DEVELOPING A MULTI-DIMENSIONAL PATIENT ASSESSMENT SYSTEM FOR COMMUNITY PARAMEDICINE HOME VISIT PROGRAMS IN ONTARIO, CANADA

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DEVELOPING A MULTI-DIMENSIONAL PATIENT ASSESSMENT SYSTEM FOR COMMUNITY PARAMEDICINE HOME VISIT PROGRAMS IN ONTARIO, CANADA

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ABSTRACT

This thesis presents a systematic framework for developing and evaluating a multi-dimensional patient assessment system for community paramedicine home visit programs. Underlying all of this work was a hypothesis that multi-dimensional patient assessment systems hold clinical utility to inform care planning activities, which in turn can direct appropriate patient care. I outline considerations for using assessment instruments to assist in the assessment process including strengths and weaknesses of using single-dimension or multi-dimensional assessment instruments when attempting to complete a consistently organized, multi-domain, and comprehensive assessment. The thesis includes a framework that outlines the major stages in developing and evaluating a new multi-dimensional patient assessment system. The framework uses community paramedicine home visit programs as an example of its application and subsequent chapters present and discuss key research questions related to each stage of the development and evaluation process; establishing a comprehensive set of clinical observations to be assessed and the related application of assessment findings to care planning activities. Two chapters explore existing assessment practices in community paramedicine home visit programs with findings that informed creation of a prototype assessment system that was pilot-tested. The fifth chapter describes results of the pilot-test and the sixth chapter investigates the clinical utility of the prototype assessment system to care planning of community paramedics. The development approach is informed by next-generation assessment practices and my work evaluating community paramedicine home visit programs provides a basis for appraisal of evidence in an emerging practice setting that does not have broadly established clinical practice guidelines. The accumulation of the evidence established in my thesis has led to the creation of a multi-dimensional patient assessment system for community paramedicine home visit programs.

My research methods and findings can assist clinicians, decision makers or other researchers where a multi-dimensional assessment system is being developed or implemented.

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My parents, Adrie and Stuart Leyenaar, taught me at a very young age (when I wasn't enjoying school very much) to reflect on my work and measure my success by the effort I put into it. My mom would ask me, "Did you do your best?" It is a lesson that I've carried with me and one that I hope to instill in my kids. Moreover, I have applied it within my years of clinical practice as a paramedic and my hope is that it is reflected in this thesis.

There is a long list of individuals that have helped me in my efforts. The list begins with the supervision provided by Dr. Andrew P Costa. I count among my supporters committee members Drs Gina Agarwal and Walter Tavares. From Dr Tavares, I extend my gratitude to the entire McNally Project for Paramedicine Research. I had the wonderful opportunity to lead the Ontario Community Paramedicine Secretariat through support of the Canadian Institute for Health Research Health System Impact Fellowship under the guidance of Dr. Samir K Sinha and Michael Nolan. Thank you to all of the members of the Ontario Community Paramedicine Steering Committee. Gratitude extends to Interdev Technologies Inc and the Mitacs Accelerate Internship program for the opportunity to work with direct access to the electronic medical record used by paramedic services. Special thanks to Terry Kuehn, Brian Field, Emily Hull, Chirag Rana, Jeff Power, Mehbad Dastur and, Antony Bogun. Over the course of my PhD, I had the opportunity to contribute to the decision support group at the Hamilton Niagara Haldimand Brant Local Health Integration Network (beginning when my colleagues were part of the Community Care Access Centre and ending as a contributor to the Emergency Services Steering Committee). My heartfelt thanks to all that I worked with there, particularly to Jane Blums, Galina Grinchenko, Lia Salam-White, Kim Hallman, and Dr. Jeff Poss, and Brent McLeod. My research would not have been possible without the support of numerous paramedic services, in

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I dedicate this work to the memory of Frank Foster and Garnett Merkley.

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DECLARATION

This sandwich thesis includes five chapters that represent "layers" between the introduction and conclusion. Each of those chapters was written for publication in peer-reviewed journals with the support of co-authors listed on the respective chapter title pages. I, Matthew S. Leyenaar, am the first author and was responsible for leading the research, analysis, and writing or each chapter. For the purposes of my thesis I have taken possessive ownership within the language of each chapter which may otherwise appear in the collective expression of peer-reviewed publication. All work was completed while I was enrolled in the Health Research Methodology PhD Program at McMaster University.

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Chapter 1 - *Introduction*

INTRODUCTION

Everyday paramedic services provide emergency response to patients that need help (1). Sometimes the underlying reason why a person calls 9-1-1 is not a cardiac arrest, stroke, or injury-related physical trauma (2–9). For some, the reasons are because of difficulty accessing primary care, managing a chronic condition, or barriers accessing care because of the limited capacity of the health system (3,6). If paramedic services provide care that is otherwise unavailable or difficult to access (10,11), then paramedics should be equipped with resources to improve patient care and access to care in addition to what presently exists. Unfortunately, difficulties emerge when emergency response provided by paramedics is called upon for non-life-threatening situations because the system has seen very little change from requirements that all patients be transported to an emergency department (12). Rapid response, access to out-of-hospital treatment, and paramedic-initiated transport to hospital works well for high acuity calls in most situations (13,14). But more and more, paramedic services are observing increasing trends in calls for emergency response associated with chronic diseases prevalent in an aging population (7,8). Advancements in paramedic education and training have resulted in a workforce that is as well (or better) equipped to identify and treat exacerbations of chronic conditions as it is for caring for patients that experience multi-system trauma or cardiac arrest (15–18). As the population ages, chronic disease management, instability of chronic conditions, a limited health system capacity, and barriers accessing primary care contribute to increasing demands for emergency response that have been categorized as unsustainable (19,20). Community paramedicine models of care are a new way for paramedic services to help patients (21–24).

The solution to increasing demands for paramedic services need not be limited to putting more paramedics into ambulances at the ready to respond (21,23). If the emergency response

system was designed as a "one-way street" to the emergency department, solutions that include building "new roads" could prove equally as viable as the idea of widening the existing "one-way street." For example, if we consider the traffic analogy further and think about traffic congestion as the cause of a traffic jam, traffic planners have found that increasing capacity of the roadway is only a temporary solution (25). Traffic planners have realized that if there is a traffic congestion problem, changing travel behaviours by encouraging the use of public transit, active transport, or alternate routes or destinations can provide better solutions (25). If we think of the healthcare continuum as a neighbourhood with traffic congestion, what do "on-demand" solutions look like for an aging population with chronic conditions? Although there have been reports calling for new ways to provide care (26,27), the care provided through the emergency response system has not seen significant change. Modest investments in community paramedicine programs present an opportunity to change delivery of care by paramedics (28).

