Understanding the Complexity of Diabetes and Urinary Incontinence in Older Adults Receiving Home Care Services: Protocol for a Mixed Methods Study

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Abstract
Urinary incontinence (UI) is a very prevalent problem for older adults with type 2 diabetes mellitus (T2DM) receiving home care services. However, the complexities of living with UI and T2DM and providing nursing care for older adults in the home care context have received very little research attention. This article describes a protocol for a convergent, mixed methods research design study to address this knowledge and practice gap. The objectives of the proposed study are to (a) determine the prevalence and correlates of UI in older adults living with T2DM receiving home care services, (b) explore the experiences of older adults living with T2DM and UI receiving home care services, (c) explore the experiences of home care nurses caring for this population, and (d) converge the multiple data sources to provide a deeper understanding of the problem and implications for provision of home care services to this population. The research methods are informed by a model of clinical complexity. The quantitative strand will involve descriptive and inferential analysis of standardized home care assessment data (interRAI) to determine the prevalence and correlates of UI in older adults with T2DM receiving home care services. Interpretive description methods will be used in the qualitative strand, and interviews will be conducted with older adults and home care nurses. The findings will be converged to inform a better understanding of the complexity of living with these chronic conditions for older adults receiving home care services and generate implications for complex intervention development. This protocol highlights methodological insights in utilizing mixed methods research to inform intervention design.

Keywords
mixed methods, interpretive description, protocol, older adults, home care, nursing, interRAI

Introduction
Urinary incontinence (UI) is a common but underrecognized and undertreated complication of type 2 diabetes mellitus (T2DM) for older adults (aged \(\geq 65\) years; American Geriatrics Society [AGS], 2013; Brown et al., 2005). While UI would not be considered a life-threatening complication of diabetes, it has a debilitating impact on the health, function, and quality of life of older adults and, consequently, their ability to live independently in the community (Coyne et al., 2013). Diabetes is a global public health burden as older adults with T2DM use more health-care resources and the prevalence of T2DM is steadily increasing every year (Canadian Institute for Health Information [CIHI], 2009; International Diabetes Federation, 2013). T2DM affects between 14% and 23% of older adults and an even greater proportion—25%—of those receiving home care services (Gruneir et al., 2016; Vetrano et al., 2016).

T2DM is associated with an increased risk of complications, including higher mortality, reduced functional status, and increased risk of institutionalization, and for older adults is

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often accompanied by multiple chronic conditions (MCC; AGS, 2013; Kirkman et al., 2012; Sherifali & Meneilly, 2016; Vetrano et al., 2016). Notably, a cross-sectional study of older adults with T2DM in Ontario, Canada, found that 90% had at least one other chronic condition and 40% had five or more chronic conditions (Gruneir et al., 2016).

Despite the large population of older adults with T2DM receiving home care services, the complexities of managing T2DM with MCC and how to approach diabetes care in this sector have not received significant research attention (Hsu et al., 2014; Sinclair et al., 2012). Furthermore, owing to the lack of recognition of UI and its relationship to T2DM, this aspect of diabetes care has also been underresearched. Thus, this article will describe a proposed convergent mixed methods research (MMR) design study with the goal of better understanding the complexity of living with T2DM and UI in the context of MCC for older adults receiving home care services.

**Background**

Very few research studies have examined the relationship between UI and T2DM in older adults, and only two cross-sectional studies of older adults with T2DM receiving home care services were located. These studies found UI prevalence rates of 48% in an Ontario and European sample and 44% in the United States (Hsu et al., 2014; Vetrano et al., 2016). In Ontario, UI is a public, reportable, home care quality indicator. The provincial average of home care clients, who have newly developed bladder incontinence or whose bladder function has not improved since their previous assessment, increased from 48% in 2009/2010 to 60% in 2014/2015 (Health Quality Ontario, 2017). Minimal research attention has been paid to the correlates of UI in older adults with T2DM. Hsu et al. (2014) reported that UI was correlated with increasing age, use of insulin, use of oral glucose lowering agents, dependence on ambulation and transferring, and cognitive impairment.

