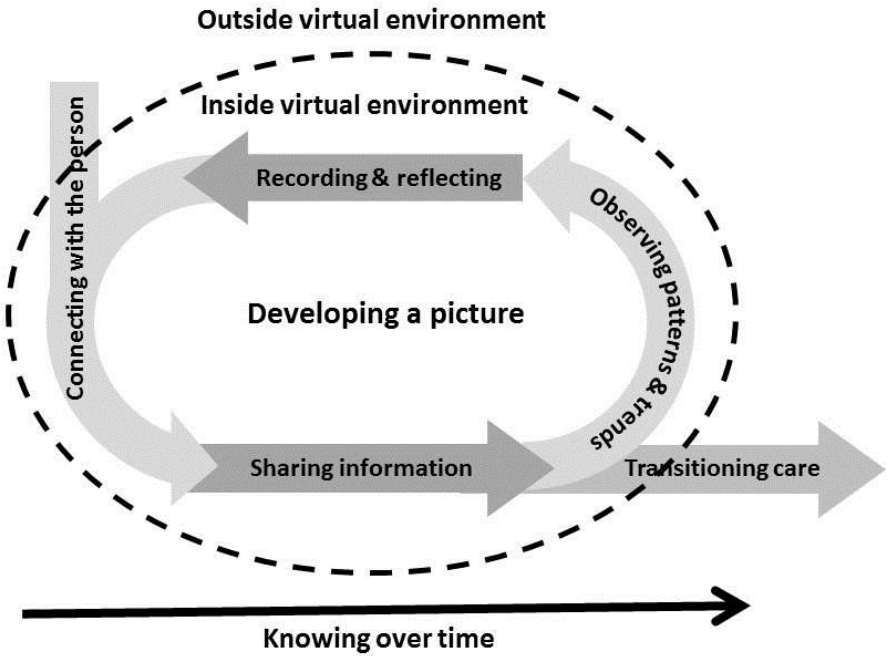

Figure 5.8 Example of diagramming during Theoretical Coding and Theory Building.

C. Building Our Theory. *Getting a Picture* evolved as the highest level conceptualization and core category from our analytical process that helped define our model (Figure 4.1) and theory. *Getting a Picture* had been represented early in the analytical process through codes such as *Painting a clearer picture* and *Getting the whole picture*, however formal elevation and labeling the core category did not occur until 18 first interviews had been coded.

Identification of the seven main processes in *Getting a Picture*, delineation of the dimensions and properties, and the development of the final theory continued to evolve with Theoretical Coding and Theory Building to the last interview. Writing of the final theory for *Getting a Picture* progressed quickly, as integration of memos and preparation of the various tables during sorting facilitated efficient synthesis of our findings; the final theoretical model served as a template to organize the order in which components of the written theory was presented.

5.6 Reflexivity in ConGT

There are divergent philosophies and views on the role and purpose of reflexivity across qualitative research traditions, and more specifically within the various approaches to grounded theory (Cutcliffe, 2000, 2003; McGhee, Marland & Atkinson, 2007; Neill, 2006). Reflexivity is often employed in qualitative studies as a strategy for the researcher to explore his or her own perceptions arising from the research process, and as a means to mitigate bias in the research process (Cutcliffe, 2000,2003; Mruck & Mey, 2007; Patton, 2002). Bias in qualitative research generally relates to the effect that beliefs, values and background of the researcher has on the study, such as the influence preconceptions may have on interpretation of data during analysis (Corbin & Strauss, 2008; Patton, 2002). Influence of *a priori* exposure to literature, application of conceptual frameworks, and background experience is considered a potential source for bias in grounded theory that risks forcing data into preconceived codes and categories through adoption of 'pet'concepts in theoretical development (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 1978, 1998; Glaser & Strauss, 1967). Our focus here is to briefly describe bias and reflexivity in ConGT, and highlight examples of how we approached applying reflexivity in our study.

Charmaz (2000, 2014) argued that bias in qualitative research cannot be totally eliminated since: (a) *a priori* exposure to the literature before initiating research is inescapable; (b) the researcher brings knowledge and experience to the research field that cannot be entirely set aside; and (c) there is an inherent interpretive element to analysis in grounded theory. From a methodological perspective, Charmaz (2014) suggested that adherence to core grounded theory methods of constant comparison, theoretical sensitivity and theoretical sampling in ConGT can help mitigate the influence of bias. However, Charmaz (2014) advocated adopting a reflexive stance in ConGT to inform "how the researcher conducts his or her research, relates to the research participants, and represents them in written reports" (p. 344). Charmaz (2014) defined reflexivity as "the researcher's scrutiny of the research experience, decisions, and interpretations in ways that bring him or her into the process" (p. 344). This is complimented by Corbin and Strauss's (2008) description of reflexivity as a way to acknowledge the researcher's relationship to the research process, including: (a) the researcher's emotional response and influence on the research process; and (b) the reciprocal influence between researcher and participation in co-creating knowledge.

Each of us brought an accumulated breadth and depth of knowledge to the research project given our respective experiences in nursing practice and research. Furthermore, in planning and operationalizing our study we had extensive *a priori* exposure to literature, conceptual frameworks and theories related to knowing the person and telehealth technology. Charmaz (2014) recommends mitigating perceived bias related to *a priori* exposure to literature by letting "…this material lie fallow until after you have developed your categories and the analytical relationships between them" (p. 307). In practice, this became an intentional activity as we mindfully employed strategies to enhance our reflexivity through strategies such as memo writing and diagramming. Charmaz (2014) views memo writing as a means to capture comparisons and ideas from the research process and as an activity that "creates an interactive space for conversing with yourself about your data, codes, ideas, and hunches" (p. 162). Creativity and self-reflection in memo writing, fieldnotes and other strategies are considered key elements of reflexivity in the research process (Charmaz, 2014; Cutcliffe, 2003; Patton, 2002) As explicated in this paper, we also attempted to adhere to the core grounded theory methods in ConGT throughout the study; in doing so we discovered that constant comparison, theoretical sensitivity and theoretical sampling enhanced our reflexivity during the analytical process. Reflexivity was often incorporated in our recording of *methodological notes* as we made decisions related to methods and procedures during the study.

A. Reflexivity in Methods for ConGT. At its core, consistent use of constant comparison as an analytical procedure is meant to mitigate preconceptions and facilitate concepts grounded in the data to earn its way into the theory (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 1978, 1998, 2001; Glaser & Strauss, 1967). We found the combination of constant comparison with coding helped us hold in abeyance preconceptions of codes and potential categories during early analysis and acted as a buffer against forcing the data. As illuminated in our example for Advanced Memo Writing, the relationship of focus codes is compared within the context which it arises and the original research question. Also highlighted in this advanced memo is our relationship as nurses to both the phenomenon and the context of nursing practice through use of language (e.g. "hallway consult") and our broader understanding of knowing the person in practice.

Use of first person narrative in the example of Early Memo Writing situated the lead author in nursing practice and also made a connection of his own knowledge of holistically

knowing the person to conducting assessments and evaluating determinants of health. These examples particularly underscore where our reflexivity honours the position we had as nurses to the phenomenon, data collection and analysis; the examples also illustrate how reflexivity is an intentional and dynamic process intimately linked to the research process (Charmaz, 2014; Hall & Callery, 2001; Patton, 2002). It is also this positionality within the nursing profession and our *a priori* knowledge that informed our decisions throughout theoretical sampling as to who might be recruited as a participant, how the interview might be approached (e.g. timing and setting) and what questions might be asked. Reflecting on sampling strategies, establishing relationships and engaging theoretical sensitivity during analysis were ongoing conscious activities for us that required active thought and evoked affective responses that were reflexive in nature (Corbin & Strauss, 2008; Hall & Callery, 2001; Neill, 2006).

Charmaz (2014) described reflexivity as especially significant "in focused coding because these codes shape our analyses" (p. 155), however we found reflexivity equally essential during Initial Coding and other parts of the analytic process as it assisted us to remain mindful of our potential biases. For instance, fracturing the data during Initial Coding with line-by-line codes directed our attention to details of the participant's message; this closeness to the data helped us focus on more discrete elements within the participant's narrative. During analysis it was incumbent on us to avoid elevating these initial codes into broader categories prematurely and to ensure each code earned its way into the resulting theory. Since we made a decision on the merits of each code during constant comparison this essentially invoked an element of interpretation (Engward & Davis, 2015). This reflexivity became an integral process of grounding the themes in the data that "implicitly requires awareness of self and a consciously reflective process" (McGhee et al., 2007, p. 335). Many of the decisions during Initial Coding were tacitly made, since coding was quick and focused within line-by-line on the transcripts. Later, during Focused Coding and Theoretical Coding, many of the decisions were more regularly captured in memo writing and methodological notes. Memo writing, methodological notes and keeping a methodological journal are considered to be strategies for reflexivity in grounded theory (Charmaz, 2014; Corbin & Strauss, 2008; Cutcliffe, 2003).

B. Methodological Notes. From the outset of the research project, we recorded methodological notes during data collection, sampling and the analytical process. The intent was to document key decision points related to methodology as the study unfolded and, rather than

use a journal as recommended by Charmaz (2014), we developed methodological notes in a manner similar to our memos. Our methodological notes captured many of the same elements suggested by Charmaz, including "methodological dilemmas, directions, and decisions" (p. 165), but were reflexive in describing our rationales and interpretations as to how and why decisions were made with respect to methodology for ConGT. The following segment of a methodological note recorded by the lead author illuminates a rationale for using visual representations in analysis:

> *When I was writing* ***Memo #0025*** [based on a conceptual diagram]*, I noted that I was "flirting with the next level of advanced" memoing. But what I have realized is that there is no clear demarcation between levels of coding, memoing or even the lines of other methods and procedures. It also moves my thinking much more into the theoretical realm. However, one of the things I do know about myself is that I am both a hands-on and visual person, so the idea of putting pieces of the data together and having a conceptual representation is very appealing to me.*

The preceding methodological note highlighted the lack of concreteness in delineating steps to ConGT, as well as the flexible and creative aspects of a constructivist approach (Charmaz, 2014; Hall & Callery, 2001). Specifically it illuminated subjective elements of the research process, such as deciding transition points in analysis and determining what approach is best suited to the researcher when engaging conceptualization. The very nature of constructivism and co-construction suggests embodiment of subjectivity, varied levels of interpretation, and flexibility in methods (Charmaz, 2014). Reflexivity in the preceding example also highlights the use of visual representations through diagramming in the analytical process to assist with conceptualization of the data, and how this was used to stimulate abstraction and a more theoretical appreciation of the findings.

5.7 Conclusion

Operationalizing the steps for data collection, sampling and analytical processes for this ConGT study was a journey of discovery given the scarcity of exemplars to explicate methods in this relatively new methodological approach to qualitative research. Since development of our study protocol and completion of our study other authors have explicated processes in ConGT, and Charmaz (2014) has offered more guidance on analytical processes in her newest book.

With conclusion of our study and first-hand experience with ConGT, our greatest appreciation has been the degree to which flexibility and creativity is afforded the researcher during the research process. For instance, our use of visual schematics and diagrams helped us to conceptualize the research process from the beginning, to make links within the data during analysis to push our analysis to higher levels of abstraction as our theory, *Getting a Picture*, evolved.

As illuminated in the analytical processes for our study, there was both a requirement and opportunity for innovation in navigating the levels of coding that Charmaz (2014) articulated for ConGT. Key points of learning included appreciating the integrated and iterative nature of data collection, sampling and analytical processes, and the role of reflexivity throughout the research process. In a constructivist approach to qualitative research, the research process is meant to be a unique enterprise reflecting, and respecting, the originality of the researcher's interpretations and style of engagement with the analytical process. In this paper, we have explicated our approach in navigating the sampling, data collection, sampling and analytical processes in a ConGT study with the intent of contributing to current knowledge of the operationalization of ConGT research.

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Chapter 6

Reflections on Conceptualization, Visualization and Technology Use in the Research Process

Reflections on Conceptualization, Visualization and Technology Use in the Research Process

The purpose of this chapter is to offer reflections on my development of knowledge, skills and abilities to conduct a constructivist grounded theory (ConGT) study. As highlighted in Chapter 5, Charmaz (2014) advocates for the use of reflexivity in ConGT as a means to inform the research process through examination of decisions and interpretations made by the researcher, and to explore relationships he or she has with participants. As noted in Chapter 5, reflexivity is also used as a strategy in qualitative research to mitigate bias in the research process. In our study, reflexivity was captured through memos and diagramming in analysis as well as through methodological notes that recorded ideas and experiences related to the research design or methods (Chapter 5).

In this chapter, I use reflexivity to illuminate my insights and experiences in navigating the ConGT research process with respect to visualization, conceptualization and the use of technology. I begin this chapter with a brief discussion of *conceptualization* as it relates to grounded theory and ConGT. I will then describe how *visualization* aided in conceptualization during the research process. I outline three main insights on conceptualizations and visualization that stem from my reflections on: (a) how I viewed mental imagery as an integral process to conceptualization; (b) the role visualization played in elements of our research process; and (c) competencies I developed to engage conceptualization and technology in our ConGT study. Throughout this chapter I provide exemplars from memos, methodological notes and other sources recorded during the research process to illustrate how visualization, competency development and use of technology manifested in the project and influenced my formation as a researcher.

6.1 Conceptualization in Grounded Theory and ConGT

Visualization and mental imagery played a significant role in my conceptualization of *Getting a Picture* throughout preparatory work (e.g. literature review and research proposal) and engagement in the research process. *Conceptualization* is broadly regarded as a process of abstraction that is fundamental to developing a grounded theory (Charmaz, 2014; Corbin & Strauss, 2008; Glaser, 1978, 2002a). In my experience, conceptualization was an intentional and creative exercise of both mental imagery and developing physical graphics to: (a) depict aspects

of nursing practice with telehealth technology (Chapter 2); (b) envision the research process (Chapter 3); (c) explicate the nurse knowing the person in a virtual environment (Chapter 4); and (d) operationalize ConGT during the study (Chapter 5). Although I created some graphics by hand with pen and paper, I often used technology (e.g. Microsoft Word™ and Power Point™) to design visual representations of processes and relationships between concepts.