Integrated, person-centred care is one of the solutions proposed for improving the healthcare system (29,30). Integrated person-centred care should prioritize individual preferences while reducing fragmentation and duplication (30). Unfortunately, too often this is easier said than done because of existing "silos of care," –legislative, regulatory, and policy frameworks that are rigid to change and ill-suited to increasing demands (31). In addition, uptake and implementation of new technologies that could help improve the ability to streamline delivery of care are slow and inconsistent (32,33). While many value the idea of "right care, provided at the right time and in the right place," implementation of practices with high clinical utility for realizing these goals is not often the case. Patient preferences can be overlooked, and preferred care-options are not always available to providers. From the beginning, community paramedicine programs have sought to address issues of access to care and system fragmentation

(34,35).

What is community paramedicine?

Community paramedicine is the application of emergency management principles (Prevention, Preparation, Response, and Recovery (36,37)) to delivery of health care. It involves patient navigation to the appropriate care provider wherever a patient is in their care journey. Prevention connects to public health with examples of operationalization through community paramedicine programs designed for influenza prevention or supporting safe consumption and treatment sites (38). Preparation connects patients to primary care providers with examples of clinic programs that focus on health promotion (38,39). Response is the traditional paramedic domain, usually connecting to emergency care but with more options including urgent or after-hours care. Community Paramedicine Response Units are being operationalized to align 9-1-1 response with community paramedicine programs (38). Recovery may be the broadest category because it represents a connection to all numerous acute or post-acute care settings. Most often, community paramedicine programs include partnerships with long-term care, palliative care, and home and community care (38).

Community paramedicine programming as a model of care can take on many different forms, usually determined by locally identified needs and jurisdictional policies (40). The International Roundtable on Community Paramedicine began holding meetings in 2005 as a way of sharing innovation and progress from the creation and implementation of community paramedicine programs (41). There is a saying often repeated by attendees, "If you've seen one community paramedicine program, you've seen one community paramedicine program." This statement highlights the diversity between programs, the historical context to "locally identified needs," and the jurisdictional differences between different settings in how community paramedicine programs are implemented (41). As the lead author for the 2019 Status of

Community Paramedicine in Ontario report published by the Ontario Community Paramedicine Secretariat, I was able to do an extensive and detailed review of all community paramedicine activities across the 54 municipal paramedic services operating in the province (representing one sub-national jurisdiction involving multiple sub-regions and municipalities) (38). Community paramedicine programming in Ontario was funded (at that time) by 14 Local Health Integration Networks but delivered by municipalities (38). The majority of paramedic services were operating more than one type of community paramedicine program and had demonstrated broad expansion across the province including new models of care beyond pilot programs that started in 2014 (38).

Significant expansion of community paramedicine programming has happened in Ontario (as it has elsewhere) (38,42,43). The phrase "spread and scale" has been used to identify program designs that should be replicated in more communities. Still, tensions exist about funding of programs (municipal versus provincial and between branches, organizations, and partnering agencies involved in program delivery). Other tensions exist between traditional emergency response and programs that run without embedded integration with emergency response (including technological challenges around maintenance of electronic medical records and parameters on access to them as healthcare providers). In spite of these tensions, the underlying motivation behind the delivery of community paramedicine programs continues to be one of improving access to timely and appropriate care for patients that experience barriers to care or are otherwise vulnerable.

How Assessment Contributes to Care Planning in Community Paramedicine Home Visit Programs

The research included in my dissertation focuses on community paramedicine home visit programs. The majority of emergency calls that paramedics respond to are in people's homes—

paramedics make house calls—which means community paramedicine home visit programs are a natural extension of paramedic practice because of seeing patients in their place of residence. Community paramedicine home visit programs usually include scheduled visits and often operate in collaboration with primary care providers (38). Sometimes patients are referred to community paramedicine home visit programs at hospital discharge or are identified because of repeated use of 9-1-1. Variations on community paramedicine home visit programs have recently emerged that include paramedics providing palliative care or being assisted through remote patient monitoring equipment. For the most part, community paramedicine home visit programs are designed to serve community dwelling older adults. Throughout this dissertation, I investigate the role of the community paramedic in care planning within home visit programs. I explore what community paramedics assess within these programs, who they collaborate with in providing care, and what informs the activities of providing care.

Care planning is a mechanism used to deliver a course of treatment over a specified period of time with allowances for changes in patient condition, if or when they occur (44,45). By nature, care plans should represent an alignment between the patients' and the clinicians' (or clinical teams) goals for care (45). Care plans can include specific treatments and addressing identified modifiable risk factors through health promotion like improved diet, exercise, or smoking cessation (39,46). Care plans should also include establishing means for ongoing or continuous monitoring of symptoms through routine tests (46). The complexity of multiple chronic diseases and their interactions with each other require that care providers understand baseline patient characteristics (47–49). Routine re-assessments and re-assessment following a change in patient condition are necessary to determine whether or not goals of care are being realized, progress towards their achievement is happening, or if new goals for care should be

established (50).

Care planning in community paramedicine home visit programs, including patient goals of care, has not been explored. Community paramedicine programs are often evaluated in terms of the health system utilization of enrolled patients, with a particular focus on avoiding repeated 9-1-1 calls (51). But community paramedicine programs are also regularly designed to deliver "shared" or "integrated" care with locally identified partnerships, often including primary care providers (52,53). If fragmented (colloquially called "siloed") care has been demonstrated to worsen patient outcomes (30,31,33), community paramedicine home visit programs are an effort to improve patient navigation to the "right care."

The decision making required to facilitate patient navigation and care planning requires community paramedics to assess factors that are contributing to a patient's state of well-being (18). Assessment is not the purview of any individual profession but exists in all health professions as a foundational component of developing the competency to carry out the respective responsibilities of the respective profession. Like education for other health professionals, paramedic education draws from competency frameworks for entry to practice and usually include a certification or examination process (15). By establishing common assessment practices across professional domains, shared care planning and delivery of care can be enabled (47). How this happens in practice may be easier said than done but standardization of assessment practices has happened in many areas already (47,49,54,55). My thesis explores the role that assessment plays in care planning activities by community paramedics.

THESIS OBJECTIVES AND STRUCTURE

The objective of my thesis was to examine assessment practices in community paramedicine programs, particularly with regard to the associated care planning activities that occur in scheduled home visit programs in order to develop a multi-dimensional patient

assessment system that was "fit-for-purpose." I sought to establish baseline information about patient conditions that were factors in enrollment in community paramedicine programs so that the outcomes from care delivered through these programs could be better understood. The examination process that I followed permitted (and included) developing and evaluating a multi-dimensional patient assessment system in the absence of standardized assessment practices.