Six qualitative research studies were identified that examined the experience of living with MCC from older adult, caregiver, and health-care professionals’ perspectives (Backman, Stacey, Crick, Cho-Young, & Marck, 2018; Eckerblad, Theander, Ekdahl, Jaarsma, & Hellstrom, 2015; Gill et al., 2014; Jarling, Rydström, Ernsth-Bravell, Nyström, & Dalheim-Englund, 2018; Newbould et al., 2012; Ploeg et al., 2017; refer to Supplementary File 1). These studies included some older adults with T2DM receiving home care services, and one study also indicated if participants experienced UI (Eckerblad et al., 2015). Living with MCC was described by participants in these studies as challenging. Associated symptoms, such as pain or fatigue, made it hard for older adults to engage in activities they used to enjoy and perform easily, such as leaving home or exercising (Eckerblad et al., 2015). Some older adult participants reported feelings of inadequacy and sought “to adjust and endure” (Eckerblad et al., 2015, p. 323), whereas others remained hopeful while accepting the realities of worsening health (Ploeg et al., 2017). Participants were discouraged by becoming dependent on family caregivers or home care supports (Eckerblad et al., 2015), while others emphasized the importance of receiving support from family and friends to remain at home (Ploeg et al., 2017). Participants also described difficulties with managing medications (Gill et al., 2014; Ploeg et al., 2017) and attending appointments with many different specialists (Backman et al., 2018; Ploeg et al., 2017).

Interacting with the health-care system was frustrating for older adults because of poor care coordination and challenges following physician treatment recommendations (Backman et al., 2018; Gill et al., 2014; Ploeg et al., 2017). Similarly, both older adult and caregiver participants shared the difficulty of working with health-care providers who focus on single diseases rather than taking a holistic approach to health (Ploeg et al., 2017). Receiving formal home care services required a period of adjustment to both the negative and positive implications (Eckerblad et al., 2015). For example, receiving personal care meant a threat to older adults’ privacy and dignity, while developing relationships with home care staff afforded opportunities for social engagement (Eckerblad et al., 2015).

Health-care professionals found the experience of supporting older adults with MCC “overwhelming, draining and complicated” (Ploeg et al., 2017, p. 7). Health-care professionals were frustrated by lack of access to a shared health record, the need to rely on reports from caregivers on outcomes of tests or specialist consultations, and inadequacy of funded services in the home care sector (Gill et al., 2014; Ploeg et al., 2017).

Thus, the complexity of managing UI and T2DM for older adults within the home care context is poorly understood, creating an evidence gap to inform clinical practice. UI is a highly prevalent but clinically underrecognized condition with negative outcomes for older adults with T2DM. The prevalence, correlates, and predictors of UI in this population are poorly understood. Qualitative research is needed to better understand the experiences of older adults living with both T2DM and UI in the context of MCC while receiving home care services as well as the experiences of the home care nurses who care for this population in order to understand what would be helpful, effective, and acceptable care.

**Objectives**

The overall goal of this proposed study is to better understand the complexity of living with T2DM and UI in the context of MCC for older adults receiving home care services. The specific objectives are as follows: (a) determine the prevalence and correlates of UI in older adults living with T2DM receiving home care services in Ontario, Canada; (b) explore the experiences of older adults living with T2DM and UI receiving home care services; (c) explore the experiences of home care nurses caring for this population; and (d) converge the multiple data sources to provide a deeper understanding of the problem and implications for provision of home care services to this population.
Method

**Convergent MMR Design**

A convergent MMR design, as articulated by Creswell and Plano Clark (2018), will be employed to answer the overarching, integrated MMR question: What are the components of complexity that older adults with T2DM and UI and the nurses who care for them experience in the home care context and how could an understanding of these components inform care approaches for this group of older adults? The convergent design involves implementing the quantitative and qualitative strands at the same time in the research process and maintains the separation of the strands until data analysis is complete. The point of interface—where mixing occurs—happens at the interpretation stage when the extent to which the data converge or diverge to answer the study’s MMR question is determined (Creswell & Plano Clark, 2018). Refer to Figure 1 for schematic representation of the MMR design.

The rationale for mixing methods in this study include completeness, context, and diversity of views (Bryman, 2006). First, utilizing both quantitative and qualitative research will provide a comprehensive complete account of the problem (Bazeley, 2018). Second, the qualitative component will provide the contextual understanding, while the quantitative data will describe the relationship of the dimensions of the problem within that context (Bryman, 2006). Finally, revealing experiences of the older adult and nurse participants through the qualitative strand and the relationship between variables in the quantitative analysis provides a richness through the diversity of views (Bryman, 2006).