Glaser (2002a) states "conceptualization is the core category of Grounded Theory. We all know or have an idea what conceptualization is in general" (p. 23). Although conceptualization is considered foundational to grounded theory, there does not appear to be a common definition for this term in the literature. In classical grounded theory, conceptualization is depicted as a process of identifying and naming latent patterns in the data (Glaser, 1998; 2002a; Holton, 2007) such that "concepts are abstract of time, place, and people, and that concepts have enduring grab" (Glaser, 2002a, p. 24). Glaser further stated "conceptualization captures the thoughts and imagination of grounded theory consumers" (Glaser, 1998, p. 133) and that the intent was to label the pattern "to best capture its imageric meaning" (Glaser, 2002a, p. 24). Such formation of mental images and labelling for a concept or phenomenon is a property of conceptualization common across the three main approaches to grounded theory. Strauss and Corbin (1998) described conceptualization as an act of classifying pieces of the data and making abstractions through comparative analysis to "evoke a similar imagery in our minds, and because of that, we group them together" (p. 105). In ConGT, Charmaz (2014) emphasized use of gerunds, the verb form of nouns, in coding and theorizing to enhance the imagery of action and process in analysis.

At one point during analysis I struggled in my understanding of conceptualization and how best to go about it; I also questioned whether I was going about conceptualization correctly. My struggle and apprehension was captured in **Methodological Note #028**[2]:

> *This prompted me to consider two things. First, how does one envision conceptualization and abstraction in the grounded theory process? How this plays out is not clear in the literature, and none of the main players in GT demonstrates how the conceptualization process goes or how the levels of abstraction are arrived at. It is*

[2] The examples of methodological notes and memos in this chapter are verbatim from the original source, and, as part of the audit trail, have not been edited (e.g. grammar, syntax, etc.).

> *almost like a mystical process that unfolds, and I have no doubt that everyone's approach to conceptualization will be different. To that end I shall need to look at some of the dissertations to see how the abstraction piece plays. But I also think that I shall have to seek some guidance to understand how the process is seen from a GT perspective. Is what I am doing, playing with the data and sketching out the various clusters, the "right" approach? From what I have read and understand from Charmaz's* [2006] *writings, is that this would be appropriate. Indeed, I think even my usual shift to free writing in my memos is part of my own unique process, and it seems this is congruent with a constructivist approach to research especially the interpretive aspect that comes with this.*
>
> *This leads me to my second consideration, and that is the implications for interpretation in the ConGT process (or any analytical process, for that matter). By nature, we as human beings see and experience phenomena all the time, and as Blumer* [1969] *states (which is foundational to GT) we make meanings of, and react to, phenomena based on our interactions with others in the context of the phenomena – and then the meanings change with time. Is not, then, our perceptions of phenomena (and the views of phenomena through another person's eyes, such as research participants) interpretations? And if so, what is conceptualization and abstraction if not interpretation?*

In the preceding methodological note, my main challenge was understanding conceptualization as being: (a) an abstraction through concept development; (b) a process of visual imagery; and (c) a process of interpretation. In the end, each of these aspects of conceptualization were essential in my ConGT analytical process as I elaborate on presently; integrating strategies to ConGT (e.g. clustering and free writing) and technology to facilitate conceptualization in analysis was a complex, intentional and creative enterprise.

6.1.1 Conceptualization as an Abstraction of Concepts

In much of the qualitative research and grounded theory literature, I found conceptualization was presented as a linear and organized process for coding where the goal was to attain a higher level of abstraction (Corbin & Strauss, 2008; Creswell, 2013; Glaser, 1978; Patton, 2002; Strauss & Corbin, 1998). Glaser (1978) stated "grounded theory is based on a

concept-indicator model, which directs the conceptual coding of a set of empirical indicators" (p. 62), and supported his position with schemas to illustrate the progression of coding and concept development. Corbin and Strauss (2008) used terms like *conceptual ladder* and *conceptual pyramid* (p. 52) to reflect the relationships and connections of meaning of concepts as they evolve in abstraction to categories. Although the schemas provided by Glaser (1978) and the terms used by Corbin and Strauss (2008) evoked visualization of a hierarchy for concepts, the process of conceptualization was not well explained and came across as a concrete step-wise approach.

Further complicating my appreciation of conceptualization in the abstraction of concepts was the rhetorical tension between *emergence* of categories and *interpretation* in grounded theory. From a classic grounded theory perspective, emergence is predicated on surfacing latent patterns and identifying a main category without the findings being "forced" by the researcher (Glaser, 1978, 1998, 2002a, 2002b). Although I agree that inductive building of a theory grounded in data requires the researcher to mitigate his or her preconceptions to avoid forcing the findings, I believe identification of patterns and categories are active and subjective interpretations made by the researcher. This is in contrast to the position that latent patterns in the data can be objectively derived strictly through constant comparison (Glaser, 1978, 2002b). Similar to the position of Bryant (2003), I do not view the researcher as a neutral observer in grounded theory processes; rather, looking for and labelling patterns in the data are intentional actions of the researcher.

Charmaz (2000, 2014) argued that the researcher generates the data, makes decisions on what data is used and interprets meanings through analysis. As such, subjectivity and interpretation are recognized as inherent to processes of conceptualization in ConGT; abstractions from codes and concepts, while grounded in the data, are co-constructions between the researcher and participants (Charmaz, 2000, 2014). Similar to Thorne's (2008) perspective in interpretive description, conceptualizing findings in our ConGT involved interpretation and envisioning conceptual levels as outlined in Chapter 5. From a constructivist stance, conceptualization can be viewed either as a process or product of interpretation (Charmaz, 2000, 2014).

6.1.2 Visualization and Conceptualization

Visualization played an essential role for me at various points in the research process from my original conceptualization of the research process (Figure 3.1) to conceptualization of the core category for the theory of *Getting a Picture* (Figure 4.1). Development and use of graphic representations were used frequently as a strategy to enhance understanding of processes, to stimulate creativity in conceptualizing and to create a tangible rendering of our analysis (e.g. Figure 4.1). Some elements of visualization in the research process were reflected in **Methodological Note #14**:

> *…capturing coding steps, in part to have something tangible to share with my supervisors and committee and, in part, to reflect the steps I am taking throughout the analytical process, I am using Power Point® to generate pictorial representation of my work. So, for instance, when looking at how to collapse and link codes together as I move from initial coding to focused coding, I created Power Point® slide graphics to help display this. I also used graphics to illustrate the sequence of coding and the numbers of codes as I moved along. Although this takes a bit of time and effort, it is helpful on a number of levels. First, it gives me something that is visually tangible that I might share with others to explain my coding process. Second, and in close conjunction with the previous point, it gives me something substantial to contribute to presentations and written thesis work down the line – in this light, it becomes a very practical application of my work. Third, the graphics helped me create an audit trail for the research project. And, finally, I find that the process of generating graphics is a very creative process that allows me to "see" the data transform into parts of the GT and to visually appreciate linkages between bits of findings. As well, the visualization of findings, linkages and processes spurred additional thoughts to explore and helped me in finding a way to articulate my work.*

Creation of graphics and visual representations as a tangible product to help explicate processes and illustrate theoretical renderings is often incorporated in the research process (Buckley & Waring, 2013; Charmaz, 2014; Corbin & Strauss, 2008). They may be integrated into research and analytical processes as with clustering, diagramming and part of memoing (Charmaz, 2014; Corbin & Strauss, 2008); I found this to be an effective strategy as illustrated in Chapter 5. From a practical perspective, the graphics and visual representations assisted in

documenting progress in the research process. Progress in relation to conceptualization of analysis and theory development was captured by various schemas (e.g. Figure 5.8) in meeting notes, memos and methodological notes. These have become part of the audit trail to help support dependability and confirmability of our research findings as outlined in the research proposal (Chapter 3).

Visualization as a Creative Process. In **Methodological Note #14**, I described the use of graphics as both a means to visually represent the analytical work being done in our grounded theory and as part of the creative enterprise for working through analysis. Charmaz (2014) advocated that the researcher incorporate creativity in ConGT when working through methods such as coding, analysis and conceptualization. We illustrated elements of our creativity in Chapter 5 through use of graphics (e.g. clustering and diagramming) for analysis and navigating levels of coding in the absence of exemplars. Although the graphics portray snapshots of progress throughout the analytical process, they also stimulated active engagement in conceptualization through hands-on manipulation of codes and theoretical concepts during theory development. Creation of diagrams can be "a useful tool for generating, exploring and recording ideas" (Buckley & Waring, 2013). As a visual learner and processor, this active engagement in generating graphics was critical for me in conceptualizing at an individual level to generate ideas during analysis and theory development. An example that illustrates the role of generating graphics to stimulate conceptualization was reflected in **Methodological Note #21**:

> *The act of assembling this conceptual diagram, for me, was both a creative act and a strategy for analysis. Piecing each of the pieces of the puzzle together "forced" me to think very deeply on the meaning of each piece and even the labelling associated with it. For instance, 'Delivering Patient-Centered Care' was a change of focus code name from 'Focusing on Patient-Centered Care', because at the time I rationalized that 'Delivering Patient-Centered Care' was the outcome, or consequence, of the preceding process (as I was sketching out this diagram in power point, I was thinking that* ***focusing*** *would have been a time process throughout the entire process, perhaps running parallel with 'Knowing Over Time').*

The use of graphics to visualize connections between codes and depict process was also beneficial in our research team discussions as part of the analytical process. It provided the

opportunity for rich discussions and sharing of divergent perspectives of the data and theory development as part of analysis. Diagrams and other visual tools can serve an explanatory role, but also can provide clarification and stimulus for further conceptualization (Buckley & Waring, 2013). For instance, Figure 6.1 is an example of a graphic I presented to the research team to give an example of Initial Codes and to demonstrate how I was grouping and conceptualizing them as Focus Codes in the analytical process. Later, I used draft theoretical models (e.g. Figure 5.8) to inform committee conversations on particular codes and fit of concepts to assist in clarifying parts of the theory and to guide theoretical sampling (Chapter 5). As noted by Corbin and Strauss (1990), such team work can enhance theoretical sensitivity, offer new insights on the data and help mitigate bias. Preparing and sharing the graphics also played a part in my PhD supervision and development as a qualitative researcher by enhancing my capacity for conceptualization, a skill that can be learned and developed (Glaser, 2002a; Holton, 2007).

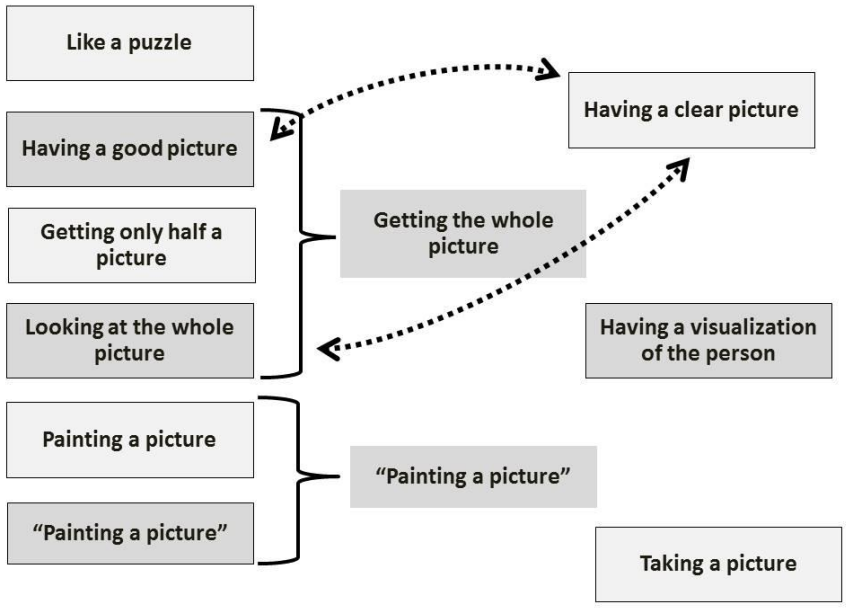

Figure 6.1 Illustration of grouping and conceptualizing Initial Codes as Focus Codes.

6.1.3 Conceptualization and Interpretation

As noted earlier, conceptualization can be viewed as both a process and a product of interpretation. In presenting ConGT as an alternative to other approaches to grounded theory, Charmaz (2000, 2014) highlighted the researcher's role of interpreting meaning from the data when co-constructing a version of reality with participants. Interpretation and decisions made at

all steps of the research process underscore the subjectivity inherent to ConGT; an allowance for multiple realities, subjectivity and co-construction with participants are congruent with the constructivist paradigm (Charmaz, 2000, 2014; Guba & Lincoln, 1994). To illustrate an example of interpretation and a link to conceptualization, **Early Memo #12** captured my thoughts on initial codes from first interviews:

> *Thus far in the coding process there have been a number of metaphorical allusions to using telehealth technology that relates to creating a visual image. In interview 06-NB, the participant likens the process of pulling in data and information on the patient to being "Like a Puzzle"; she indicates that this is how she communicates her process of assessment to the family/care givers that look after the patient upon discharge. In earlier transcripts, "painting a picture" and "creating a picture" were also illuminated by participants either of the person specifically or of the person within the context of the situation or environment.*
>
> *This seems to highlight an important aspect, perhaps strategy, in getting an appreciation of the person - developing a sense of who they are, what the situation is like for them in the moment, and perhaps a visualization of what is happening around the person in his or her environment. What this also seems to highlight is how important a visualization, or possibly the notion of imagery, plays in getting to "know the person". The historical roots of nursing are very much visual and communication oriented, and traditionally the process of getting to know the person has been through face-to-face interactions, such as through formal assessments.*

The preceding memo captures interpretations of meaning of codes (e.g. visualization playing a role in getting to "know the person") and comparisons of the codes to the context in which they occurred. Further, there is a demonstration of reflexivity in relating my understanding of the practice of nursing to visualization; the role of reflexivity in ConGT in exploring the relationship of the researcher with the research process was described in Chapter 5. The comparison and grouping of Initial Codes in this memo can be mapped to Figure 6.1 as part of a visual representation of decision-making and interpretation in conceptualization at an early stage of analysis. As described by Denzin (2007), grounded theory is "…a set of performative and interpretive practices and ways of making the world visible" (p. 459), whereby the

researcher interprets meanings and constructs explanations of social interactions influenced by variables in a particular context.

6.2 Use of Technology in Conceptualization and ConGT

Technology played a significant role in the analytical process at various points of my study; Word™, Excel™ , NVivo 10[3] and Power Point® software were each used to code data or assist in conceptualization of findings. As I discovered, familiarity with both the hardware and software associated with technology was requisite to making decisions for how and when technology might be employed in the research process. However, as a novice to both ConGT methodology and use of NVivo 10, I was limited in my capacity to fully utilize this qualitative analysis software from the outset of analysis. Although I had a technical understanding of NVivo 10 and some experience with content coding using an earlier version of NVivo, I found the function of the software not to be intuitive in design or to fully align with ConGT methods. For instance, the taxonomy used by NVivo 10 did not fit with that of ConGT; it uses the term *node* rather than *code* that is standard in qualitative terminology. As well, in having an arbitrary *node hierarchy* for coding levels, NVivo 10 functionality did not seem amenable to the flexible and creative procedures expected for ConGT.