My thesis begins by describing a framework for developing and evaluating a multi-dimensional patient assessment system (Chapter Two). The framework explains the steps required (and taken) to gather together a standardized set of clinical observations that can inform care planning activities. It provides guidance for evaluating the psychometric and clinimetric properties of the resulting assessment instrument. It serves as a theoretical foundation for the remaining chapters and includes an overview of how each of the subsequent chapters contributes evidence necessary to judge the conceptualization of a multi-dimensional patient assessment system and its intended clinical utility. Briefly, Chapter Three describes an environmental scan and content analysis of patient assessment practices in Ontario, Canada to enable inferences about standardized taxonomy of assessment domains. Chapter Four describes a modified Delphi study that investigated consensus amongst a purposefully diverse group of stakeholders and key informants about appropriate domains for inclusion in a standardized conceptual model of a multi-dimensional patient assessment system for community paramedicine home visit programs. The evidence gathered through the studies described in Chapters Three and Four, as well as a previously published scoping study (56) were used to create a prototype assessment instrument that was tested through the Common Assessments for Repeated Paramedic Encounters (CARPE) Study. The results of the CARPE Study are described in Chapter Five with a comparison to populations of community dwelling older adults receiving at-home care or support services.

Chapter Six describes a modified Delphi study that investigated the relevance of assessment items from the CARPE Study to the care planning activities of frontline community paramedics in Ontario, Canada. My concluding chapter summarizes and discusses the implications and limitations of my thesis as a whole, reflecting on the framework described in Chapter Two to consider future research opportunities in community paramedicine and in development of new multi-dimensional assessment systems.

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Chapter 2 - A Framework for Developing and Evaluating Multi-Dimensional Patient Assessment Systems: An Example from Community Paramedicine Home Visit Programs

Note: The objective for this chapter is to provide guiding "how-to" on employing research methods appropriately when developing and evaluating evidence-based assessment practices using a multi-dimensional patient assessment system. All of the work completed in the subsequent chapters draws from the guidance provided by this framework.

I articulate principles of the scientific method; namely to formulate a hypothesis and conduct an experiment to test it. I wrote this framework, taking responsibility for the structure and examples included, by drawing from what I have learned and the expertise I have practiced as a student in the Health Research Methodology PhD Program.

The implications of Chapter Two permeate throughout each of the subsequent chapters of my thesis which provide fully described inter-related experiments which were designed to test individual hypotheses about assessment practices in community paramedicine.

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ABSTRACT

Multi-dimensional patient assessment systems (also called comprehensive second-generation assessments instruments) combine the assessment of multiple disease, functional, and social processes in one instrument with standardized terminology and consistent scoring to facilitate comprehensive team-based care and sharing clinical information between providers and settings. Such assessment systems continue to emerge as a response to the challenge of single domain assessments to address increased multi-morbidity, lack of awareness and assessment duplication of multiple care providers, and the health informatics. Despite examples of successful multi-dimensional assessment systems, a framework to guide development and evaluation does not exist. I outline the considerations for using single-dimension- and multi-dimensional assessment systems when attempting to complete a consistently organized, multi-domain, and comprehensive patient assessment. I present a framework outlining the major stages in developing and evaluating a new multi-dimensional assessment system and discuss key research questions investigated at each stage. I expand on contemporary validity framework to demonstrate different judgement processes necessary following evaluation of an instrument's clinimetric and psychometric properties. I draw on examples of developing and evaluating a multi-dimensional patient assessment system for use in community paramedicine home visit programs to illustrate application of the framework in an emerging practice setting that does not have broadly established clinical practice guidelines.

BACKGROUND

Context

A growing chronic disease burden has increased the need for healthcare providers to consider the influence multimorbidity has on the delivery of care and associated care planning (1). Comprehensive multi-dimensional assessment reviews a patient's physical, social, and mental health and identifies risks and care needs (2,3). A multi-dimensional patient assessment should be designed as person-centred, not setting-specific (4); structured to facilitate development of an integrated or co-ordinated care plan to meet needs (2); and held as a necessary part of chronic disease management involving multiple care providers (1). Historically reserved for institutional settings, introduction of comprehensive multi-dimensional clinical assessments in community settings marked an evolution of assessment practices (5) in home care, community mental health, at-home palliative care, and children and youth mental health (1,4,6). Standardization of multi-dimensional assessment systems (also called second-generation assessment instruments (7)) across care settings can support the understanding of multiple disease, functional, and social processes and facilitate information sharing between clinicians with common terminology and consistent scoring (1,4,6,8). Integrated care models with less fragmented service delivery, less duplication, and based on patient needs, goals, and preferences (9) is an approach to care which may benefit from multi-dimensional assessments (10) because contributions of care providers are likely to change based not on the emergence of new conditions but rather a change in the severity of an existing one (4). Multi-dimensional patient assessments help care providers understand how severity is changing (and influencing other domains of health) by providing comparable information about patients regardless of care setting (4). To support improved patient care and chronic disease management while maintaining clinical flexibility in assessment processes, guidance is needed to ensure that multi-dimensional assessments capture all necessary clinical

observations for care planning and are “fit-for-purposes” of integration and comprehensiveness (1).

Multi vs Single Dimension Patient Assessment Systems

Many single-dimension assessment instruments have been developed, each evaluated separately within specific practice contexts or patient populations resulting in setting- or problem-specific uptake or implementation (See Supplemental Table 2-1 for examples). Figure 2-1 illustrates examples of single-dimension assessments and provides a comparison to a multi-dimensional approach. When a specific disease or condition is being investigated in depth by a specialist, utilization of a single-dimension assessment instrument is likely appropriate (11). But single-dimension assessment tools, mnemonics, or instruments focusing on a specific problem or a single domain can work counter to care planning goals when used in combination because of difficulties interpreting and sharing findings across an interdisciplinary team (12). Multi-dimensional assessments were born out of the limitations of using assessments of narrow health domains or problems or combining them into agglomerations (7,13). Using combinations of single-dimension assessment instruments presents difficulties because of issues such as duplication of very similar items across instruments, inconsistent terminology, repetitive documentation of items, inconsistent scoring (high values indicating positive findings in some cases and negative findings in others), or redundant training processes and results in an overall lack of integrated findings and applications (1,4,12,13).