Clinical complexity: Conceptual model. The challenges of living with MCC create clinical complexity, which has been conceptualized in a model by Grembowski and colleagues (2014) to guide research in this area. The model was developed from a review of the medical, public health, and epidemiological literature as well as expert consultation and consensus-building among an MCC research network (Grembowski et al., 2014). The model informed design and decision-making regarding qualitative sampling, selection of quantitative variables,
topics for qualitative interview questions, and the joint display approach for mixed methods analysis (Evans, Coon, & Ume, 2011).

This model was chosen to guide the study as it considers the multiple components that could influence health outcomes for older adults receiving home care services (Northwood, Ploeg, Markle-Reid, & Sherifali, 2017). Clinical complexity is defined as “the gap between the major system components: an individual’s needs and the capacity of the health-care system to support those needs” (Grembowski et al., 2014, p. S10, emphasis added). The size and nature of this gap is affected by the main interacting components in the model: the health-care system, individual characteristics of the person, social supports, and community resources as well as the economic, health, and social policies that influence health inequalities (Grembowski et al., 2014).

Quantitative strand design. The central research questions for this strand are: Among older adults (aged ≥ 65 years) with T2DM receiving home care services in Ontario, (a) What is the prevalence of UI? (b) Are there differences in the sociodemographic, psychosocial, functional, and clinical correlates between those with UI and those with no known UI? and (c) What are the sociodemographic, psychosocial, functional, and clinical predictors associated with UI?

The source of this information will be an administrative, population-level database containing the anonymized, standardized, assessment-tool findings completed on all long-stay (estimated > 60 days) Ontario home care clients, the Resident Assessment Instrument for Home Care (RAI-HC). The RAI-HC is developed and maintained by an international research collaborative—the interRAI (www.interai.org)—and has documented reliability and validity (Foebel et al., 2013; Hirdes, 2006; Hirdes et al., 2008; Landi et al., 2000; Morris et al., 1997; Morris et al., 2012). Assessments with the RAI-HC done by trained health-care professionals is mandated by the Ontario provincial government and many other jurisdictions nationally and internationally (Hirdes, 2006; Morris et al., 2012). A cohort of individuals over age 65 with T2DM receiving home care services over a 5-year look back (2011–2016) will be assembled. In cases where the RAI-HC has been repeated, the most recent data will be included, consistent with other research using these data (Maxwell et al., 2013). Health outcome scales are also embedded within the RAI-HC instrument (refer to Table 1), and these are generated by software-based algorithms that have been validated against gold-standard, clinical-assessment tools (Armstrong, Stolee, Hirdes, & Poss, 2010; Burrows, Morris, Simon, Hirdes, & Philips, 2000; CIHI, 2013; Hirdes, Frijters, & Teare, 2003; Landi et al., 2000; Martin et al., 2008; Stolee, Ross, Cook, Byrne, & Hirdes, 2009).

Variables in the RAI-HC. The dependent variable in this study is UI. Continence status is determined in the RAI-HC by a look back at the previous 3 days and is graded based on five categories of severity (refer to Table 2; Morris et al., 2012). For this study, UI will be classified as a dichotomous variable, continent or incontinent. The incontinent variable will include both the frequently incontinent and incontinent categories. The continent variable will include the continent, infrequently incontinent, and occasionally incontinent categories. The rationale for this dichotomy is that older adults experiencing daily episodes of incontinence would have different health-care needs than those experiencing occasional urine loss (Dumoulin et al., 2017). The independent variables in this study—clients’ sociodemographic, psychosocial, functional, and clinical characteristics and health service utilization—will be assessed using a variety of items and scales in the RAI-HC. These variables were selected based on components of the complexity model (Grembowski et al., 2014), literature on the correlates and complications of T2DM and UI, and their availability in the RAI-HC (refer to Table 3).