A limitation of analytical software can be the hierarchal structure of the coding program and predetermined coding format, which can: (a) impose a rigid approach to analysis that is reductionist in nature; (b) decontextualize the data; and (c) mask researcher interpretation through a sense of objectivity (Morison & Moir, 1998; Richards, 1997, 1999; St John & Johnson, 2000; Webb, 1999). Some of these concerns and my challenge to envision integration of coding with conceptualization using NVivo 10 were reflected in **Methodological Note #6** at the start of the analytical process:

> *Using NVivo - during Initial Coding, the basic coding function for line-by-line is fairly straightforward. However, I find the visual representation of the coding and segments difficult to put together in a conceptual form; the data seems so fragmented on just one transcript. I find using the comment bubbles in Word™ much easier to read, however the volume of codes is quite large (there are over 300 codes already in the first transcript). Although I know how to link codes in NVivo (I had used an earlier version*

[3] NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 10, 2012

> *with content analysis for a research project), I am not sure how best to go about the next level of coding since it is hard for me to picture the codes in the context of the data from which it comes. A colleague has shown me how to convert the comment bubbles from Word™ to Excel™ spreadsheets, which is helpful to combine my coding data – I can work from paper hard copies, at least early in analysis. One benefit to using NVivo is being able to search specific codes across several documents once they are uploaded. I think it is a matter of figuring out what will work for me now.*

As highlighted in the preceding note, I had observed how Initial Coding had fragmented the data and articulated my concern that coding in NVivo 10 would separate the data from the context. The fragmentation of data is part of the analytical process, but for theory development in grounded theory the researcher must be able to engage in constant comparison of data at all levels of coding and conceptualization (Charmaz, 2014; Corbin & Strauss, 1990; Holton, 2007; Richards, 1999). The process we used to maintain the links between constant comparison, codes and context to conceptualize *Getting a Picture* were detailed in Chapter 5; it required us to determine the best methods and strategies to support a ConGT methodology, including how best to employ NVivo 10 and other software technologies. Such decisions on analytical tools and application are incumbent on the researcher according to the research project, but should also account for the researcher's ability and preference (Morison & Moir, 1998; St John & Johnson, 2000).

Also highlighted in **Methodological Note #6** was my anticipation that managing the volume of line-by-line codes would be daunting given my lack of familiarity with the functionality of NVivo 10. I had never navigated the full analytical process of a research project before or ever worked with the large number of initial codes as generated in ConGT. Although qualitative analysis software, such as NVivo 10, has the capacity to store large volumes of information and can facilitate data management it requires the user to have the ability to manipulate the data for conceptualization and theory development. On one hand, this required knowledge and skills of the analytic software to navigate and work with the data (St John & Johnson, 2000; Richard, 1999). But it also meant that, as a researcher, I needed to be mindful that analytic software does not interpret, contextualize or conceptualize the data; these tasks remained the responsibility of the research team (Morison & Moir, 1998; Richard, 1997). Thus, in addition to developing competencies to conduct a ConGT research study it became necessary

for me to develop competencies in using technology for collection, management and analysis of data.

6.3 Competency Development for Conceptualization and Technology in ConGT

As a novice to grounded theory, I developed requisite competencies to conduct a ConGT study and strategies to overcome challenges. *Competency* is defined as the ability "to integrate and apply the knowledge, skill, judgements and personal attributes required to practice safely and ethically in a designated role and setting" (Black et al., 2008, p. 173). Although I had theoretical knowledge and an understanding of grounded theory methodology, methods and procedures, it was active engagement in the research process that facilitated further development of competencies and consolidation of knowledge through practice. As underscored thus far in this chapter, two main areas of competency development for me were conceptualization and use of technology in the analytical process. Integrating these two areas of competency to a ConGT methodological approach further required me to develop knowledge, skills and judgement to operationalize the study research design and related methods.

Similar to participant accounts articulated in our study, I found it important to construct a mental picture of how processes fit together to both operationalize our ConGT study and conceptualize the final theoretical rendering of *Getting a Picture* (Chapter 4). As previously established, conceptualization may be learned and developed; it logically follows from this position that conceptualization may be appreciated as a competency in qualitative research, however there seems little written relative to this topic. From my own experience through this dissertation work, I would argue that visualization and conceptualization are essential competencies for grounded theory researchers given its status as core category and the impetus to create a mental imagery of processes in grounded theory (Charmaz, 2014; Glaser, 2002a). Further to being a learnable skill, Glaser (2002a) believed that individuals may have varied capacity to conceptualize; from this perspective, an argument can be made that the ability to learn and perform conceptualization might be evaluated. During the course of my dissertation work, feedback from my supervisors and subjective self-evaluation became indicators of development in my conceptualization capacities. As illustrated in an email message I sent to my

supervisors (personal communication, 16 October 2014), mentorship and validation of my progress were part of my competency development:

> *…it was very helpful in working through some of my tensions on the conceptualization/interpretation aspects of GT, but also reassuring in knowing that I am on the right track. The most recent model seems to be getting to the higher level of abstraction, and it did spawn some ideas…*

With respect to developing competency in use of software for the analytical process, the main areas of focus for me were the technical competency in using NVivo 10 for analysis, keeping data contextualized during the analytical process and transforming pieces of digital data to conceptualization of the theory. Developing the technical competency to use a software package "is a steep learning curve and can be time-consuming" (McLafferty & Farley, 2006, p. 36) as the researcher becomes familiar with the functionality, language and capacity of the technology (Hesse-Biber, 2007; McLafferty & Farley, 2006; St John & Johnson, 2000). The risk for decontextualization of data is often cited as a limitation of analytical software, particularly in terms of fragmentation through coding and creating a distance between the researcher and data (Holton, 2007; McLafferty & Farley, 2006; St John & Johnson, 2000). For grounded theory this can be regarded as problematic and be potentially "counter-creative to the conceptual ideation imperative for generating good grounded theory" (Holton, 2007, p. 287). Thus, formal education opportunities (e.g. courses on use of analytic software) and mentorship by researchers experienced in use of analytic software might be considered with adoption of analytic software to enhance the analytical process and mitigate loss of context (Hesse-Biber, 2007; Morison & Moir, 1998).

Although NVivo 10 has capacity to generate certain digital representations and graphics of the data, I found these features limited my ability to conceptualize theoretical elements arising from the data and constrained the flexibility and creativity essential to a constructivist approach in grounded theory development. This was due, in part, to the fragmentation of data that occurred with coding and that NVivo 10 lacked the intuitive function to generate graphics and visual representations from the codes in a manner that worked for me. However, another major factor was my limited ability to navigate NVivo 10 to sort the data, critically analyze the findings and conceptualize relationships from the data to generate a grounded theory. McLafferty and

Farley (2006) noted that only seeing parts of the data on a computer screen and a requirement to scroll through different forms of data or data sources might impede the ability for some researchers to conceptualize the data; this fit my experience in using NVivo 10.

At times the computer screen was a barrier for me to conceptualize when working with textual data formats. For instance, I found Excel™ spreadsheets of codes (e.g. Table 5.2) did not lend themselves well to mapping relationships between codes or categories, or give me a mental image or visualization of processes. My solution was to cluster data and diagram manually with pen and paper or use Power Point® to create graphics with shapes, symbols, colour and other features of the program. From a creative stance, Power Point® provided a hands-on medium that allowed me to work and refine the visual representation of processes and relationships between codes and concepts. From a practical stance, Power Point® slides could be converted to a variety of formats, such as JPEG graphics, for immediate incorporation into records (e.g. memos and methodological notes), slide presentations and manuscripts. Power Point® was also a technology that I was familiar with. As described in Chapter 5, NVivo 10 was employed at various stages of the analytical process based on my ability to use it and appreciate its functionality, such as in Focused Coding and Theoretical Coding. Consideration for use of analytic software needs to be made based on the researcher's competence and comfort with the technology, personal preference and the purpose of inquiry (Morison & Moir, 1998; St John & Johnson, 2000; Webb, 1999).

6.4 Concluding Reflection

On reflection of my experiences in the research process for the study, there were a number of parallels for visualization, conceptualization and use of technology to that of participants using telehealth technologies in *Getting a Picture*. Visualization and conceptualization in my ConGT study entailed collection of data and piecing together a mental image of processes throughout the research project to facilitate abstraction of the data and render the final grounded theory. It involved using a variety of technologies in analysis, navigating more than one technology to access data (e.g. Word™ files for interview transcripts and NVivo 10 for codes), putting data fragments together and contextualizing the information during conceptualization. Also similar to findings in *Getting a Picture*, I discovered that visualization, conceptualization and use of analytic software required development of competencies to conduct

ConGT research and integrate technology into the research process. Having navigated a ConGT study to gain a better understanding of visualization and conceptualization, I have become more familiar with analytical software. Further, I have developed my own strategies for analysis and, through all these processes, have enhanced my competencies for future qualitative research projects.

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Chapter 7

Integrated Discussion:

Visualizing a Whole and Accurate Picture

Integrated Discussion:

Visualizing a Whole and Accurate Picture

In my dissertation work, I explored nursing practice in the context of technology use and revealed how visualization and conceptualization are used to create a mental image in both the clinical setting with telehealth and the research process. A goal in achieving a mental image when using telehealth technology was to attain a whole and accurate picture of the person (Chapter 4). Similarly, a goal in my constructivist grounded theory (ConGT) was to create a comprehensive theoretical conceptualization of how nurses came to know the person in a virtual environment; this involved use of visualization, conceptualization and use of technologies in the analytical processes for *Getting a Picture* (Chapter 5 and 6). Meleis (2007) defined nursing theory as "a conceptualization of some aspect of reality (invented or discovered) that pertains to nursing" (p. 41) that can be evaluated for completeness and accuracy. In this chapter, I highlight findings from my dissertation that describe the processes nurses use to attain a mental image through visualization and conceptualization with integration of data from virtual environments and other sources. My dissertation findings include three themes related to visualizing a whole and accurate picture: (a) use of visualization to create a mental image; (b) influence of technology in getting the picture; and (c) development of competencies to support visualization and use of technology to achieve getting a whole and accurate picture.

I begin this chapter by presenting a summary of the three chapters that inform my dissertation findings. These three chapters are the grounded theory study (Chapter 4), the methods paper (Chapter 5) and my reflections related to the research process (Chapter 6). I then present each of the three aforementioned themes and discuss each theme in depth. Finally, I outline implications these themes and my dissertation work have for domains of professional nursing: practice, education, policy/administration and research.

7.1 Summary of Chapters

7.1.1 Chapter 4: Grounded Theory Study

I conducted a qualitative study informed by Charmaz's (2002, 2014) constructivist grounded theory (ConGT) to explicate the processes of how nurses come to know the person with remote patient monitoring (RPM), a form of telehealth technology. The study included 33

interviews and five observational experiences from 22 registered nurses who primarily used RPM in provision of care for persons requiring support in managing or maintaining their health. Participants described development of a visualization, or mental image, of the person as integral to knowing the person for provision of safe, appropriate and holistic care. This visualization occurred whether or not the participant had a face-to-face encounter or other means to see the person, such as with video camera. The process of visualization was *Getting a Picture*, the core category that evolved in my grounded theory. *Getting a Picture* involved seven main processes that are depicted in a theoretical model (Figure 4.1) that represents the integrated and iterative processes nurses engaged in to develop a contextualized and holistic visualization of the person. The seven main processes include 21 sub-processes that reflect complex and dynamic activities participants undertook to get the picture and to know the person (Table 4.1). A parallel category of *Getting the Wrong Picture* emerged as some participants described having an incorrect visualization of a person based on digital data from RPM and other technologies.

Obtaining data to inform getting a picture of the person often required navigation of multiple technologies and systems that were disparate and lacked integration. However, information needed to visualize the whole picture was not exclusively confined within the realm of the virtual environment (VE) as participants described accessing information about the person from outside the VE, such as with the use of paper-based documentation or consultation with other care providers. The study revealed that navigation and use of RPM and other technologies required the nurse have knowledge and skills to use various technologies. The study also revealed that visualizing a whole and accurate picture of the person was influenced by: (a) limitations inherent to some technologies; (b) lack of interoperability between technologies and systems; and (c) human computer interactions and human factors that impeded getting a picture.

7.1.2 Chapter 5: Methods Paper

In the methodology paper (Chapter 5), I delineated my approach to implementation of ConGT methods and analytical processes for *Getting a Picture*. I presented a revised schematic of the ConGT research process (Figure 5.1) first introduced in the original study protocol (Chapter 3). This revised schematic was refined to more accurately reflect how sampling, data collection and the analytical processes advanced in the study. Key learnings from using ConGT included the flexibility and creativity that the researcher can employ in working through methods

such as coding, analysis and conceptualization. Another important insight for me was the role visualization played in these processes, whether developing a schematic to represent the research process, supporting reflexivity (e.g. clustering and diagramming) or conceptualizing the core category for the theory. Through operationalization of my ConGT study, I discovered: (a) that conceptualization played an essential role throughout the research process, including the study design and analytical processes; (b) bringing together fragmented data during the analytical process to conceptualize a grounded theory involved visualization and navigation of coded materials through a series of iterative steps; and (c) execution of the study and conceptualization required flexibility and innovation in theory development to *Getting a Picture*. As a novice researcher, I came to appreciate how engagement with ConGT facilitated development of my knowledge, skills and confidence in navigating the analytical process and conceptualizing a grounded theory.

7.1.3 Chapter 6: Reflections of Research Process

In Chapter 6, I presented a reflection on the development of my abilities to conduct a ConGT study, utilize technologies during the analytical process and conceptualize findings. In this chapter I described conceptualization in grounded theory and ConGT, and highlighted the conclusion I came to in understanding conceptualization as an active process of interpretation. I used reflexivity to explore how I experienced use of visualization as an integral and creative part of conceptualization, and made a link between conceptualization and interpretation to the paradigmatic underpinnings of ConGT methodology. I also reflected on the role technology played at various times in collection, storage and organization of digital data in my ConGT study; conceptualization of fragmented data sources was facilitated by use different software in analysis, such as Power Point™ and NVivo 10. I outlined how, as a novice researcher, it became essential for me to develop competencies to operationalize ConGT methods, to conceptualize, and to integrate technology into the research processes. Drawing from memos, methodological notes and other sources recorded during the research process, I illustrated: (a) how visualization and conceptualization informed my operationalization of a ConGT study;(b) some of the challenges I faced when integrating analytical software with my approach to conceptualization during the analytical processes; and (c) some of the knowledge, skills and abilities I identified as requisite to my formation as a researcher.