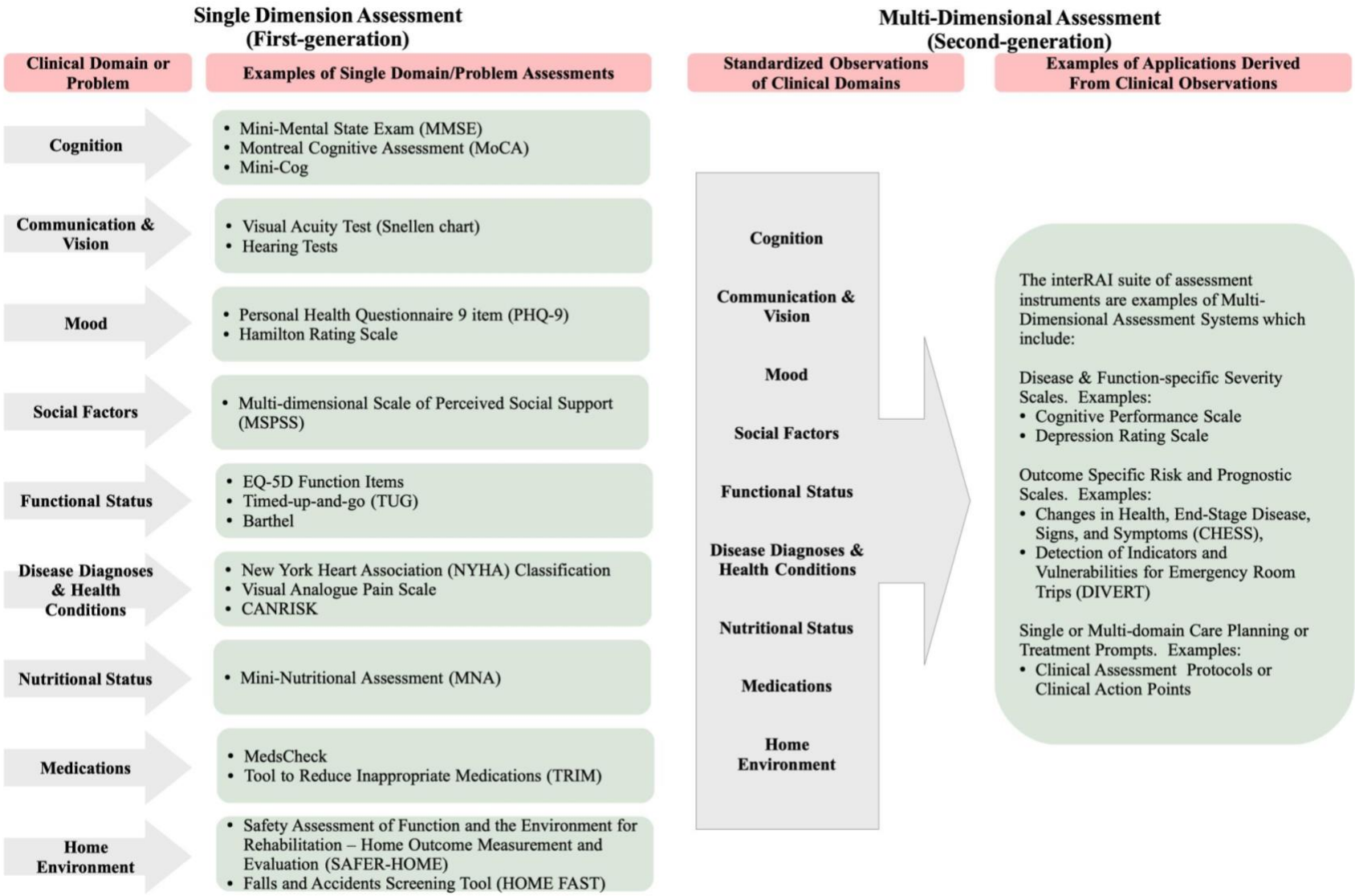

Figure 2-1: Comparing between single-dimension and multi-dimensional assessment with some examples of clinical domains that might be assessed and associated assessment instrumentation. For references on included examples see Supplemental Tables 2-1 and 2-2.

When compared to assessments that focus on single domains of health or disease, multi-dimensional assessment highlights aspects of functioning, disability, and health that often underlie all disease pathologies and dictate patient recovery and wellbeing (4,7,13). The clinical utility of a multi-dimensional assessment can extend beyond a specific disease or condition to inform care planning and improve patient care (4,7,13). Single-dimension assessments usually include a series of observations and performance tasks that inform a score or measure of patient condition such as severity (examples included in Supplement Table 2-1). Multi-dimensional assessments gather standardized clinical observations within and between health domains and can provide decision support application (through severity and risk scores) to care planning activities (4,7,13). Efficiency of data collection occurs because a single observation can be used to inform multiple assessment applications. For example, rating patient independence for decision-making in everyday tasks can assess the severity of cognitive impairment while also informing indices of functional (Activities of Daily Living, ADL) performance and capacity, indictors of need for specialist neurocognitive referrals, and risk scales for mortality (14). Conversely, if different single-dimension assessment instruments are used (one to measure cognitive impairment and another to measure functional impairment in this example) without some effort to standardize clinical observations across domains, then their clinical utility is difficult to understand when developing care plans for multiple aspects of patient need (15). Findings from multi-dimensional patient assessments provide baseline information used for care planning of multiple chronic diseases by multiple care team members (1,4,10). The skillset necessary to complete a multi-dimensional assessment is not exclusive to any singular member of the care team or to any one health profession (6). When clinical observations are standardized and assessment practices follow a structured process the clinical utility of the assessment can

facilitate care planning, information sharing (16–19), and improve assessment skills (6). Although significant efforts directed towards aligning assessment practices between different healthcare professionals have occurred, multi-dimensional patient assessment system development, implementation, and evaluation remains a complicated and multi-staged process (4,5,12,15).

Developing a multi-dimensional assessment requires rigorous evaluation to determine if the clinical observations of the assessor properly inform the delivery of care (4,12,13). Others have described validation as a process of developing validity arguments following the testing of stated hypotheses or assumptions (20–22). Describing an extensive list of possible questions or hypotheses to test (12) is an example of using the validity argument approach within the context of multi-dimensional patient assessment systems. By prioritizing hypotheses in greatest need of testing and planning a process to collect the necessary evidence, clinicians, researchers, and decision makers are able to make judgements about implementation and use (20,23). When hypotheses are stated *a priori*, accountability to the testing process can strengthen resulting judgements, thereby lessening *ad hoc* analyses or picking-and-choosing favorable studies (23). Terminology about validity and validation used to support instrument development and evaluation has created confusion because of mixed uptake of contemporary validity frameworks (24). Additionally, existing frameworks that focus on developing or evaluating single-dimension measurement systems (11,21,25) are limited in their application to multi-dimensional patient assessment systems because they do not account for the ability to concurrently accumulate evidence across multiple domains nor provide guidance for the judgement processes needed to appraise potentially competing evidence. Rather than recycling and repeating the development and evaluation process for each assessment item or domain, I gather these processes together,

making allowances for iterations as needed, to concurrently address the driving applications of clinical observations—to provide and improve patient care. Each new experiment that contributes further evidence supporting or discouraging particular parts of the assessment process signifies the need for judgements to be iterative as well (23,26,27). To account for multiple clinimetric properties and to permit necessary revisions, I extend the contemporary validity framework to guide judgement processes for conceptualization (28–30), sensitivity (12,31), and clinical utility (19) (in addition to validity and reliability). To illustrate its application, I use examples from my work investigating assessment practices in community paramedicine home visit programs. My aim is to provide a framework for developing a multi-dimensional patient assessment system that acknowledges the perpetually evolving complexities of clinical practices by directing evaluation with multiple (sometimes concurrent) experiments.