### Table 1. Resident Assessment Instrument for Home Care Health Outcome Scales.

| Scale | Description |
|-------|-------------|
| Depression Rating Scale | Clinical screen for depression |
| Changes in Health, End-Stage Disease, and Signs and Symptoms Scale | Identifies frailty and health instability to recognize clients at risk of serious decline |
| Activities of Daily Living Self-Performance Hierarchy Scale | Measures client’s self-performance in hygiene, toileting, locomotion, and eating |
| Instrumental Activities of Daily Living Difficulty Scale | Measures client’s capacity in completing housework, meal preparation, and phone use |
| Cognitive Performance Scale | Describes client’s cognitive status |

Source: Canadian Institute for Health Information (2013).

### Table 2. Definitions of Urinary Continence in Proposed Study and the Resident Assessment Instrument for Home Care.

| Dichotomous Classification | Continence Pattern | Description |
|---------------------------|-------------------|-------------|
| Continent                 | Continent         | Complete control, including cueing or prompting by a caregiver |
| Infrequently incontinent  | Not incontinent over last 3 days, but client does have incontinent episodes (specifically, a recent history of incontinence) |
| Occasionally incontinent  | Less than daily episodes of incontinence (incontinent on one to two of the last 3 days) |
| Incontinent               | Frequently incontinent | Incontinent daily but with some control present. For example, the client remains dry during the day but is incontinent at night |
| Incontinent               | Incontinent       | No bladder control and multiple daily episodes of incontinence all or almost all of the time |

Source: Morris et al. (2012).
Table 3. Corresponding Resident Assessment Instrument for Home Care Items to Assess Characteristics and Health Service Utilization of Older Adults Receiving Home Care Services.

| Characteristics            | Measured Variables                                                                 |
|----------------------------|-------------------------------------------------------------------------------------|
| Sociodemographic           | Age, Sex, Marital status, Education level, Primary language, Limited funds          |
| Psychosocial               | Presence of primary caregiver living with client, Primary caregiver status           |
| Community resources        | Living arrangement, Home environment                                               |
| Functional                 | Activities of Daily Living Self-Performance, Hierarchy Scale, Instrumental Activities of Daily Living, Difficulty Scale, Cognitive Performance Scale |
| Clinical                   | Use of incontinence pads, Bowel continence, Morbid obesity                          |
| Health service utilization | Formal care in last 7 days (e.g., personal support worker, nurse, physical therapy, day care), Time since last hospital stay, Wound care dressing, Emergency room use in past 90 days, Physician visit in past 90 days |

Quantitative strand analysis. IBM SPSS Statistics Version 24 will be used for the analysis. Percentages and frequencies will be used to describe the categorical data (e.g., sex), and means will be used to describe the central tendency of the continuous data (e.g., age). Differences between older adults with T2DM and UI and older adults with T2DM but no known UI will be analyzed using inferential statistics: independent *t* tests for continuous variables and the $\chi^2$ test of independence for categorical variables. A *p* value < .001 will be considered statistically significant. However, given the large sample size typical of working with RAI-HC data, it will not be meaningful to strictly rely on *p* values, thus the effect size and clinical significance of the differences will be considered (Guthrie, Thériault, & Davidson, 2015). Significant associations between each independent variable and the outcome (UI) will be assessed using logistic regression. Independent variables that demonstrate statistical and clinical significance will be included as factors in a multivariate model. Odds ratios (OR) representing at least a 20% clinically relevant difference (i.e., OR $\geq 1.2$) along with effect size $\geq 0.2$ will be used to identify potential predictors of UI (Fisher et al., 2014; Guthrie et al., 2015). Multicollinearity will be evaluated before a final model will be established. Goodness of fit of the regression models will also be assessed using the $c$ statistic (area under the receiver operating characteristic curve) and sensitivity and specificity measures. The goal will be to produce a model that best explains the presence of UI in older adults with T2DM receiving home care services and would be clinically useful to identify older adults most at risk in order to provide service to address those factors.

Qualitative strand design. Thorne’s (2016) interpretive description methodology will be employed in the qualitative strand of the study. The central questions for this strand are: (a) How are T2DM and UI experienced by older adults receiving home care services? and (b) How do home care nurses care for older adults with T2DM and UI?

Interpretive description is an applied, health research, qualitative approach that answers questions of clinical practice (Thorne, 2016). Interpretive description studies have the following features: (a) occur in natural settings, (b) focus on experiential knowledge, (c) seek human commonalities as well as differences, (d) attend to context, (e) acknowledge the social element of human experience and multiple realities, and (f) have utility for the practice discipline of nursing and other health-care professionals (Thorne, 2016).