7.2 Visualizing a Whole and Accurate Picture

The ability to visualize a picture that is whole and accurate with use of technology figured prominently in clinical care provision with telehealth (Chapter 4) and in the research process (Chapters 5 and 6). For clinical care in nursing, a whole and accurate picture of the person in his or her context is as regarded as necessary for provision of safe, appropriate and holistic nursing practice (Edwards, 1998; Locsin, 2009). For nursing research there is an expectation for generation of quality evidence to guide nursing practice; therefore, a whole and accurate picture may be regarded as essential to satisfy aspects of methodological rigor (e.g. credibility) and utility of findings (Charmaz, 2014; Corbin & Strauss, 2008; Polit & Beck, 2012). Yet there is a dearth of literature that speaks to visualization or role of conceptualization in nursing practice; further, there appears to be no literature that links these two concepts to the use of technology to visualize a whole and accurate picture. As revealed in my dissertation work, getting a whole and accurate picture is influenced by: (a) the nurse's use of visualization to get a picture; (b) functionality and interoperability of the technologies used; and (c) competency development for visualization and technology. Here I discuss each of these aspects in further detail.

7.2.1 Use of Visualization to Get a Picture

Visualization was described by participants in the grounded theory study as an important process for generating a mental picture and for conceptualizing people, environments and processes. In the context of generating a mental picture, *visualization* is commonly used interchangeably with other terms, such as *imagery*, *mental imagery*, or *visual imagery* (Menzies & Taylor, 2004; Sanders, Sadoski, van Walsum et al., 2008). Visualization is defined by the Oxford English Dictionary (2016) as "the action or fact of visualizing; the power or process of forming a mental picture or vision of something not actually present to the sight; a picture thus formed." In their concept analysis, Menzies and Taylor (2004) defined *imagery* as "a mental function, is a lived experience that is a dynamic, quasi-real, psychophysiological process" (p. 8). Similarly, Kosslyn (2005) defined *visual mental imagery* as "a set of representations that gives rise to the experience of viewing a stimulus in the absence of appropriate sensory input" (p. 332).

For the purpose of this discussion, *visualization* is regarded as the purposeful action of an individual to consciously and intentionally create a mental picture of some aspect of the world

external to the individual, such as a person, place or process. In Chapter 6, I established a connection between visualization and conceptualization from my experience in the research process, and stated "conceptualization was an intentional and creative exercise of both mental imagery and developing physical graphics" (p. 151). In this discussion, visualization will also encompass use of mental imagery in analytical processes of research and be used interchangeably with conceptualization in this context.

A. Cognitive Processes for Visualization. Visualization is a complex function of the brain, and there are many theories positing how mental images are formed and the neurobiological nature of the images (e.g. Kosslyn, 1994, 2005; Paivio, 1971; Pylyshyn, 1973; Zimmer, 2012). Working memory is a higher cognitive function that is thought to play a major role in generating a mental image, reasoning and decision-making; it relies on both short-term and long-term memory to recall and process information (Baddeley & Andrade, 2000; Kosslyn, 1994, 2005; Pylyshyn, 1973). Visualization is influenced by many factors, such as previously stored information (e.g. a visual experience or a sound), frequency of exposure to sensory input (e.g. viewing data), repetition in recalling information, conscious awareness and other variables (Baddeley & Andrade, 2000; Kosslyn, 2005; Pylyshyn, 1973).

Individuals have varied capacity to form mental images; some are referred to as *imaginers*, since they rely on visualization to perform cognitive tasks, whereas other individuals are thought to use verbal-analytical strategies for cognitive processing and are referred to as *verbalizers* (Kozhevnikov, Kosslyn & Sheppard, 2005; Paivio, 1971). Research supports a distinction between individuals who are high level imaginers and lower level imaginers (Katz, 1983; Pylyshyn, 1973). Some imaginers are thought to be more adept at visualizing objects, while others tend to visualize spatial relationships (Kozhevnikov et al., 2005; Price, 2009). A further differentiation has been made in the level of *vividness* of imagery, which is the acuity or closeness that an image approximates actual perception (Baddeley & Andrade, 2000). Vividness is thought to be related to regular retrieval of information from long-term memory, and has been linked to both cognitive and motor responses in learning (Baddeley & Andrade, 2000; Katz, 1983). Psychometric surveys, such as the Vividness of Visual Imagery Questionnaire (VVIQ), have been developed to measure individual differences in vividness of visual imagery (Baddeley & Andrade, 2000; Campos & Pérez-Fabello, 2009).

B. Visualization in Professional Practice. Use of visualization, or mental imagery, has been well documented as a means to alter cognitive processes and perceptions of individuals for a variety of outcomes. In sports and exercise, for instance, mental imagery has been used to enhance motor performance and motivation (Kossert & Munroe-Chandler, 2007; Martin, Moritz & Hall, 1999). In healthcare, visualization and mental imagery has often been associated with enhancing therapeutic outcomes, such as relief of pain and anxiety or for rehabilitation (Borkovev & Ruscio, 2001; Gosden, Morris, Ferreira, Grady & Gillanders, 2014; Van Leeuwen & Inglis, 1998). Visualization has also been explored as an adjunct to education to enhance the performance of clinical skills, including learning basic venipuncture and surgical skills in medical students (Arora et al., 2010; Bathalon, Dorion, Darveau, & Martin, 2005; Geoffrion et al., 2012; Sanders, Sadoski, van Walsum et al., 2008; Sanders, Sadoski, Wasserman et al., 2007). Shavell (2013) argued that in dentistry visual imagery and perception is crucial for conceptually visualizing the form and fit of teeth in order to "properly sculpt restorations, fabricate provisional restorations, critically analyze work returned from the laboratory" (p. 7).

In nursing, Eaton and Evans (1986) appear to have conducted one of the earliest research studies on the mental imagery ability of nursing students, having proposed that examining mental imagery might improve teaching of psychomotor nursing skills. Eaton and Evan's study focused specifically on enhancing the imaging ability of students with low ability to form images. Later, Bachman (1990) studied the use of mental imagery in support of psychomotor skills of nurses learning one-rescuer cardiopulmonary resuscitation and Bucher (1993) considered the role of imagery skills with physical practice and mental rehearsal in the execution of psychomotor skills. Although there is potential relevance for use of visualization and mental imagery in developing skills through nursing education, there is a dearth of other published research and findings in this area of nursing practice since 1993.

What little available literature on use of visualization or mental imagery by nurses mainly reflect therapeutic interventions for clients in clinical practice in areas such as pain management and mental health (Antall & Kresevic, 2004; Stephens, 1993), rather than as a component of the nurse's skills set. However, my research results (Chapter 4) and other studies related to use of telehealth technology (e.g. Edwards, 1998; Purc-Stephenson & Thrasher, 2010; Romero, Angelo & Gonzalez, 2012) identified visualization of a person receiving care as an essential element to clinical practice. In a meta-ethnography by Purc-Stephenson and Thrasher (2010), for instance,

nurses used telephone triage to obtain information to "construct a mental image of the caller and their situation" (p. 490) to inform decisions on urgency of the health matter and what information should be given to the caller. Such activities of assessment, clinical reasoning and decision-making are core to nursing practice and care of the person (Benner, Sutphen, Leonard & Day, 2010; Babenko-Mould, Lethbridge & Andrusyszyn, 2014; Tanner, 2006). Links have been made between visualization in nursing practice to both clinical reasoning (Edwards, 1998; Edwards, Sadoski & Burdenski, 2004) and decision-making (Rayo et al., 2015; Wilbanks & Langford, 2014).

Based on the available literature and results for *Getting a Picture* I believe that visualization in clinical practice is an important skill for nurses to bring together pieces of digital data from technologies to inform clinical reasoning and decision-making in provision of care through telehealth. From my experience in the research process, I further believe visualization, as an adjunct to conceptualization, is an important skill for the nurse researcher. As illuminated in my explication of ConGT (Chapter 5) and reflections (Chapter 6), visualization and conceptualization were integral in analysis of data and facilitated decision-making in development of theory. Grounded theory is characterized as an inductive qualitative method, and employs inductive reasoning "that begins with study of individual cases and extrapolates them to a conceptual theory" (Charmaz, 2006, p. 188). Visualization has been linked to both inductive reasoning and deductive reasoning (Edwards, 1998; Knauff & Johnson-Liard; 2002), and these forms of reasoning guide decision-making in the nursing process for clinical practice and research (Babenko-Mould et al., 2014; Polit & Beck, 2012).

7.2.2. Technology in Visualizing a Whole and Accurate Picture

Use of technology is ubiquitous in nursing practice as computerized systems and digital modalities are increasingly used to communicate, share information and store data in VEs across various settings (Care, Gregory & Chernomas, 2014; Miller, 2007). In my dissertation work, I highlighted some specific examples of technologies nurses use to get a visualization in both provision of care (e.g. RPM, electronic medical records, and telephone) and research (e.g. NVIVO 10, Excel® and PowerPoint®). However, visualizing a whole and accurate picture strictly through technology is not without challenges, as was demonstrated by participants who described *Getting the Wrong Picture* with use of telehealth technologies and in my own attempt

to use analytical software in data analysis. In *Getting the Wrong Picture*, participants highlighted a risk of compromising health of the person receiving care through inaccurate visualization of the person's condition based on the availability and types of data; in many situations there was fragmentation of the person's data across disparate technologies and systems. In Chapter 5 and Chapter 6 I described both fragmentation of data and challenges to bring the pieces together for conceptualization in the analytical process for a research study; I did not use NVivo 10 optimally due to my own skills, but also found the functionality of NVivo 10 did not align with my way of visualizing. Before continuing to address the challenges to visualizing a whole and accurate picture with use of technology, I now describe some characteristics and dynamics that influence development of a visualization when using technology.

Common to most technologies is that data collected from one source is converted to a digital format for transmission and stored for use (Nelson & Staggers, 2014; Schlacta-Fairchild et al., 2014). An exception to this can be synchronous audio or video sessions, such as use of telephone or cameras; however, in many situations even these can be recorded and stored for use at a later time (Bashshur, Shannon, Krupinski & Grigsby, 2011; Schlacta-Fairchild et al., 2014). With RPM, each piece of data from the person is received, separated and stored automatically by the technology for recall by the clinician. In the majority of cases involving RPM, recall of the data is asynchronous, in that the clinician will view the data at some point after the data has been collected and stored (Barnett & Sheetz, 2003; Schlacta-Fairchild et al., 2014). In this situation, each piece of data is a discrete segment of a bigger picture and becomes spatially and temporally distanced from the person to whom it represents. This digital fragmentation of information that represents part of the whole person has been identified as a potential risk for limiting what can be "seen" of a person, decontextualizing the person and depicting the real person (Barnard, 2009; Locsin, 2009; Sandelowski, 2002).

Analytical software in research (e.g. NVIVO 10) is also asynchronous, since coding occurs at various times after data collection. In analysis and coding there are a number of digitally-mediated steps that data passes through from collection to storage by the software. For instance, an audio recording of a participant interview is often collected and then transcribed to an electronic document (e.g. Word® document) for upload into the NVIVO 10 computer software. In some cases it is necessary to further convert data into a format the technology can

process, such as hand-written notes (McLafferty & Farley, 2006). In this scenario, there can be a varied and significant time lag from interview to analysis and, similar to RPM, the data is separated from the original source. Also similar to RPM, the data is fragmented through a coding process in analysis, however this is not done automatically by the technology – this fragmentation is done at the discretion of the researcher (Li & Seale, 2007; McLafferty & Farley, 2006; Roberts & Wilson, 2002; Russell & Gregory, 1993). As outlined in Chapters 5 and 6, there is an element of judgment and interpretation inherent to this fragmentation of data during the coding process.

Data that is reduced from the whole can become decontextualized from the source of origin (e.g. person, place and process) due to fragmentation, distance and time (St John & Johnson, 2000; Sandelowski, 2002). It is then necessary for the receiver of the data to retrieve the fragments from the technology and reassemble the pieces to develop a visualization as described by participants in *Getting a Picture* (Chapter 4) and in my reflections (Chapter 6). As outlined in Chapter 4, retrieving data fragments and reassembling the data in the clinical setting with RPM or other telehealth technologies is essential in the provision of safe, appropriate and holistic care of the person. The intricate and iterative nature of data collection and the analytical process described in Chapters 5 and 6 to produce *Gettng a Picture* illustrates some of the complexities of bringing data fragments together with technology to visualize and conceptualize ConGT research. Arguably, retrieval and reassembly of data fragments to visualize and conceptualize nursing research would be equally essential for generation of quality knowledge and theory to inform nursing practice. Professional standards mandate that nurse researchers are accountable and responsible to generate quality research that is appropriate to support evidence-informed practice in nursing (Canadian Nurses Association [CNA], 2008; College of Nurses of Ontario [CNO], 2009a; College of Registered Nurses of Nova Scotia [CRNNS], 2012; Polit & Beck, 2012).

I developed a schematic to depict the process of fragmentation and reassembly of data to form a visualization with use of technology (Figure 7.1). This schematic can be applied in use of telehealth technologies (e.g. RPM) or analytical software in research. The solid arrows depict data flowing from the source (e.g. person) and the broken circle denotes the space within the virtual environment, while the broken arrows depict both data fragments and inconsistent temporal flow of data to the recipient (e.g. nurse).

As highlighted in my grounded theory study, additional data from other sources is often also incorporated to form the picture – for the clinician this might be from other telehealth technologies (e.g. telephone and electronic medical records), and for both clinician and researcher this may include data from other technology sources (e.g. web-based information) or non-technology sources (e.g. observation and face-to-face encounters). Thus, the receiver of the data requires technology that supports reconstruction of a whole and accurate picture. Three main challenges attaining this visualization with technology are: (a) space and temporal proximity of the clinician or researcher to the data; (b) the limitations of technology to support visualization; and (c) reconstruction of fragmented data into a picture.