MAIN TEXT

Defining Clinimetric and Psychometric Properties for Developing and Evaluating Multi-Dimensional Assessment Systems

Evaluating assessment instruments should involve multiple inter-related experiments to investigate reliability, validity, and other clinimetric or psychometric properties (See Table 2-1) (11,26,31,32). If advantages of multi-dimensional assessment systems (described above and illustrated in Figure 2-1) are recognized by clinicians, researchers, or decision makers then evaluation and judgement about "proof-of-concept" can represent a preliminary step to generate evidence that will later contribute to validity arguments (28–30). Validation has long been described as determining if an instrument does what it is designed to do (20). Development should begin by exploring what those intended uses are and whether they are achieved through exploratory research and small-scale pilot-testing prior to larger scale implementation (28–30). Initial testing may investigate the appropriateness of assessment practices and generate content validation evidence by examining existing assessment practices (11,19,25,28). Determining

whether or not a finding is reproduced by different assessors or at different times or through parallel methods (25) is important because the extent to which an assessment provides findings that are consistent, stable, and repeatable demonstrates its reliability (11). The interpretation and use argument can permit inferences about reliability findings to apply to applications where scores are computed based on the responses to specific assessment items (23). Defining different measures of reliability and validity provides convenient labels for what can be a lengthy list of different tests used to evaluate an instrument (12). As with reliability, there are multiple ways to test validity but the relationships between different types of tests have different impacts on the inferences made (23). For example, many tests examining validity of assessment domains are not worthwhile without first establishing measures of reliability of those domains (21,25). From there, judgement is needed to determine if assessment applications can inherit validity arguments from assessment items or domains (25). Evaluating content validity of an assessment application would require identification of important outcome measures, possibly through expert consensus (11,29)—which in turn may also support other efforts evaluating clinical utility. Measures of clinimetric properties relating to sensitivity (detecting change) need to also be considered (11,12,25,31,33). For the purposes of this framework I summarized key guiding principles about evaluation methodologies in Table 2-1.

Table 2-1: Some clinimetric and psychometric properties to consider when developing and evaluating a multi-dimensional patient assessment system.

Property requiring evaluation	**Defined process or objective**	**Examples of possible claims to test or questions to investigate**	**Supporting methodologies**
Conceptualization	Exploring possibility-of-use through exploratory research and small-scale pilot-testing or feasibility studies.	• Existing assessment practices include multiple domains. • Assessors are competent in assessment of multiple domains. • Assessment applications can appropriately direct care planning and delivery of care for multiple conditions	• Literature review • Environmental scan • Interviews of key informants • Consultation of relevant experts • Small-scale pilot-testing
Reliability	Testing to determine consistent, stable, or repeatable findings.	• Consecutive assessments (under controlled conditions) generate consistent findings • Assessments by different assessors are consistent • Agreement is demonstrated for identical assessment items in different assessment instruments	• Studies that measure test-retest, inter- or intra-rater, or inter- or intra-measure reliability • Generalizability studies
Validity	Examining whether findings are representative of what is being observed.	• Agreement between assessment applications derived from single-dimension instruments and multi-dimensional assessment systems • Assessment identifies impairments of functioning, disability, and health • Assessment applications are generalizable to the wider population	• Validation studies that examine constructs including convergent or divergent validity • Investigating sources of bias, experimental validity studies
Sensitivity	Testing ability to detect clinically relevant changes over time. Sometimes referred to as responsiveness.	• Change is identified in patient condition after identified events • Assessment includes information prioritized by patient • Cumulative exposures to events are identified over time	• Studies measuring positive predictive value or negative predictive value. • Testing diagnostic accuracy of assessment applications
Clinical Utility	Testing appropriateness, accessibility, practicality, and acceptability to determine usefulness in practice.	• Assessments provide information relevant to delivery of patient care • The resource implications (time-to-complete, training, associated costs) of assessments demonstrate efficiency • Decision support provided by assessment applications improves patient care	• Consultation of providers • Derivation of new applications • Quality indicator measurement studies

Stages of development, evaluation, and judgement

Evidence has demonstrated that process standardization (adoption of common or shared process characteristics) occurs when motivation to cooperate is greater than competitive interests (34). If integrated person-centred care is the intent, then cooperating across care sectors should be inherent—necessitating standardized clinical observations of multiple domains facilitated by a multi-dimensional approach to assessment. In turn, developing multi-dimensional assessment requires determining the clinical domains for standardization and the associated assessment applications (as illustrated in Figure 2-1). The evaluation process draws together multiple experiments (according to examples described in Table 2-1) to build an evidence base supporting alignment of assessment practices with the application of assessment findings to the delivery of patient care. Figure 2-2 illustrates multiple sequential and concurrent steps supporting development, evaluation, and judgement processes of multiple clinimetric properties that combine investigations of clinical observations and assessment applications. Evaluation of multiple clinimetric properties through an argument approach could be particularly valuable because explicitly stating inferences associated with interpretation and use arguments at each stage can inform future investigations as well as supporting implementation decisions.