Qualitative sample. A purposive sampling approach will be used to recruit 15–25 older adult participants (Onwuegbuzie & Leech, 2007). The lower limit of 15 older adults is likely still large enough to discern commonalities and differences and achieve sufficient depth (Thorne, 2016). About 10–15 community nurses will also be recruited, including both generalists (e.g., home-visiting nurses) and specialists (e.g., nurse continence advisors). The smaller sample size for the nurse participants is because each nurse would likely have seen many clients with T2DM and UI and could speak from the breadth of their experiences (Malterud, Siersma, & Guassora, 2015; Thorne, 2016).

Older adult participants will meet the following inclusion criteria: (a) $\geq$65 years of age, (b) have T2DM and UI, (c) English speaking, (d) receive home care services, and (e) dwell in the community (private home, lodging home, or retirement home). Participants would be excluded if they (a) have type 1 diabetes, (b) are younger adults, (c) have previously been or
currently are a patient of the first author, or (d) due to cognitive issues may not be competent to consent or participate in the interview. The inclusion criteria for the nurses are: (a) registered nurse or registered practical nurses and (b) have worked in the home care sector for at least 6 months.

**Recruitment strategies.** Multiple active and passive recruitment techniques will be employed. The study has the endorsement of two regional home care programs (Local Health Integration Networks). Interested home care coordinators and nurse participants will be asked to share informational postcards with their clients who meet the inclusion criteria. The first author will also attend diabetes education meetings and group exercise classes to share information about the study. Finally, the study brochure will be posted in public locations (e.g., older adults’ recreation centers, family health teams). The second author will e-mail home care nurses in her professional network to solicit participation.

**Qualitative strand data collection.** One-on-one interviews with both older adults and nurse participants will be the main mode of data collection and will be conducted by the first author (Thorne, 2016). The interviews will be semi-structured, using predetermined questions that are open-ended and flexible but allow for clarification with prompts and follow-up questions (refer to Online Appendices A and B for the interview guides; Brinkmann & Kvale, 2015; Doody & Noonan, 2013). The questions for the interview guides were generated for each domain of the complexity framework based on the gaps identified in the literature review and principles of qualitative interviewing (Thorne, 2016). Demographic information will also be collected at the start of the qualitative interviews. Interviews with older adults will take place in their homes (or by phone if preferred), and interviews with nurses will take place at a location of their choosing, such as their agency office, or by phone.

All interviews will be digitally recorded. A field journal will be kept by the first author, documenting impressions and observations regarding the interviews (Thorne, 2016). A reflexive journal will also be maintained to reflect upon how ideas, theoretical allegiances (i.e., the framing of the study in complexity framework), and the first author’s own expert clinical opinion influences the interactions with the participants and the analytical process (Thorne, 2016).

**Qualitative strand analysis.** NVivo Version 11 will be used to store and organize the qualitative data. All interviews will be transcribed verbatim by a skilled transcriptionist. Interpretive description analysis is governed by the following overarching principles: (a) Data collection and analysis are concurrent and interdependent, (b) data sorting and organizing are components of analysis, (c) analysis involves constant comparative analysis, (d) disciplinary preconceptions are managed prior to and during analysis through a “reflexive accounting” through journaling, and (e) analysis involves looking for commonalities as well as expressions of variance (Thorne, 2016).

The first phase of analysis is “sorting and organizing” (Thorne, 2016, p. 156). Time will be spent reading over the transcripts, making notes, and listening to the interview recordings (Thorne, 2016). The next phase of analysis is “making sense of pattern” (Thorne, 2016, p. 163). This phase involves moving into some initial coding, using broad-based generic words to group data, and then bringing together descriptions of the experience that are thematically related (Thorne, 2016). The relationships of the themes will be examined to determine whether components of one grouping might have a relationship to another group of data or even if the themes could be reorganized to see if new insights are revealed (Thorne, 2016). The first and second authors will undertake these analysis phases by comparing, contrasting, and coming to consensus on the initial structure of the pattern.