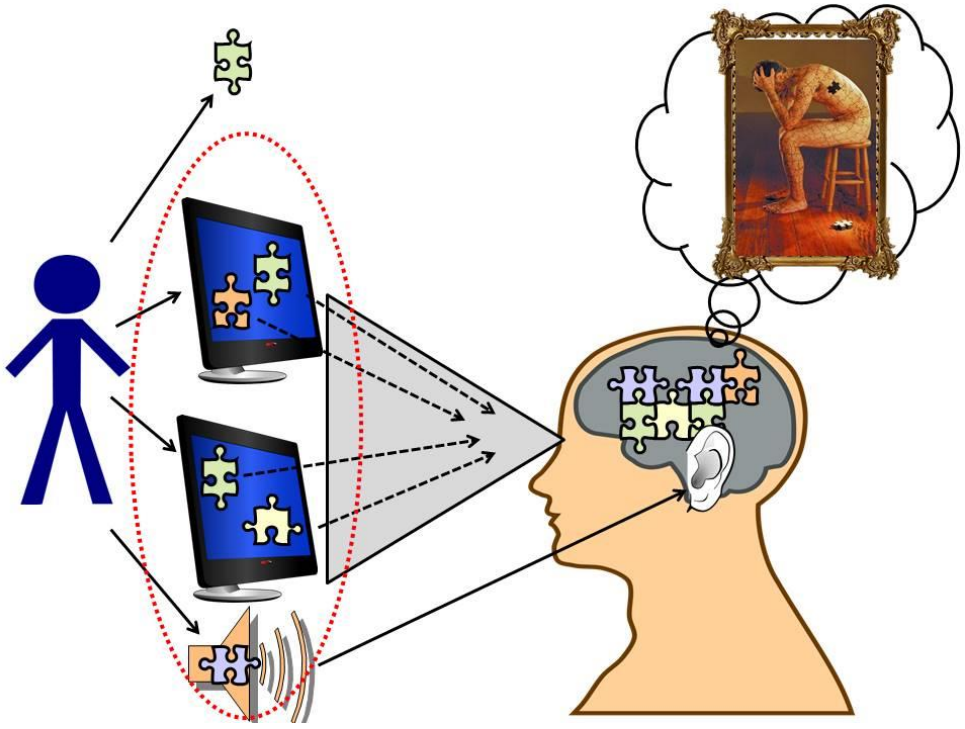

Figure 7.1 Representation of fragmentation and flow of data required to construct a mental image through visualization.

A. Space and Temporal Proximity to Data. By virtue of technology design and the manner in which data is fragmented and stored, there is a natural distancing of the clinician or researcher from the data (Sandelowski, 1995; St John & Johnson, 2000). The nature of space and how we conceive this in philosophical terms, such as a specific location, a geometrical variable or a constructed entity, plays an important role in understanding the perception of

distance between data and the person using the data (Poland, Lehoux, Holmes & Andrews, 2005; Schwamm, 2014).

In describing *virtual environment* at the outset of the research project, I presented the following definition in Chapter 3:

> "a space created with use of digital communications where transmission of data and communications occurs between individuals, and which is considered distinctly separate from what is usually regarded as the "real world" (Lombard & Ditton, 1997; Milgram & Kishino, 1994; Wilson, 1997)."

In light of this definition and thinking of space as either a location or a geometrical variable, one can appreciate that a distance exists between the user of data and the data itself. One can then also appreciate that a distance would exist between each fragment of data and that a further distance exists between the user of the data and the originator of the data study (Figure 6.1). In research, St John and Johnson (2002) proposed that reduction of data with analysis software risks distancing the researcher from the data and results "in loss of meaning and context" (p. 396). Following a similar line of logic, it can be argued that use of telehealth technologies, such as RPM, results in reduction of data and creates a spatial distance that could lead to a decontextualization of the person receiving care. Sandelowski (2002) speaks to the tension of spatiality and virtual environments in relation to nurses demonstrating presence and providing care, highlighting the inherent risk that technology has for losing the context of the person as a "…black-and-white or colorized image; or numeric, graphic, digital, schematic, or other visual display" (p. 66).

From a temporal perspective, the synchronous or asynchronous manner in which data is transmitted and retrieved likely influences the way in which data is perceived; there is a dearth of literature on this topic. However, as exemplified by the sub-categories in *Recognizing Patterns and Trends* (Chapter 4), the condition of the person receiving care may change from the time of data transmission, potentially resulting in a visualization that no longer fits the situation. In a clinical scenario, this lag in time to developing a whole and accurate picture may have significant implications in terms of response to a changing health status and related clinical decision-making for care (Schwamm, 2014). These temporal considerations in visualizing the person may further

contribute to *Getting a Wrong Picture* since changes in biometric data for some chronic health issues, such as diabetes and heart failure, can be subtle and evolve slowly over time.

B. Limitations of Technology. As revealed in the experiences of participants who used telehealth technologies (Chapter 4) and my reflections in using analytical software (Chapter 6), there are limitations to which current technologies can assist the clinician or researcher in visualizing a whole and accurate picture. Many limitations are related to design and function of technologies involved, including connectivity between different devices and the ability for technology to support the user in getting a holistic and accurate picture. Two broad areas of limitations I address here are the lack of interoperability and the capacity of technologies.

Interoperability relates to how data is transmitted, shared and retrieved; it entails how different technologies integrate with each other, and also the integration between technology and systems (COACH, 2015; Sutherland, Igras, Ulmer & Sargious, 2000). At the technology level, *physical* interoperability and *semantic* interoperability are significant factors in ensuring connectivity and flow of information from one form of technology to another (Ganguly, Ray & Parameswaran, 2005). Physical interoperability essentially pertains to the physical ability for one device to connect and share data to another device (Ganguly et a., 2005). Semantic interoperability is the ability for technologies to share information between each other, requiring that programming be compatible for technologies to "speak" to each other (Baird, 2007; Ganguly et al., 2005; Miller, 2007). In my study findings (Chapter 4), lack of physical and semantic interoperability was evident to some degree in every setting as demonstrated by electronic medical records and RPM technology that could not physically connect to each other or could not share digital information. This often required participants to navigate more than one form of technology to access data. In conducting the study, lack of physical interoperability was reflected in my use of multiple devices to collect, transcribe and code data; connections between the various technologies were not seamless and I was required to navigate different technologies to access the data. Use of Excel®, Word® and Power Point® programs separate of NVIVO 10 in data analysis also demonstrated lack of *data-level* interoperability, where data is stored and used over several disparate programs (Ganguly et al., 2005).

Heterogeneity of technology and challenges with integration of healthcare information systems often are barriers to expansion of telehealth technologies in clinical settings (Galarraga,

Serrano, de Toledo & Reynolds, 2007; Ganguly, Kataria, Juric, Ertas & Tanik, 2009). The lack of physical and semantic interoperability are largely related to proprietary rights of technology developers and vendors, which is generally understood in terms of protecting copyright, trademark and patent rights (Baird, 2007; Carfazzo & Seto, 2010; Galarraga et al., 2007). However, these types of interoperability issues prevent seamless connection of technologies and sharing of data, resulting in fragmentation of the data to different sources and requiring the user of the technology to navigate multiple technologies to retrieve pieces for establishing a larger picture (Baird, 2007; COACH, 2015; Ganguly et al., 2005; Schlacta-Fairchild et al., 2014).

While lack of interoperability has been identified as a significant factor in receiving and organizing data, technology design to generate a whole and accurate picture or facilitate navigation of technology is also an issue. There is a body of literature that focuses on the technical aspects of computer programming, visualization of data (e.g. dashboards and graphics), interpretation of visual graphics and human-computer interactions in the use of technologies (e.g. Ganguly et al., 2009; Grammel, Tory & Storey, 2010; Wilbanks & Langford, 2014). For instance, even how data is represented by technology can be inconsistent and influencing the meaning of the content (Galarraga et al., 2007). Although the substantive knowledge and technical expertise related to this literature falls outside the scope of my discipline and focus of this dissertation, I noted in Chapter 4 how technology and piecing together data intersects with provision of nursing care with telehealth technology. I also highlighted in Chapter 6 my challenges in using NVivo 10 to enhance visualization in theory development due to the way textual data is displayed on the screen and lack of intuitive functionality of the software. In reference to analytical software, McLafferty and Farley (2006) stated, "some researchers may have difficulty in conceptualizing data when only seeing it on the screen…scrolling back and forth, coding categories and themes. There may be a temptation to print the transcript and revert to manually coding using different coloured highlighter pens" (p. 36).

C. Reconstruction of Fragmented Data. Data that is electronically captured and stored is brought together and represented in a variety of manners for the user, generally in a digital display of numbers, graphics and, in the case of video, a synchronous visual image (Grammel et al., 2010). The machinations and programming for technology to bring the data together involves a series of steps whereby raw data is transformed into data tables, manipulated through steps of filters and calculations, and then mapped to create a visual representation (Ganguly et

al., 2009; Grammel et al., 2010). However, the ability for technology to form the visual representation is dependent upon a number of factors, including volume of data to be brought together, the nature of the program design, and integration with other technologies (Grammel et al., 2010; Karsh, Holden, Alper & Or, 2006). Interoperability, therefore, is also problematic in bringing data together since telehealth networks are often custom built for specific purposes and organizations (Galarraga et al., 2007; Miller, 2007). As highlighted in Chapter 4, these factors created challenges for nurses in navigating technology and bringing together the pieces of data to get a whole and accurate visualization of the person receiving care. Similar constraints can be experienced by researchers in bringing together data fragments and contextualizing the data due to multiple sources, variation in data formats and lack of integration between technologies (McLafferty & Farley, 2006; Russell & Gregory, 1993). Overarching the technical aspects of technology design and connectivity of information sources is the ability of the user to navigate, interpret and interact with the digital visual representations (Grammel et al., 2010; Karsh et al., 2006).

7.2.3 Competency Development for Visualization and use of Technology

Visualization of a whole and accurate picture that integrates use of technology requires development of competencies for the processes of visualizing and conceptualizing, and for use of the technology. Results from my study identified a number of competencies related to knowing the person with use of telehealth technology and operationalizing a ConGT; these competencies are summarized in Table 7.1. Given the complex nature and relationships between visualization (e.g. cognitive and mental imagery processes) and technology (e.g. functionality and limitations) as illuminated in the preceding discussions, it can be surmised that competency development to visualize a whole and accurate picture with technology is also complex. In reviewing Table 7.1, there are overlaps between many of the competencies for knowing the person in a virtual environment and operationalizing a ConGT study. I briefly discuss two broad categories that encompass these overlapping competencies: competency development for visualization and competency development for technology use.

A. Competency Development for Visualization. Developing a mental picture and forming conceptualizations that relate to visualization are similar competencies that span both "*Getting a Picture*" and "Operationalizing a ConGT" in Table 7.1. The connection of both

Table 7.1 *Summary of Competencies for Visualization of a Whole and Accurate Picture with Technology*

Getting a Picture (Chapter 4)
• Developing knowledge and skill to use RPM and other technologies in clinical practice • Navigating technologies to access information • Making interpersonal connections through technology • Interpreting digital data • Developing a mental picture for *Getting a Picture*
Operationalizing a ConGT (Chapter 5 and Chapter 6)
• Conceptualizing elements of the ConGT research process • Forming conceptualizations of codes and categories during the analytical process • Developing knowledge and skill to use analytical software (i.e. NVivo 10) • Manipulating technologies to facilitate data management and retrieve information • Integrating digital data and representations into my own processes for visualization

mental imagery and conceptualization were addressed in Chapter 6 and earlier in this chapter. The nature of interpretation has also been considered in relation to assessing data from technology in the clinical setting and conceptualization in research as it relates to decision-making and analysis, respectively (Chapters 4, 5 & 6).

The development of visualization as a skill has not been well established, yet literature supports the premise that individuals are able to enhance the ability to visualize through engagement in exercises meant to actively stimulate use of imagining, including forms of mental rehearsal (Krejci, 1997). Glaser (2002) also suggested that capacity in conceptualization, where mental imagery is used, can be developed or enhanced. However, challenges remain in understanding the brain processes associated with imagery including neurobiological factors, interpretation of sensory data (e.g. visual or auditory) and role of perception in creating images (Kosslyn, 1994, 2005; Paivio, 1971; Pylyshyn, 1973; Zimmer, 2012). There are competing theoretical views on the nature of visualization and mental imagery, ranging from Paivio's perspective of dual-coding that reflects a combination of visual and verbal stimuli in the

formation of a mental image to the phenomenological view where interpretation influences what is "seen" in the mind's eye (Kosslyn, Thompson & Ganis, 2003; Paivio, 1971; Pylyshyn, 1973; Yuille, 1983). The visual nature of digital data and relationship to interpretation as part of visualization is of significance here; as I highlighted earlier, technology design for graphics and presentation of digital data are elements of human factors engineering to be considered in developing "a clear and accurate image of the person" (Chapter 4, p. 100).

B. Competency Development for Technology Use. Required knowledge and skill for use of various technologies in nursing practice is one competency common across both "*Getting a Picture*" and "Operationalizing a ConGT" (Table 7.1). Closely related to this competency are navigation of data sources and accessing data, which seem similar for both telehealth care and analytical processes in facilitating a visualization of a whole and accurate picture assisted by technologies. There is little research that focuses specifically on competencies related to the use of telehealth technologies in nursing; most findings of competencies are secondary to the primary research focus or pertain to the broader fields of information and communication technologies (ICT) and nursing informatics (e.g. Gassert, 2008; Hart, 2008; National Initiative for Telehealth [NIFTE], 2003; Staggers, Gassert & Curran, 2002). *ICT* is defined as encompassing "all those digital and analogue technologies that facilitate the capturing, processing storage, and exchange of information via electronic communication" (Canadian Association of Schools of Nursing [CASN], 2014, p. 13). *Nursing informatics* is defined as "a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, knowledge, and wisdom in nursing practice, education, research and administration" (Nelson & Staggers, 2014, p. 512). Competencies for ICT and nursing informatics that overlap with those for technology in Table 7.1 at a beginning level for nurses include (CASN, 2014; Staggers et al., 2002):

a) Knowledge and basic skills to use computers and telecommunication devices;
b) Use of intranet and network systems to locate, access and retrieve data;
c) Ability to use applications and basic desktop software (e.g. word processing programs, email, multimedia programs, documentation, etc.); and
d) Navigation of operating systems, file servers, and peripheral devices (e.g. printers, zip drives, etc.)

Foundational competencies in ICT, such as device use and application use, have become routine in daily life and considered foundational competencies to telehealth and informatics (CASN, 2014). However, one qualitative study identified *Technical "Know-how"* as a category encompassing new skills that practicing nurses needed to learn in order to use a variety of e-Health technologies, such as RPM (Arnaert, Beaulieu, Nagel & Gabos, 2012). *Technical "Know-how"* included competencies for: a) use of hardware (e.g. camera and tablets) and software (e.g. programs); b) encryption and privacy; c) infrastructure and connectivity; and, d) trouble-shooting technology (Arnaert et al., 2012). Given that many of these competencies are considered basic level competencies for ICT and nursing informatics, there may be gaps in nursing education for competency development in use of technology.