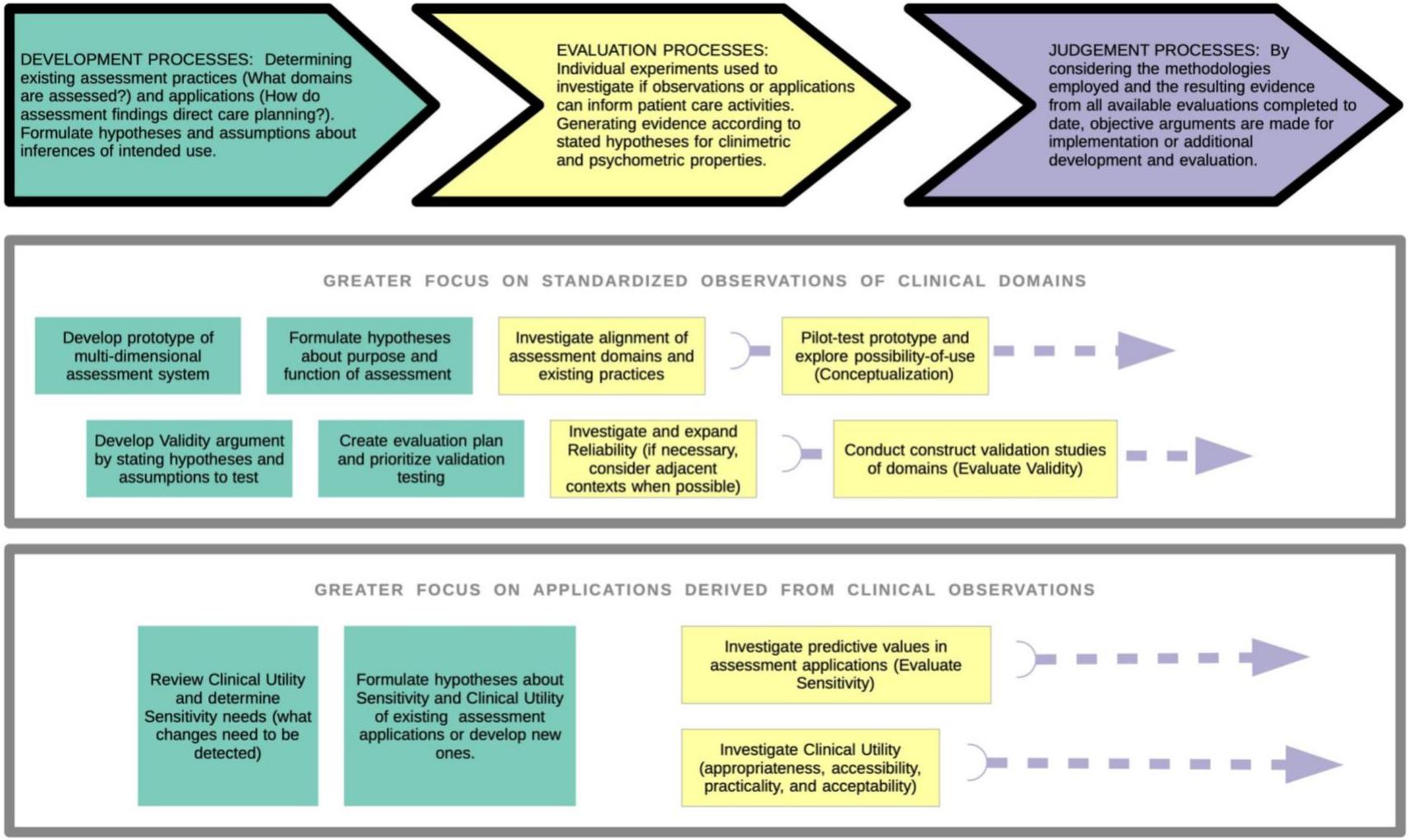

Figure 2-2: Illustrating the framework for developing, evaluating, and judging a multi-dimensional assessment system using examples of multiple and interrelated experiments needed to build evidence for subsequent decisions about use or further research.

Stage 1 – DEVELOPMENT PROCESSES: Identifying and standardizing clinical observations that inform assessment domains in a multi-dimensional assessment system

The aim of the development stage is to formulate hypotheses and assumptions about each property that will be tested during subsequent evaluation. Conceptualization is predominant during development (28,29) but conceptualization also requires evaluation and judgement. Similarly, development is not limited to conceptualization as hypotheses and assumptions about reliability, validity, sensitivity, and clinical utility should also be formulated. A collective effort is needed to initiate development that gathers existing approaches to assessment across multiple domains or from across care settings as part of an integrated approach to delivering care. In Table 2-1, examples of possible claims to test for each clinimetric property illustrate that such claims should be explicitly stated during the development process for each property that is going to be developed and evaluated. Development includes constructing preliminary arguments drawn from established evidence that may be judged prior to proceeding to further evaluation. A literature review that systematically gathers the best available evidence about assessment practices is a logical first step during the development stage, followed by other exploratory research (such as an environmental scan) that can identify potential needs or applications for multi-dimensional assessment or investigate which assessment items or domains are already in use. Interviews with key informants or investigating expert opinion through a modified Delphi study about appropriate assessment practices is another example of preliminary research suitable during Stage 1.

In Stage 1, inter-related efforts collecting existing evidence presents a decision point where directions towards either further development contributing to clinical utility of assessment applications continues, or preliminary evaluation of assessment domains occurs. Aligning both efforts can enable concurrent research. Multi-dimensional assessment systems are often built

with the transferability of assessment items or domains in mind, including standardized core items that have been tested in adjacent care settings (4). Any established evidence supporting reliability, as an example, should be considered and plausible inferences determined through transparent processes (20,23). The path towards implementation of multi-dimensional assessment may be more straightforward if there is an existing multi-dimensional assessment instrument, but this does not negate the potential need for identifying additional assessment domains or applications or for new or expanded evaluation of the instrument. The interRAI suite of instruments have been developed with adaptability for new settings in mind, including assessor training required to translate assessment practices from multiple single-dimension approaches to a singular multi-dimensional approach (4). How interpretation and use arguments about a multi-dimensional assessment system are framed will lead to decisions about the standardization of clinical observations. In the example of the interRAI suite of instruments, standardization of clinical observations has been demonstrated through their development and implementation (4,7,13). Planning a course for evaluation processes is a natural conclusion to Stage 1.

Stage 2 – EVALUATION PROCESSES: Testing multi-dimensional assessment systems

Whether a multi-dimensional assessment system is newly established or already exists, evaluating assessment practices is necessary to ensure assessment applications contribute to care planning, delivery of treatment, or case management activities. Multiple methods of evaluation (provided in Table 2-1) can contribute to each clinimetric property. Any subsequent judgements (in Stage 3) will be limited by evaluative methodology and will reflect the population, setting, and context of the test sample (not the instrument itself) (11,31,35). Clinicians, decision makers, and researchers need to carefully consider any inferences drawn from pre-established tests. If multiple examples of testing have previously been completed, including in adjacent care settings

from which plausible inferences can be made, it may be worthwhile to proceed to directly to Stage 3 without immediately conducting further tests or experiments.

If testing to date is limited or incomplete, further evaluation is necessary to build the evidence base according to the plans established during the development process. First-time testing through pilot implementation is a logical way to begin. Such testing should contribute evidence supporting both assessment domains and applications. Balancing evaluation efforts to consider assessment domains and assessment applications can be challenging. Tests that examine convergent or divergent validity and experimental validity are "first steps" (4) that can also contribute evidence to an instrument's sensitivity and clinical utility. Convergent validity that compares new assessment items to previous assessment items is a natural experiment when comparing a single-dimension instrument to a multi-dimensional instrument. Experimental validity that explores response distributions to individual assessment items or examines associations between assessment items helps build validity arguments and evidence of the clinical utility for the assessment system as a whole. Determining if observations are transferable between populations, settings, or contexts further supports judgements in Stage 3 about multi-dimensional assessments, including their role in integration of care. Figure 2-2 presents some suggestions when considering how to initiate evaluation.