The next phase is “transforming pattern in findings” (Thorne, 2016, p. 173). This process will involve testing the relationships between the parts (themes) and the whole (emerging conclusions; Thorne, 2016). This phase will be undertaken by the first author, including reflection, refinement, and confirmation of conclusions to ensure there is no another explanation (Thorne, 2016). At this stage, the data will be examined to see how they are relating to the complexity model’s components and relationships (Bazeley, 2018; Thorne, 2016). Engagement in analysis with all authors during this phase will allow for critiques and counterchecks (Thorne, 2016). Based on this input and research team negotiation, the final product of analysis will be produced: a written conceptualization of the findings (Thorne, 2016).

**Mixed methods analysis and interpretation.** The findings from the analyses of the quantitative and qualitative strands will be compared to generate the mixed methods interpretation (Creswell & Plano Clark, 2018). The complexity model components, the findings from the quantitative analysis, and the qualitative themes will be compared in a “joint display” (refer to Table 4; Bazeley, 2018; Creswell & Plano Clark, 2018; Moffatt, White, Mackintosh, & Howel, 2006). The joint display table brings together the quantitative and qualitative results for consideration to achieve the MMR goal of integrating the findings (Evans et al., 2011; Woolley, 2009). The results may not match neatly in the joint display, but an exploration of the differences or divergence—for example, between nurses’ and older adults’ perspectives—is an opportunity to enrich the analysis and lead to further insights (O’Cathain, Murphy, & Nicholl, 2007). Findings that do not align with the complexity model will be described and could have potential to inform future model refinement, as the authors had intended MCC researchers apply the model (Grembowski et al., 2014). Also, the mixed methods interpretation will inform the generation of implications for the provision of home care services to this population (Bazeley, 2018).

**Provisions for validation.** This convergent MMR design has many provisions for the validity of the quantitative data, the credibility of the qualitative data, and the overall quality validation of the MMR study. For an MMR study, the rigor of the study is reflected by the provisions made in each strand and overall in...
Table 4. Joint Display of Quantitative and Qualitative Analysis.

| Complexity Model Components | QUAN | QUAL |
|-----------------------------|------|------|
| Health-care system          | For example, proportion receiving nursing services and odds of recent ER use influencing continence status | Themes | Themes |
| Community resources         | For example, proportion living in home environment in disrepair and odds of living alone influencing continence status | Themes | Themes |
| Person                      | For example, mean age, proportion male/female, and difference in DRS related to continence status | Themes | Themes |
| Health                      | For example, proportion with ADL impairment and difference in ADL impairment related to continence status | Themes | Themes |
| Social support              | For example, proportion with primary caregiver unable to continue caregiving and odds of presence of caregiver influencing continence status | Themes | Themes |
| Population health and inequities | For example, proportion with limited funds and odds of making financial trade-offs influencing continence status | Themes | Themes |

Note. Model components are based on components of complexity conceptual model (Grembowski et al., 2014). QUAN = quantitative strand; QUAL = qualitative strand; ER = emergency room; DRS = Depression Rating Scale; ADL = activities of daily living; RAI-HC = Resident Assessment Instrument for Home Care; UI = urinary incontinence.

the MMR analysis (Creswell, Klassen, Plano Clark, & Clegg Smith, 2010).

Quantitative strand validity. As described earlier, the RAI-HC is a reliable and valid standardized assessment tool and is completed by trained assessors (Morris et al., 2012). The RAI-HC provides population-level data on all home care recipients so the sample size will be very large. The results will also have external validity as they will apply to the home care population locally as well as in other jurisdictions that have publicly funded home care (Creswell & Plano Clark, 2018; Guthrie et al., 2015). However, the cross-sectional design will only permit assessment of correlations between UI in older adults with T2DM and other variables, not causation.

Qualitative strand credibility. Credibility of the qualitative strand will be ensured by attending to the four principles used to evaluate a study’s credibility according to Thorne (2016): (a) epistemological integrity, (b) representative credibility, (c) analytic logic, and (d) interpretive authority. Epistemological integrity will be evidenced by demonstration of the first author’s self-understanding of her epistemological position in the study and that all decisions made along the qualitative strand of the study remain aligned with that position (Thorne, 2016). This evidence will be documented in a personal statement of disciplinary position, congruent to the underpinnings of the study’s conceptual model. Representative credibility will be achieved by having triangulation of data sources: older adults and the clinical insights from the nurses who provide care in the home setting (Thorne, 2016). The clear description of the sample population, sampling strategy, and large sample size also strengthens the credibility of the qualitative strand (Robinson, 2014). The analytic logic of the study will be evidenced in the carefully documented audit trail. This audit trail will include the steps and decisions made throughout the data collection and analysis that another researcher could theoretically follow, including clearly described coding procedures and expert critiques by research team members (Krefting, 1991; Thorne, 2016). This audit trail will also inform the interpretive authority of the findings as the reader will be able to see how conclusions were formed (Morse, 2018; Thorne, 2016). Furthermore, the act of reflexive journaling coupled with the expert critique by research team members will assure the user of the research that the first author’s angle of vision was not overscribed on the findings (Morse, 2018; Thorne, 2016).