There is often an assumption that students entering into baccalaureate nursing programs have computer skills. However, studies have indicated that levels of basic computer skill for both new and graduating nursing students vary and that there are often lower abilities for skills like navigating databases and managing spreadsheets (Fetter, 2009; Hart, 2008; McDowell & Ma, 2007). Ability to navigate databases has implications given the increased use of electronic health records and other health information systems in clinical nursing practice settings (Gassert, 2008; McDowell & Ma, 2007). Furthermore, incorporation of ICT and nursing informatics into baccalaureate nursing curricula is often lacking or inconsistently integrated into nursing programs (Fetter, 2009; Gassert, 2008; Ornes & Gassert, 2007). Initiatives have been undertaken at the national and international levels to build capacity for both nursing programs and nurse educators, and to gain consensus on competencies for ICT, nursing informatics and other technologies (CASN, 2016; Fetter, 2009; Saratan, Borycki & Kushniruk, 2015). An example has been the development of teaching strategies and methods to integrate digital health into nursing curricula using a peer leader group of digital health champions in university and colleges across Canada (CASN, 2016).

Specific to development of competencies for telehealth technologies in nursing practice, it is recognized that preparation in additional knowledge and skills is required to deliver holistic, safe and appropriate care (CNA, 2007; College of Registered Nurses of British Columbia [CRNBC], 2016; College of Registered Nurses of Nova Scotia [CRNNS], 2014). Although there is an obligation for registered nurses to develop and maintain competencies for practice (CNO, 2009a; CRNNS, 2012; International Council of Nurses [ICN], 2007), there are few resources to

Table 7.2 *Resources Supporting Nursing in Telehealth Practice in Canadian Jurisdictions*

Province or Territory	Practice Guideline for Telehealth[1]	Practice Guideline for Telephone	Referral to CNA (2007)[2]	Assistance through Consultation[3]	Referral to Other Resources
Alberta (CARNA)			**X**		CNPS infoLaw[4]
British Columbia (CRNBC)	**X**				
Manitoba (CRNM)		**X**		**X**	
Newfoundland and Labrador (ARNNL)		**X**		**X**	CNPS infoLaw[4]
New Brunswick (NANB)				**X**	CRNNS (2014)[5]
Northwest Territories and Nunavut (RNANTN)				**X**	Employer policies
Nova Scotia (CRRNS)	**X**				
Ontario (CNO)	**X**				
Prince Edward Island (ARNPEI)				**X**	
Quebéc (OIIQ)				**X**	Québec Nurses Act
Saskatchewan (SRNA)				**X**	CNPS infoLaw[3]
Yukon Territories (YRNA)					

[1] Includes “Telepractice”, “Telenursing” and similar terms
[2] Canadian Nurses Association (2007) *Position Statement – Telehealth: The Role of the Nurse*
[3] Consultation of practice support and application of professional standards of practice and other practice guidelines
[4] Canadian Nurses Protective Society (2009) *infoLAW: Telephone Advice*
[5] College of Registered Nurses of Nova Scotia (2014) *Practice Guidelines: Telenursing*

identify specific requirements of competencies for telehealth technology (Table 7.2) and few formal opportunities exist to facilitate development of competencies for telehealth technology. In relation to detailing competencies required specifically for telehealth technology use, Table 7.2 illustrates the gaps and inconsistencies in providing guidelines and support for this area of nursing practice across Canada. This may reflect the perceived current need to support telehealth practice, however four jurisdictions have dedicated telehomecare programs (i.e. British Columbia, Ontario, Quebec and New Brunswick) and the overall enrolment of persons receiving telehehomecare in Canada had increased by 54% from 2012 to 2014 (COACH, 2015).

Development of competencies in telehealth technology is mainly facilitated through orientation, on-the-job training or vendor education sessions (CNO, 2009b; ICN, 2007; Schlacta-Fairchild, Varghese, Deickman & Castelli, 2010). In terms of formal competency development, structured educational programs and training may be offered through dedicated programs for telehealth (e.g. the Ontario Telemedicine Network [OTN] Telehomecare Centre[4]). The Registered Nurses' Association of Ontario (RNAO) supports competency development in a wide range of telehealth and clinical technologies through the Nursing and eHealth Project[5] and provides online modules, education sessions and a nurse educator resource to nurses (RNAO, 2012). Centennial College (2016) in Toronto, Ontario, is one of the few educational institutions to offer a specific course in telehealth; this course covers concepts and standards related to various telehealth applications that rely on ICT systems.

There is a dearth of literature, particularly research studies, to address requisite competencies for incorporation of technologies into the practice domain of research. Technical competency for navigating analytical software seems parallel to that of competencies for ICT and nursing informatics. At the baccalaureate level, McDowell and Ma (2007) described that experience with spreadsheets did not increase and there were low rates in using statistical programs; both of these competencies would likely be an asset to development of knowledge and skills for analysis.

In summary to this point in this chapter, visualizing a whole and accurate picture with use of technology is a complex undertaking in the clinical and research domains of professional

[4] OTN Telehomecare Centre http://telehomecare.otn.ca/
[5] RNAO http://rnao.ca/ehealth

nursing practice. Visualization, as it relates to creating a mental image and conceptualizations, involves sophisticated neurobiological and physiological processes within the brain. Though these processes within the brain are not yet fully understood, it is known that visualization incorporates memory, stimuli (e.g. verbal and visual) and interpretation to create a mental image. It is also understood that individuals have varied capacity to visualize and different levels of vividness to their mental images, and that individuals tend to better visualize either objects or spatial relationships. When integrating technology into visualization, whether to know a person or to analyze in research, limitations and functionality of technology can influence the wholeness or accuracy of a mental image. Further, requisite competencies to use technology (e.g. navigate systems and bring together data) are essential to visualizing a whole and complete picture; however, competencies for technology use are not well-defined for telehealth or research, and gaps for basic knowledge and skills for ICT and nursing informatics seem evident in nursing education.

7.3 Implications for Nursing

The findings from my research study and operationalizing a ConGT methodology highlighted a complex intersection of visualization, conceptualization and use of technology in getting a whole and accurate picture. These findings have several implications in the domains of professional nursing practice for practice, education, policy, and research as summarized in Table 7.3.

7.3.1 Practice

The research focus of this dissertation was to explore how nurses know the person in the context of practice with use of technology in a virtual environment (VE). Although RPM was the technology of focus at the outset of the study, it was revealed that nurses might use a number of other technologies including telephone, video and electronic medical records to know the person. As well, nurses used data from outside the VE (e.g. paper documentation or in face-to-face clinical encounters) to visualize the person (Chapter 4). The research results and my discussion in the dissertation illuminated how data for *Getting a Picture* of a person or to conceptualize in research is fragmented requiring navigation of various data sources and technology. This has implications for nursing clinical practice with telehealth, including identification and

Table 7.3 *Implications for Professional Nursing Practice*

Domains	Implications
Practice	• Identify core requisite competencies required of nurses in use of technology (e.g. ICT*, nursing informatics and telehealth) and promote development of requisite competencies for technology use in practice • Adapt practice to provide holistic, safe and appropriate care in nursing practice using telehealth technologies
Education	• Explore and evaluate mental imagery as a strategy in nursing education • Promote integration of competency development for ICT and telehealth technologies into basic nursing education
Policy/ Administration	• Standardize the taxonomy for ICT, nursing informatics and telehealth • Standardize core competency and practice standards for telehealth across Canada
Research	• Build on the current grounded theory "*Getting a Picture*" to include broader use of telehealth technologies, other domains of nursing practice (e.g. distance education) and other healthcare professionals • Validate components of the grounded theory "*Getting a Picture*" (e.g. evaluate links to established competencies) • Investigate the potential relationship of mental imagery and technology use in clinical practice (e.g. telehealth technologies) and research

development of competencies to know the person for provision of safe, appropriate and holistic care.

The legal, ethical and moral imperatives to support competent nursing practice in Canada are imbedded into professional standards or standards of practice in each jurisdiction (e.g. CNO, 2009a; CRNBC, 2012; CRNNS, 2012). Most documents that outline standards, and the guidelines that specifically address telehealth technology (Table 7.2), broadly refer to competencies required of nurses in practice. The practice guidelines for telehealth identified in Table 7.2 speak to: (a) use of ICT in practice; (b) the nurse's obligation to provide safe and

appropriate care; (c) the nurse's responsibility and accountability to maintain competence in practice; and (d) potential requirement of necessary education and preparation to support practice with telehealth technologies (CNO, 2009b; CRNBC, 2011, 2016; CRNNS, 2014). However, the requisite competencies are not well detailed or defined, and there are few referenced sources of evidence within the documents to refer nurses to; most evidence supporting the telehealth guidelines for nursing telehealth practice was published before 2005. Although nurses bear the obligation and responsibility for safe and ethical telehealth practice, in most situations nurses must self-assess competencies for decisions related to maintaining competency in the absence of clear guidance or evaluation tools. The lack of well-delineated competencies to inform quality nursing practice with telehealth technology, the need for more current evidence to support competency development and the absence of standardized tools to evaluate competencies are challenges to supporting delivery of quality care.

Locsin (2005) regarded technological competency in nursing as "the ability to use healthcare technologies to continually know and understand the patient" (p. 123). Technological competency includes the proficient use of technology to enhance care and is one aspect to knowing the person and perceiving "human beings as whole and complete in the moment" (p. xix, Locsin, 2005). From my dissertation work, both visualization and use of technology are requisite competencies for the nurse using technology in telehealth practice and research. While visualization is not specifically noted as a competency in nursing practice, navigation and use of technology for nursing practice in Canada are reflected as requisite competencies (CNA, 2008; CNO, 2009a, 2009b; CRNNS, 2012). There is a body of literature from which to begin identifying and delineating core competencies for telehealth technologies and other technologies in nursing practice. Identification and integration of core competencies to support nursing practice in telehealth, ITC and nursing informatics has been recommended in numerous literature sources (e.g. Arnaert & Macfarlane, 2011; CASN, 2013; Chapter 2; NIFTE, 2003; Schlacta-Fairchild et al., 2014).

One specific project that can be used to identify and begin delineating core competencies is a scoping review to build on the foundational work of telenursing competencies (ICN, 2007) and to include similar competencies shared with ICT and nursing informatics. Scoping reviews are a useful tool to provide a broad overview of a topic area, and can be used to map concepts related to a specific focus (e.g. competencies in telehealth) and report on types of evidence in a

particular field (Joanna Briggs Institute, 2015). A second project would be to use the theory and model for *Getting a Picture* (Chapter 4) to evaluate current professional standards, standards of practice and practice guidelines for gaps in required evidence and knowledge to inform nursing practice in telehealth.

Another implication in the clinical setting is having the infrastructure and a supportive environment to facilitate nursing practice. *Getting a Picture* (Chapter 4) highlighted how fragmentation of the data through technology and issues with interoperability can factor into the nurse's ability to bring the pieces together to form a sense of wholeness. Thus, addressing issues of interoperability to reduce fragmentation and minimize the number of technologies that nurses need to navigate is imperative to enhance getting a whole and accurate sense of the person, and to promote safe and holistic nursing care (Macdonald, 2008). For instance, integration of technologies that are physically and semantically compatible would consolidate data for ease of access, allow for timely communication of information and reduce the risk of missing data (Cafazzo & Seto, 2010; CASN, 2013; Chapter 4; Galarraga et al., 2007). More efficient exchange of information and decreased requirement to navigate multiple platforms decreases workload (e.g. extraneous tasks) and often promotes uptake of technologies in practice settings (Baird, 2007; Macdonald, 2008). As well, configuring digital displays and dashboards to better represent data would facilitate better visual sensory input for nurses in telehealth practice and support interpretation in the visualization process; such attention to human factors engineering and human-computer interactions would further enhance the quality and safety for telehealth care (Faisal, Blandford & Potts, 2012; Wilbanks & Langford, 2014).

7.3.2 Education

The use of mental imagery as a means to enhance motor skill development for students has previously been explored in nursing education (Bachman, 1990; Bucher, 1993; Eaton & Evans, 1986). While some promising results from these explorations were reported, a limitation commonly cited in the studies was use of small sample sizes (Bachman, 1990; Bucher, 1993; Eaton & Evans, 1986). However, since these studies there does not seem to have been more recent investigations done with mental imagery in nursing education. Bucher (1993) indicated that less emphasis was being placed on development of motor skills, and hypothesized that this was related to a shift of focus in nursing education away from motor skills to cognitive skills.

However, use of mental imagery to enhance practice skills has been reported more recently in medicine for venipuncture and surgery (Arora, et al., 2010; Geoffrion et al., 2012; Sanders et al., 2007; Sanders et al., 2008), and has been proposed for use in dentistry (Shavell, 2012). With the exception of the study by Geoffrion et al. (2012), which also had a small sample size, these more recent research studies reported positive outcomes in terms of enhanced motor skills.

In light of these developments, use of mental imagery as an adjunct to other strategies in nursing education might be re-considered given advances made in understanding cognitive learning styles, use of visualization for mental rehearsal and evaluating learning outcomes. Benner et al. (2010) advocated the development of clinical imagination that help students to "both recognize significant changes in a patient's condition and make a pervasive argument for a change in therapy" (p.143). Thus, the relationship of mental imagery and visualization to cognitive tasks, such as clinical decision-making, might also be more formally investigated in nursing education. As previously noted, vividness in imagery is thought to be linked to both cognitive and motor responses in learning (Baddeley & Andrade, 2000; Katz, 1983).

The efficacy of visualization as a strategy in nursing education and as a competency for telehealth and research will need further exploration. For instance, the relationship of vividness in imagery to clinical decision-making through quasi experimental designs or randomized control trials may help provide evidence to support both learning and clinical practice. Positive outcomes for either enhanced motor or cognitive skills through visualization may provide alternative strategies for nursing education and potentially offer an effective and low-cost means of simulation learning (e.g. development of venipuncture skills). Development of clinical imagination would also provide students an opportunity to rehearse clinical reasoning and contextualization of situation/practice (Benner et al., 2010).

Although competencies for ICT and nursing informatics are reflected in entry-to-practice competencies (e.g. CNO, 2014; CRNBC, 2015) and a strategy recommended to enhance ICT capacity of nurses (CNA, 2006), there is no literature available in the Canadian context that indicates how well prepared baccalaureate students are in these areas or for use of telehealth technologies. However, it is recognized that competencies for ICT and nursing informatics need to be incorporated in curricula for both basic and graduate nursing education (CASN, 2013; CNA, 2006; Staggers et al., 2001). A significant gap to incorporating ICT skills to nursing

curricula is lack of formally prepared faculty with expertise in ICT, nursing informatics and telehealth (Booth, 2006; Care et al., 2014). Booth (2006) recommended that faculty development is required in informatics and eHealth; he suggested a needs assessment be completed by individual faculty as part of curricula redesign to identify required skills and knowledge. One strategy to build capacity of educators and integrate digital health into the nursing curriculum and develop teaching strategies for relevant was the creation of a Digital Health Faculty Peer Network[6] through CASN (2016). This digital health champion program provided opportunities for sharing information, collaboration and mentorship in support of incorporating core informatics competencies into nursing education (CASN, 2016). Such initiatives need to be expanded and ongoing at the nurse educator level, but also need to be evaluated for outcomes at both the curriculum level and student performance.