The evaluation process is iterative and acts a bridge between development in Stage 1 and judgement in Stage 3. Iterations during the evaluation process can have different precipitating factors including preceding development activities, testing newly established assessment items or additional assessment applications included in a new multi-dimensional assessment system, testing an existing multi-dimensional assessment system further, or the refinements made after judging results of previous evaluations.

Stage 3—JUDGEMENT PROCESSES: Summation of multi-dimensional assessment evaluation; methods and impact

Accounting for a multi-dimensional assessment system's purpose of integration and comprehensiveness is an example of an over-arching objective of the judgement process, particularly when compared to single-dimension assessment instruments. Interpreting outcomes from every single isolated test illustrates the need to continuously return to judgement of interpretation and use arguments. If interpretation and use arguments are created during development in Stage 1 and evaluation in Stage 2 is prioritized accordingly, then judgement can follow a systematic approach (23,26) and contribute to implementation decisions. Judgement requires reflection on everything that has been demonstrated through the development and evaluation stages. The actionable outcomes from this stage are either more testing or immediate refinement.

Over time, more testing will happen, and further interpretation of results will be required. As implementation occurs, more questions should be included in the evaluation process with the expectation that the ever-evolving evidence base will contribute to ongoing improvement of clinical assessment. Challenges and barriers to implementing evidence into clinical practice have been broadly recognized (36), but if addressed, implementation of multi-dimensional assessment systems can build momentum towards refinement and further evaluation. For example, when shared information is available across the care continuum, "ripple effects" of cooperation between different care providers enable greater care integration (10). Third-generation assessment is already emerging as an extension of the concepts of multi-dimensional assessment to enable communication of assessment findings that draws from common language that can be shared beyond the boundaries of setting-specific care (4).

Application of framework to community paramedicine

An aging population, a greater understanding of social determinants of health, and an increased prevalence of chronic diseases have contributed to uptake of multi-dimensional assessment systems (1,4,8), as well as spread of community paramedicine programs (37–40). If community paramedicine programs deliver integrated care, then community paramedics are required to assess patients with diverse clinical presentations and determine an appropriate course of treatment and care planning similar to other care professionals (16,41,42). When care planning activities of community paramedics are informed by patient assessments, different approaches are needed while still being complementary to emergency response (17,37,43). Traditional emergency response requires rapid head-to-toe assessment for life threats followed by a general secondary survey including medical history and further focus on presenting complaints (16). In community paramedicine settings, the assumption that care will be immediately followed by transportation to the hospital is removed (37), which means that care, particularly as part of integrated delivery of care or through local collaborative partnerships, necessitates a more comprehensive assessment process and a shift from setting-specific to person-specific care (43). A community paramedic's practice setting draws from established paramedic practice and competencies, suitably adjusting and adapting to foster multi-dimensional assessment.

Guided by this framework, I explored the community paramedicine practice setting with a specific focus on scheduled home visit programs through a series of preliminary studies intended to inform the development process and contribute to initial evaluation (summarized in Table 2-2). An environmental scan of assessment practices in community paramedicine home visit programs demonstrated that existing multi-domain assessment had a general focus on a relatively small number of body systems that were consistently assessed (42). The study revealed that

community paramedics often employed multiple single-dimension assessment instruments but lacked a structured framework to guide assessment processes (42) similar to what is used in emergency settings (16,41). Some practice settings used multiple single-dimension assessment instruments and screening tools that created lengthy assessments which could be inconsistently applied, possibly without adequate discrimination (42). I conducted a scoping study (including author consultation) to identify aspects of assessment that were applied to care planning and case management and demonstrated that integrated care was often part of community paramedicine program design (43). I convened a panel of experts to explore consensus on assessment domains that should be part of assessment practices in community paramedicine home visit programs and included in a multi-dimensional assessment system (44). In addition to assessment domains, the consultation included questions such as; "What are the goals of care?" "What are patient needs?" and "What do health system partners ('external' forces) look for?" to probe assessment applications. Panel members represented multiple different jurisdictions and multiple different parts of the healthcare continuum (not exclusively paramedic practice) in order to maintain a person-centred rather than setting-specific perspective (44). The study results demonstrated agreement on a multi-domain assessment structure (44). When combined, the expert panel, literature review, and environmental scan contributed to development of a multi-dimensional assessment system with assessment domains aligned to existing clinical observations in community paramedicine home visit programs while also contributing evidence to content validation of the assessment domains.

Table 2-2: A summary of clinimetric and psychometric properties, claims that were tested, methodologies used, and findings from preliminary studies conducted in the development and evaluation of a multi-dimensional patient assessment system for community paramedicine home visit programs.

Property requiring evaluation	**Claims that were tested or questions that were investigated in community paramedicine settings**	**Supporting methodologies**	**Findings from studies**
Conceptualization	• Existing assessment practices include multiple domains • Assessors are competent in assessment of multiple domains • Assessment applications can appropriately direct care planning and delivery of care for multiple conditions	• Literature review • Environmental scan • Consultation of relevant experts • Small-scale pilot-testing	• Application of assessments to care planning in published literature includes direct provision of care for multiple conditions and collaboration with other members of the healthcare team (43). • Although multiple domains are included in existing practice, it appears that many are inconsistently applied (42). • An inter-disciplinary panel of experts from multiple jurisdictions demonstrated consensus on multiple assessment domains appropriate for review in community paramedicine home visit programs (44). • A small-scale pilot test successfully demonstrated necessary components of a conceptual prototype assessment instrument (ISRCTN 58273216).
Reliability	• Consecutive assessments (under controlled conditions) generate consistent findings • Assessments by different assessors are consistent • Agreement is demonstrated for identical assessment items in different assessment instruments	• Studies that measure test-retest, inter- or intra-rater, or inter- or intra-measure reliability	• Reliability of standardized assessments items has been demonstrated in adjacent care settings (45).
Validity	• Assessment identifies impairments of functioning, disability, and health • Assessment applications are generalizable to the wider population	• Validation studies that examine constructs including convergent or divergent validity • Investigating sources of bias, experimental validity studies	• The findings from the pilot-testing of a prototype assessment instrument provide some preliminary evidence about the community paramedicine patient population in comparison to other community care populations (ISRCTN 58273216). • Validity studies of assessment applications from adjacent care settings have demonstrated potential for application within community paramedicine assessments (46).
Clinical Utility	• Assessments provide information relevant to delivery of patient care	• Consultation of providers	• Most assessment domains included in the prototype assessment instrument demonstrated relevance to care planning