Quality validation of the MMR study. The overall MMR validity will be based on the study’s adherence to the components of an MMR validation framework including design quality, legitimation, and interpretive rigor (Dellinger & Leech, 2007). As described earlier, the convergent MMR design is the appropriate design to answer the study questions and achieve the goals of completeness, contextual understanding, diversity of views, and complementarity (Dellinger & Leech, 2007). Having a clearly documented protocol will ensure that all methods are implemented true to the design, ensuring both design fidelity and analytical adequacy (Dellinger & Leech, 2007). Provisions for legitimation include having an adequate sample size in both strands and a clear analysis plan (Bryman, 2006; Dellinger & Leech, 2007). Interpretive rigor will be attained with clearly documented evidence in an audit trail that findings emerged from the MMR study, transparent data analysis (interpretive transparency), and congruency between data analysis and the complexity conceptual model (theoretical consistency; Grembowski et al., 2014; O’Cathain, 2010).

Ethical considerations. The study protocol has received approval from the Hamilton Integrated Ethics Review Board (Project #3024-C, 3137). Informed, written consent or verbal consent for phone interviews will be obtained from all participants by the first author. Older adult participants will be advised that participation in the study will in no way affect their usual home care. As these interviews will be conducted in the home environment, if observations are made of safety issues, abuse, or neglect, the informed consent document explains that the researcher has a duty to alert the home care coordinator. Given many older adults receiving home care services may have some
degree of cognitive impairment, a determination of ability to consent or participate will be made by the first author (an experienced gerontological nurse) before conducting the interview.

Significance and Implications

This proposed convergent MMR study to address the complexity of living with T2DM and UI in the context of MCC for older adults receiving home care services has several intended implications. Firstly, as the first study of this population in the home care context, practical clinical knowledge will be produced as the protocol is based on both clinical experience of a practice problem and evidence from a literature review (Dellinger & Leech, 2007). Grounding the protocol in current clinical, empirical, and conceptual knowledge will also ensure that the inferences made in the study will build on current understanding and meet the study’s goal (Dellinger & Leech, 2007). The proposed study has disciplinary relevance as the future findings could be used to inform the development of a complex intervention to address the problem of UI for older adults with T2DM and MCC receiving home care services.

Secondly, the study will provide learnings on how MMR can be used to comprehensively understand a clinical dilemma and inform complex intervention design. The use of a theoretical framework to bind an MMR study is not typically done in health-care research but has great likelihood of generating results that would be helpful in planning interventions and health-care delivery (Bazeley, 2018). The integration of the analysis of interRAI assessments in MMR to inform home care intervention design is not common but potentially beneficial to explore co-occurring patterns of MCC (such as T2DM and UI) and health outcomes (Mello, Hermans, Van Audenhove, Maq, & Declercq, 2015).

Finally, the proposed study will lead to future inquiry related to UI and T2DM in older adults with MCC. Sequential studies will include codesign by health-care professionals, older adults, and caregivers of the components of a complex intervention to manage UI in older adults with T2DM receiving home care services and a pragmatic, randomized, controlled trial of the newly described intervention.

Conclusion

The intent of this MMR project is to improve the understanding of the clinical complexity of older adults living with T2DM and UI in order to take practical steps forward to address the prevalent problem of UI in this population receiving home care. The structure of the study and the potential findings are well positioned to have utility to inform and influence health-care delivery and consequently prevent the negative health outcomes associated with T2DM, UI, and MCC.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

Note

1. The interRAI-Home Care, an updated assessment tool, replaced the Resident Assessment Instrument for Home Care in Ontario in 2018.

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