7.3.3 Policy/Administration

As evident in Table 7.2, there is inconsistency in the support of nursing practice with telehealth across jurisdictions in Canada. This may be due to scale of telehealth implementation in some regions (e.g. only four provinces have dedicated telehealth programs) or possibly related to available resources (e.g. expertise in telehealth, financial or human resource). However, a significant challenge is that each province and territory is autonomous in regulating its own healthcare professionals; thus, there is a lack of standardization between jurisdictions (Care et al., 2014). Universal to all jurisdictions is the impetus of having standards and competencies to protect the public interest and safety through promoting good nursing practice, evidence-informed care and setting education criteria for nursing (College & Association of Registered Nurses of Alberta [CARNA], 2013; CRRNS, 2012; Nurses Association of New Brunswick [NANB], 2012). Yet, professional standards and standards of practice for registered nurses are quite broad in nature as they delineate the minimum level of expected performance of nurses and criteria for which performance can be measured (CRNBC, 2012; CRRNS, 2012; NANB, 2012). Of note, few jurisdictions specifically mention the term *technology* and its application(s) in their standards documents; references to technology are typically broad, stipulating that nurses use it appropriately and in relation to security of documentation. An example is NANB (2012) that

[6] http://www.casn.ca/2015/03/digital-health-nursing-faculty-peer-network/

only refers to technology in relation to client-centered practice and stated "…supports innovation by implementing and evaluating new knowledge and technology" (Section 3.6, p. 11).

Given the increasing use of telehealth technologies in nursing practice and the legislated obligations to promote delivery of safe care, there is an opportunity to bridge gaps in policy (Care et al., 2014); as evidenced in Table 7.2, there is already precedence for sharing and collaboration in supporting nursing practice. There are recommended and/or required competencies specific to nursing practice with telehealth to support safe and appropriate provision of care (e.g. CRNBC, 2016; CNO, 2009b; CRNNS, 2014; ICN, 2007). Three jurisdictions in Canada outline requisite competencies specific for use of telehealth technologies (CNO, 2009b; CRNBC, 2011, 2016; CRNNS, 2014), two jurisdictions provide guidelines for nursing care using telephone and the remaining jurisdictions mainly provided consultation and/or direction to other resources (Table 7.2). Currently, however, most jurisdictions rely on consultation and interpretation of professional standards or practice standards required of all registered nurses to determine competencies that involve use of technologies.

As previously noted, efforts have been made at a national level to raise awareness for identification of core competencies for technologies in nursing practice and to incorporate healthcare technologies in nursing education. In support of these initiatives, particularly in conjunction with identifying core competencies, achieving standardization in the taxonomy of healthcare technologies and terminologies would be of benefit for clinical practice, education and research. For instance, *telehealth*, *telemedicine*, *telehomecare*, *telenursing*, *nursing informatics* and others are often used interchangeably (Care et al., 2014; Schlacta-Fairchild et al., 2014). While there are commonalities with some of these terms, and overlap in some of the ICT functions, clarity on concept definitions and meanings would be beneficial for both education and research purposes. There are currently several national stakeholders (e.g. Canada Health Infoway, CASN, CNA, COACH) that can be brought together to build consensus on the terminologies and definitions associated with healthcare technologies; potentially this might involve leadership from Health Canada and the federal Minister of Health.

7.3.4 Research

There are a number of opportunities for research that arise from my dissertation work. The research study (Chapter 4) focused on nursing practice, however in a number of the settings

where I conducted my research other healthcare professionals worked collaboratively with the nurses and used the same telehealth technologies. Building on the theoretical model for *Getting a Picture* (Figure 4.1), exploring this model with other healthcare providers using a more general qualitative approach would provide insight to how knowing the person is reflected in other disciplines. As this is a substantive theory related to a particular focus, an alternative extension to the current theory would be to develop a higher level formal grounded theory that is more abstract of person, time and place (Glaser & Strauss, 1967; Polit & Beck, 2012). For example, in relation to my earlier descriptions of visualization and concept of space, the processes in Figure 4.1 could be evaluated to determine if they apply to knowing a person without the virtual environment necessarily being constrained by technology.

Validation of each of the categories and the model, or testing of the entire theoretical model can also be undertaken (Polit & Beck, 2012; Walker & Avant, 2005). Validation of the categories and model could be achieved by using focus groups of other nurses who use other types of technologies to know a person, or in other settings. Although my dissertation was focused on telehealth in clinical care and engagement in the research process, I believe visualizing a whole and accurate picture with incorporation of technology has application in other domains of professional nursing practice such as education. There has been increasing use of technologies to support delivery of nursing education by distance, including professional development for practicing nurses, individual courses for baccalaureate nursing students and entire degree programs for graduate students (Gunderson, Theiss, Wood, & Conti-O'Hare, 2014; Mancuso-Murphy, 2007; Mastel-Smith, Post, & Lake, 2015). Having a picture or creating a mental image of the student in these situations has been identified as important to creating social presence and promoting engagement in online class environments (Gunderson et al., 2014; Mastel-Smith, 2015).

Validation of the theory could also include mapping competencies identified for ICT, nursing informatics and telehealth practice to the main categories and sub-categories. Surveys, focus groups or a Delphi process might be used to gain consensus on relationships between competencies and the levels of categories for clarification or further exploration (Polit & Beck, 2012).

Testing the theory and model could also be done. For example, since visualization has been associated as a core variable to knowing the person with use of technology, a hypothesis can be made that ability to create mental images or the vividness of imagery may correlate to some aspect of health outcome. Essential to this would be determining existing valid screening tools (e.g. Vividness of Visual Imagery Questionnaire) or developing appropriate measurement tools. Subsequent results from validation and testing could potentially help: (a) identify and support decisions for competencies for telehealth technology; (b) define objective criteria by which to measure competencies in practice; and (c) provide needed evidence to support clinical practice, education and policy development for telehealth care by nurses.

Finally, as articulated earlier in the chapter and in relation to education, use of mental imagery has been re-introduced as an education strategy to prepare clinicians in development of motor skills. Research work focused on further exploring and evaluating visualization as an adjunct to preparing baccalaureate nurses for entry-to-practice and graduate students for research would be an asset to furthering knowledge development and evidence to support professional practice.

7.4 Conclusion

Through my dissertation work, I illuminated the role of visualization and conceptualization with the use of technology in provision of telehealth care in the clinical setting and the analytical process of a ConGT research study. The research study highlighted how nurses worked to getting a clear and accurate mental image as part of the process to knowing the person receiving care through RPM and other technologies. As the first study identified to directly explore the phenomenon of how nurses know the person, *Getting a Picture* contributed to knowledge on this essential aspect of nursing care. Both the research study and explication of the operationalization of a ConGT methodology contributed to understanding the benefits and challenges in visualizing a whole and accurate picture when using technology, such as some current limitations of technology, the complexity of cognitive dimensions in mental imagery and the development of requisite competencies in professional nursing practice. Given the increased uptake of technologies in nursing practice and the responsibility to provide holistic, safe and appropriate care, this dissertation provides a foundation for further research and education for nursing in a virtual environment.

7.5 Reference

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Chapter 8

Contribution of Collaborators

Contribution of Collaborators

In this chapter, the roles and contributions of the doctoral candidate (Daniel A. Nagel), collaborators and co-authors to development of this dissertation are described in accordance with the guidelines of the Faculty of Graduate and Postdoctoral Studies at the University of Ottawa (2016)[7]. The contributions of co-authors for each of the four manuscripts are outlined in Table 8.1, and the contributions of other stakeholders who supported the completion of this dissertation are acknowledged.

8.1 Research Team Members

The following members comprised the research team for this dissertation:

a. **Daniel A. Nagel**, RN, BScN, MSN, PhD(c) – is a Registered Nurse with a clinical background in community health nursing that includes primary care, home care and clinical coordination. He also has 10 years' experience in nursing education at both the undergraduate and graduate level and an interest in curriculum development.

b. **Dr. Dawn Stacey**, RN, PhD, CON(C) – holds a Research Chair in Knowledge Translation to Patients and is a Full Professor in the School of Nursing at the University of Ottawa. Dr. Stacey is a senior scientist and the Scientific Director of the Patient Decision Aids Research Group at the Ottawa Hospital Research Institute. More specifically, her research program focuses on: (a) patient decision aids; (b) decision coaching; (c) implementation of evidence into practice; (d) telephone-based care; and (e) interprofessional approaches to shared decision making.

c. **Dr. Josephine B. Etowa**, PhD, MN, BScN, RM, RN, FWACN – is a Full Professor and Loyer-DaSilva Research Chair in Public Health Nursing in the Faculty of Health Sciences at the University of Ottawa. Her program of research is grounded in over 25 years of clinical practice in the areas of maternal-newborn and child health (MNCH), and in public health nursing. In addition, Dr. Etowa has conducted a series of grounded theory studies examining the worklife experiences of nurses from various social locations.

[7] *General Regulations* retrieved from http://www.uottawa.ca/graduate-studies/students/general-regulations?cat_1=92

d. **Dr. Wendy Gifford**, RN, PhD – is an Associate Professor at University of Ottawa School of Nursing and Associate Director of the Nursing Best Practice Research Center Ottawa site. Her research program focuses on leadership and knowledge translation, specifically for improving health care delivery and patient outcomes.

e. **Dr. Kathryn Momtahan**, RN, PhD – is a Senior Clinical Research Associate at the Ottawa Hospital Research Institute and has a critical care nursing background. Dr. Momtahan (KM) holds a PhD in Experimental Psychology with a focus on healthcare human factors. She has conducted human factors research in the private sector, as a nurse scientist at the University of Ottawa Heart Institute, and as the Nursing Research Lead at The Ottawa Hospital.

f. **Dr. Shelley Doucet**, RN, PhD – holds the Jarislowsky Chair Interprofessional Patient Centred Care and is an Associate Professor in the Department of Nursing & Health Sciences at the University of New Brunswick (UNB) in Saint John. Her experience includes teaching interprofessional student teams in classroom and clinical settings. As well, her clinical experiences as a Registered Nurse have led her to establish interprofessional health education and practice initiatives and to explore their outcomes. Dr. Doucet's current research is based in primary health care settings, with a focus on children with complex health conditions and their families.

8.1.1 Roles of Team Members

Daniel Nagel (DN) was the primary researcher for this dissertation. As part of the fulfillment of the requirements of the degree of Doctorate of Nursing, DN conceived, participated in and led all aspects of the research study.

Dr. Stacey (DS) and Dr. Etowa (EJ) were dissertation co-supervisors and Dr. Gifford (WG) and Dr. Momtahan (KM) were committee members. All participated in different phases of the dissertation that included: (a) providing content and methodological expertise; (b) approving the research proposal; (c) securing ethics approval for research conducted in Ontario; (d) contributing intellectual content to analysis and manuscript development (Table 8.1); (e) providing consultation and feedback on dissertation components; and (f) reviewing and approving the final version of the manuscripts and dissertation.

Dr. Doucet (SD) assisted with securing ethics approval for research conducted in New Brunswick, and provided: (a) intellectual content to analysis and manuscript development (Table 8.1); and (b) feedback and approval for final version of the manuscript arising from Chapter 4.

Table 8.1 *Contribution of Co-Authors to Manuscripts*

Criteria	Chapter 2 Conceptualizing Telehealth	Chapter 3 Research Protocol	Chapter 4 Study Results	Chapter 5 Methods Paper
Conception or design of the work	DN	DN	DN	DN
Acquisition of data	DN	N/A	DN	DN
Analysis/interpretation of data	DN	N/A	DN	DN
	JP		DS	DS
			JE	JE
			WG	WG
			KM	KM
			SD	
Drafting of the work	DN	DN	DN	DN
Review and revision for intellectual content	DN	DN	DN	DN
	JP	DS	DS	DS
	DS	JE	JE	JE
	JE	WG	WG	WG
	WG	KM	KM	KM
		SD	SD	
Final approval of the manuscript	DN	DN	DN	DN
	JP	DS	DS	DS
	DS	JE	JE	JE
	JE	WG	WG	WG
	WG	KM	KM	KM
	KM		SD	
Accountability for all aspects of the work	DN	DN	DN	DN

8.1.2 Roles in Manuscript Co-Authorship

In addition to the team members listed in the preceding section, Jamie Penner (JP) co-authored the published manuscript from Chapter 2. JP is a Registered Nurse and doctoral candidate at McGill University.

The roles for co-authorship on each of the manuscripts are outlined in Table 8.1 in accordance with the criteria recommended by the International Committee of Medical Journal Editors (2016)[8]. These criteria are:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work;
2. Drafting the work or revising it critically for important intellectual content;
3. Final approval of the version to be published; and
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

8.2 Stakeholder and Funding Acknowledgements

As a requirement for a doctoral fellowship through the Canadian Institutes of Health Research–funded Strategic Training Initiative in Health Research program for Health Care, Technology and Place, DN participated in seminars and received critical feedback from peers and mentors on his proposal and early research findings. With Health Care, Technology and Place - Strategic Training Initiative in Health Research, DN received mentorship from Dr. Holly Witteman (University of Laval) and DS. Transcription of interview data was completed by Elaine Parker.

DN received the following funding support for his dissertation work:

1. $12,000 per year – University of Ottawa (Faculty of Graduate and Post-doctoral Studies) Admission Scholarship;
2. $5,000 (2014) – Saint Elizabeth's Graduate Student Research Award; and,

[8] *Defining the Role of Authors and Contributors* retrieved from http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html

3. $15,000 (2014-2015) – Strategic Research Training Doctoral Fellowship through HCTP.

Appendices

Appendix A

Participant Recruitment Invitation

"How Does the Nurse Come to Know the Patient in a Virtual Environment?" A Research Study on Telehealth

This research study is to explore how nurses who use telehealth technologies in practice, such as remote patient monitoring, get to know the patient.

The goal of this study is to understand and describe processes the nurse uses to get information about the patient in order to understand the patient's context to develop a professional relationship and make clinical decisions for care. Findings from this study will provide valuable information on skills and knowledge required by nurses for providing care through telehealth to help improve nursing practice and provide safe patient care.

We are seeking Registered Nurses who currently provide or have provided care using Remote Patient Monitoring to support adult patients in management of their health.

Participation is completely voluntary. Participants would agree to a one-hour interview, and possibly a second follow-up interview, arranged at a time and place convenient to the participant and interviewer.

Confidentiality of participant identity and any shared information will be strictly maintained.

For more information, please contact:

Daniel Nagel, RN (BC & ON), PhD(c)
Doctoral Candidate
School of Nursing, University of Ottawa
Email:
Phone:

Doctoral Supervisors: Dr. Dawn Stacey and Dr. Josephine Etowa

Appendix B

CONSENT FORM

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Université d'Ottawa
Faculté des sciences
de la santé

École des sciences
infirmières

University of Ottawa
Faculty of Health
Sciences

School of Nursing

Title of the study: Knowing the Person in a Virtual Environment: A Grounded Theory Study of Telehealth in Nursing Practice

Student Researcher: Daniel Nagel, RN (BC & ON), PhD(c)
School of Nursing
Faculty of Health Sciences
University of Ottawa
Email:
Cell phone:

Supervisors: Dr. Dawn Stacey
Email:
Phone:

Dr. Josephine Etowa
Email:
Phone:

School of Nursing
Faculty of Health Sciences
University of Ottawa

Invitation to Participate: I am invited to participate in the abovementioned research study conducted by Daniel Nagel and his supervisors Dr. Dawn Stacey and Dr. Josephine Etowa. I understand that this study is a doctoral project for Daniel Nagel's PhD program.

Purpose of the Study: The purpose of this proposed study is to advance our understanding of the process of how a nurse comes to know the person (the patient) when using telehealth technology to deliver nursing care, particularly remote patient monitoring (RPM).
I understand a qualitative research approach will be used to answer the primary question of the study, "How does the nurse come to know the person in a virtual environment?" This question will help us understand the processes of communication and social interaction between the nurse and the patient when the nurse uses RPM. It will also help us to understand how nurses might have to adapt knowledge and skills acquired through traditional nursing education and practice to the delivery of nursing care using telehealth technologies such as RPM.

Participation: My participation will consist essentially of one or two interviews. I will participate in an initial interview of approximately **one-**

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hour (60 minutes) and, depending on the progress of the study, may be asked to do a follow-up interview of **30 – 60 minutes** in duration. The interview sessions will be scheduled at a time and date mutually agreed to by myself and the researcher, and either be conducted by telephone, Skype or in-person at a location we mutually agree to.

I may also be asked to be observed in my use of telehealth technology, if permission is granted by my supervisor or manager and by the organization I work for.

Risks: My participation in this study will entail that I volunteer my experience and thoughts on the use of telehealth technology use in the delivery of care to patients, and that there are no anticipated risks associated with participation in this study. I understand that I will be volunteering a period of time to participate in the interviews and potential observation experience, and have received assurance from the researcher that every effort will be made to minimize these risks by keeping interview times to the agreed length and allowing me to reschedule, withdraw or terminate the interview as I require.

Benefits: My participation in this study will give me a chance to talk about my experiences with telehealth practice to someone who is genuinely interested in this area and I understand some professionals find this to be a welcome, even rewarding, experience in itself. I will also have the satisfaction of knowing that my participation will contribute to new knowledge that may benefit my own professional practice and the practice of RNs and other healthcare providers who use telehealth technology. I also understand my participation may help promote quality care and health outcomes for patients receiving support through telehealth technology.

Confidentiality and Anonymity: I have received assurance from the researcher that the information I will share will remain strictly confidential. I understand that the contents will be used only for the purpose of this study that explores how nurses come to know a person with use of telehealth technology. I also understand that my confidentiality will be protected by having me communicate directly with the researcher and his supervisors, and that once I am enrolled in the study I will be allocated a unique code number that will be used in the labeling of digital recordings, interview transcripts and any observational notes. Only members of the research team will have access to my information, although I understand that members of the Office of Research Ethics and Integrity, University of Ottawa, may audit the information, as it pertains to this study, for quality assurance. My **anonymity** will be protected through use of the unique code number, and I understand my name and other personal identifying information will not be used in any reports, presentations or publications. If results of this study are published, I will not be identified in any way. If I choose to use Skype for the interview, I understand there is a very small risk that privacy of our conversation may be compromised.

Conservation of Data: The data collected, including digital recordings, electronic files, hardcopy interview transcripts and observational notes, will be kept in a secure manner. Digital information, such as recordings and electronic documents, will be protected with an encrypted security code, and computers used for work in this project will also be secured with user identification and password protection. All participant information obtained during the study will be kept secured in locked filing cabinets in the locked access Nursing Best Practices Research Centre in the Faculty of Health Sciences, at the University of Ottawa. All data collected and

participant information will be kept confidential as required or permitted by law, be kept on the University of Ottawa campus and will be destroyed after ten (10) years after results of the study have been published.

Compensation: I understand no expenses are anticipated for me during the study, and there will be no payment for participation.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be used to maintain the scientific integrity of the study.

Acceptance: I, *(Name of participant),* agree to participate in the above research study conducted by Daniel Nagel of the School of Nursing, Faculty of Health Sciences at the University of Ottawa, which is research under the supervision of Dr. Dawn Stacey and Dr. Josephine Etowa.

If I have any questions about the study, I may contact the researcher or his supervisor (please refer to first page of consent for contact information).

If I have any questions regarding the ethical conduct of this study, I may contact:

Protocol Officer for Ethics in Research
University of Ottawa
Room 154 Tabaret Hall
550 Cumberland Street
Ottawa, ON
K1N 6N5
Tel.: (613) 562-5387
Email: ethics@uottawa.ca

There are two copies of the consent form, one of which is mine to keep.

I agree to my interview being audio recorded (please check):	**YES**	☐	**NO**	☐
I agree being observed in the use of telehealth technology (please check):	**YES**	☐	**NO**	☐

_____ _____
Participant's name [printed] Date [day/month/year]

_____
Participant's signature

_____ _____
Researcher signature Date [day/month/year]

Appendix C

Participant Demographic Information Sheet

Participant ID Number: _____ Date: _____

A. <u>Personal Information</u>

1. Age _____
2. Sex ☐ Female ☐ Male

B. <u>Education</u>

1. Year basic nursing education completed _____
   Year
2. What is the highest nursing credential you earned?

   ☐ Diploma/CEGEP
   ☐ Bachelor's degree
   ☐ Master's degree
   ☐ Doctoral degree
   ☐ Other; Please specify _____

3. What is the highest education credential you have earned?

   ☐ Diploma/CEGEP
   ☐ Bachelor's degree
   ☐ Master's degree
   ☐ Doctoral degree
   Please specify discipline of highest degree _____

C. <u>Work History</u>

1. In total, how many years have you worked as a nurse? _____

2. Where is your current place of work?
   ☐ Hospital ☐ CLSC/Public Healthcare Centre
   ☐ Telehealth Program ☐ Family Practice Office
   ☐ Other (Please specify): _____

3. What is your current job title? _____

4. What are your current job responsibilities (job description)? _____

   _____

5. How long have you worked in your current position: _____years

6. What is the time allotment for your current position?

   ☐ Full-time (100%)
   ☐ Part-time (50%) or _____%
   ☐ Other: Specify the numbers of hours/week: _____

7. Approximately what percentage of time in your current position is dedicated to using telehealth in delivery of care?

   _____ %

8. Prior to this position, had you worked with telehealth technology?

   ☐ No
   ☐ Yes

   If "Yes", please specify:

   a) Approximate length of time _____ years

   b) Type of environment you worked with telehealth in

   ☐ Hospital ☐ CLSC/Public Healthcare Centre ☐ Family Practice Office
   ☐ Telehealth Program ☐ Other: _____

   c) What capacity did you work with telehealth in your previous position? (e.g. what job function did you have in relation to telehealth services?)

   _____

   _____

   d) Approximately what percentage of time in your previous position was dedicated to using telehealth in delivery of care?

   _____ %

Appendix D

Study Interview Guide

Initial interviews will follow this semi-structured guide, with additional probes being generated during the interview in the context of the participant's responses. Following the first interview, questions and probes may be revised or refined in relation to the primary and secondary research questions. As the research study progresses, interview questions will change to reflect concepts and categories identified through analysis and to theoretical sampling that will inform direction of inquiry. In grounded theory, questions will evolve to become more focussed and direct as codes and categories become more defined.

Introduction: [***Participant Name***], thank-you for agreeing to participate in our research study to explore how the nurse comes to know the person in a virtual environment through the use of telehealth technology. This interview will take approximately one hour, however if it is necessary to take a break or if for whatever reason you need to discontinue the interview, please let me know. All information that you provide in this interview will be kept confidential, and your identity will not be revealed.

You have indicated that it is ok for me to record this interview. Is that still ok with you? [***Response***].

If you have any questions or require any clarification, please do not hesitate to let me know.

I would like to start the interview by having you…

1. **Please describe a patient care situation using telehealth where you felt you really knew about the patient.**

   a. What made you feel that you knew this person?

   b. How did you learn what you needed to know about this person?
      - What assessment strategies did you use to learn about the person
      - What sources of information did you use to learn about the person?
      - How did you get to the point of feeling that you had enough information?

   c. In what ways did knowing the person help you in providing your nursing care?
      - How were you able to make the clinical decisions you needed for care of this person?
      - What interventions were you able to make for the care of this person?
      - How did knowing the person affect the health outcomes or health goals of the person?

   d. What might have been more helpful to you in knowing the person better?
      - Reflecting back, what other information about the person would have been useful for you? How might you have gotten this information?

2. What does "knowing the person" mean to you?

a. What do you think is important for coming to "know the person" when you provide care?

b. Why do you feel knowing the person is important when you provide care?

c. How much about the person do you feel you need to know in order to provide care?

d. How has your notion of knowing the person in provision of holistic care changed with the adoption of telehealth technology in nursing practice?

3. How do you come to "know the person" when you provide care through remote patient monitoring?

a. In what ways does the technology help you come to "know the person"?

b. What strategies do you use with this technology to understand the person and the context in which they are in?

c. How do you get enough information to help you determine how to plan your interventions when using technology?

- How do you determine that you have enough information from using the technology to make your clinical decisions?
- Besides the telehealth technology, what other ways might gain insight to the person you care for?

d. Please describe how you are able to develop and maintain/facilitate a professional relationship with your patients using telehealth technology.

- In what ways are you able to be "present" with your patients using telehealth technology?
- How are you able to understand the patient's perceptions of their health status?
- How are you able to appreciate other dimensions of a person's wellness? For example:
    - Mental health status?
    - Emotional status?
    - Spiritual wellness?

e. Please describe a time when you were uncomfortable or uneasy making a clinical decision because you did not feel you had enough information.

- What did you do in that situation?
- What actions did you need to take to get adequate information for your decision?
- Thinking back, what might have been helpful for you to have had adequate information for you to make the best decision?

4. **Please describe your personal experience with using telehealth technology in providing nursing care.**

    a. What other type(s) of telehealth technology have you used in providing care to patients?

    b. How did you feel about your transition to using remote patient monitoring [other telehealth technology] in your practice?

    c. What adjustments did you need to make in your transition to telehealth?

5. **How have you had to adapt your nursing care in using the technology?**

    a. How did you adapt your nursing care to the telehealth environment?

        - Please describe any challenges you experienced in adapting your nursing practice to the technology?
        - Describe any limitations that the technology may have had for you delivering your nursing care in the way you would like.
        - How did you work around these limitations?

    b. How have you changed your approach to providing care through the use of telehealth technology?

        - What changes have you needed to make to your nursing practice in relation to the use of the telehealth technology?

    What has this meant for you in not having face-to-face contact with patients?

Appendix E

Study Observation Guide

This guide will be used by the researcher where observation of the participant in his or her work environment is permitted. The focus of observation will be to gain an appreciation of how the nurse interacts with persons through telehealth technology and to understand the processes required of the nurse in communications with the person, the act of clinical decision making, and other members of the healthcare team. Some aspects of this observation experience will require verbal discussion and clarification with the participant at the time.

Participant ID Number: _____ **Date: _____**

Physical Environment	
Organization – type of services offered, organization of healthcare team	**Physical Environment** – office environment, type of equipment used, proximity to health team
Type of Technology – describe technology, function, types of data collected, transmission of information	**Participant's Use of Technology** – what actions does RN execute, how does RN integrate patient data
Infrastructure Support	
Management/Education – educational & training support for telehealth services, management & leadership support	**Policies/Procedures** – institutional/organizational policies, clinical practice guidelines
Interdisciplinary Collaboration – communication, referrals, types of disciplines involved	**Other Support**

Patient Engagement	
Flow of Information – how is data presented, inputted and integrated; timing of data retrieval	**Workflow Processes** – what steps does the RN follow ta access system, time required to interact with patient
Participant Processes and Activities – delineate steps that the RN takes to navigate telehealth system, input/retrieve data, and respond to patient information	**Patient Processes and Activities** - delineate steps that the patient takes to navigate telehealth system, input/retrieve data and respond to RN information
Observational Fieldnotes – description of observational experience and impressions of the experience.	

Appendix F

University of Ottawa Office of Research Ethics and Integrity Approval

File Number: H10-13-06 **Date (mm/dd/yyyy):** 03/12/2014

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Dawn	Stacey	Health Sciences / Nursing	Supervisor
Josephine	Etowa	Health Sciences / Nursing	Co-Supervisor
Daniel	Nagel	Health Sciences / Nursing	Student Researcher

File Number: H10-13-06

Type of Project: PhD Thesis

Title: Knowing the person in a virtual environment: A grounded theory study of telehealth in nursing practice

Approval Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
12/13/2013	12/12/2014	Ia Partial

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:

PARTIAL APPROVAL:

This partial approval is valid for recruitment of participants where there will be no workplace observations as well as for research done within following organizations:

- The Horizon Health Network sites (HHN permission submitted to the REB February 26th, 2014)
- University of New Brunskwick (UNB permission submitted to the REB March 12th, 2014)
- The Ottawa Hospital and Heart Institute (OHSN-REB submitted to the REB March 12th, 2014)

Other recruitment locations will be added to the certificate as permission letters are received.

File Number: H10-13-06 **Date (mm/dd/yyyy):** 03/12/2014

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement and other applicable laws and regulations in Ontario, has examined and approved the application for ethical approval for the above named research project as of the Ethics Approval Date indicated for the period above and subject to the conditions listed the section above entitled "Special Conditions / Comments".

During the course of the study the protocol may not be modified without prior written approval from the REB except when necessary to remove participants from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the study (e.g. change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur, and new information that may negatively affect the conduct of the project and safety of the participant(s). Modifications to the project, information/consent documentation, and/or recruitment documentation, should be submitted to this office for approval using the "Modification to research project" form available at: http://www.research.uottawa.ca/ethics/forms.html.

Please submit an annual status report to the Protocol Officer four weeks before the above-referenced expiry date to either close the file or request a renewal of ethics approval. This document can be found at: http://www.research.uottawa.ca/ethics/forms.html.

If you have any questions, please do not hesitate to contact the Ethics Office at extension 5387 or by e-mail at: ethics@uOttawa.ca.