With evidence supporting a prototype, the development and evaluation process continued by pilot testing the multi-dimensional assessment in community paramedicine home visit programs. Pilot testing was devised as a pragmatic prospective cohort study that did not require paramedic services to alter delivery of existing community paramedicine home visit programs and enabled evaluation across multiple sites with minimal disruption of existing program delivery models. Paramedic services were recruited to implement multi-dimensional assessment as a quality improvement exercise that could expand or streamline assessment practices of community paramedics. The pilot study involved recruitment of multiple paramedic services, software development, assessor training, data sharing agreements, ongoing support, and time for data collection. The results, including descriptive analysis and comparison to adjacent patient population groups is available (included in Chapter Five). The pilot testing indicated that patients in community paramedicine home visit programs appear to have a greater chronic disease burden, limited social supports, and ongoing mental health challenges—all of which are plausible contributors to an increased health system utilization which could be manifested in increased 9-1-1 calls and engagement with paramedic services. I also conducted another modified Delphi study to explore the relevance of the assessment domains that were included in the pilot study to the care planning activities (assessment applications) of a broadly representative sample of community paramedics from one Canadian province. A small number of the participants were community paramedics that had participated in the pilot study and were familiar with multi-dimensional assessment. Together, the steps taken to develop assessment domains by pilot testing a multi-dimensional assessment system in multiple community paramedicine home visit programs and engaging frontline community paramedics in an

experiment to examine clinical utility of the assessment's applications contribute evidence to appraisal and sets the stage for further implementation and evaluation.

Further implementation will contribute to longitudinal evaluation and enable refinement of multi-dimensional assessment practices based on generated evidence. Preliminary evidence and judgement indicate that expanded implementation of a new instrument is possible and warranted to support expanded evaluation of stated hypotheses. Analyses of data collected through multi-dimensional assessment could investigate associations between functional ability, cognitive ability, psycho-social well-being, and a number of other factors that might contribute to 9-1-1 use. Investigating factors associated with health system utilization while controlling for changes in patient condition over time could help to predict repeated 9-1-1 use and build arguments for evaluating instrument sensitivity. In addition, completing sub-group analysis of the evaluation of predictive validity (as an example) may lead to identifying and measuring differences between different patient population groups and contribute to validity arguments. Implementation will enable greater system-level modeling of community paramedicine programs as part of integrated person-centred care, ongoing surveillance of community paramedicine program performance (including development of quality indicators), and long-term follow up to the evaluation of community paramedic assessment practices.

CONCLUSION

I have described a framework comprised of three stages to direct inter-related experiments that contribute to developing and evaluating a multi-dimensional patient assessment system. I illustrated that different evaluation processes can be conducted in conjunction with the complexity of assessment practices—implying that "accumulating several types of… evidence" (12) is a necessary component of development. Describing multiple steps for inter-related experiments that contribute to developing and evaluating multi-dimensional assessment is

necessary for informing evidence-based assessment practices. The processes of development and evaluation are iterative and need to be contextualized according to research methodologies involving pilot-testing followed by broad implementation and continuous judgement. Guided by interpretation and use arguments that acknowledge the role of both standardized observations of clinical domains and the applications of assessment to care planning multiple clinimetric and psychometric properties should be evaluated. The application of this framework can demonstrate its own value in contributing to the ongoing evaluation of multi-dimensional assessment systems and guide both subsequent judgement processes and future development processes.

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APPENDIX A: Supplemental Tables

Supplement Table 2-1: Examples of Single Domain/Specific Problem Assessment Instruments grouped by Clinical Domain with references supporting derivation or implementation.

Clinical Domain or Problem	Assessment Example	Applicable References
Cognition	Mini-Mental State Exam (MMSE)	Folstein MF, Folstein SE, McHugh PR. Mini-mental state (MMSE) Journal of Psychiatric Research, 12.
	Montreal Cognitive Assessment (MoCA)	Nasreddine ZS, Phillips NA, Bédirian V, Charbonneau S, Whitehead V, Collin I, Cummings JL, Chertkow H. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society. 2005 Apr;53(4):695-9.
	Mini-Cog	Borson S, Scanlan J, Brush M, Vitaliano P, Dokmak A. The mini-cog: a cognitive 'vital signs' measure for dementia screening in multi-lingual elderly. International journal of geriatric psychiatry. 2000 Nov;15(11):1021-7.
Vision	Snellen Visual Acuity Test	Snellen H. Probebuchstaben zur Bestimmung der Sehscharfe, Utrecht, v: d.
Mood	Personal Health Questionnaire 9 Item (PHQ-9)	Löwe B, Kroenke K, Herzog W, Gräfe K. Measuring depression outcome with a brief self-report instrument: sensitivity to change of the Patient Health Questionnaire (PHQ-9). Journal of affective disorders. 2004 Jul 1;81(1):61-6.
	Hamilton Rating Scale	Hamilton M. The Hamilton rating scale for depression. In Assessment of depression 1986 (pp. 143-152). Springer, Berlin, Heidelb
Social Factors	Multi-dimensional Scale of Perceived Social Support (MSPSS)	Zimet GD, Powell SS, Farley GK. Multidimensional scale of perceived social support (MSPSS).
Functional Status	EQ-5D Function Items	Johnson JA, Coons SJ. Comparison of the EQ-5D and SF-12 in an adult US sample. Quality of Life Research. 1998 Feb 1;7(2):155-66.
	Timed-up-and-go (TUG)	Richardson S. The Timed "Up & Go": A Test of Basic Functional Mobility for Frail Elderly Persons. J Am Geriatr Soc [Internet]. 1991; 39(2):142–8. Available from: https://pubmed.ncbi.nlm.nih.gov/1991946/
	Barthel	Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index: a simple index of independence useful in scoring improvement in the rehabilitation of the chronically ill. Maryland state medical journal. 1965.
Disease Diagnoses and Health Conditions	New York Hear Association (NYHA) Classification	Prakash R, Aronow WS, Khemka M. Left ventricular end-diastolic pressure in anginal patients: lack of correlation with New York Heart Association's functional classification. J Am Geriatr Soc. 1975 Feb;23(2):77-9. doi: 10.1111/j.1532-5415.1975.tb00388.x. PMID: 1141626.
	Visual-Analogue Pain Scale	Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. Pain. 1983 Sep 1;17(1):45-56.
	CANRISK	Robinson CA, Agarwal G, Nerenberg K. Validating the CANRISK prognostic model for assessing diabetes risk in Canada's multi-ethnic population. Chronic Dis Inj Can. 2011;32(1):XX-XX.

Clinical Domain or Problem	Assessment Example	Applicable References
Nutritional Status	Mini-Nutritional Assessment (MNA)	Guigoz Y, Vellas B, Garry PJ. Assessing the nutritional status of the elderly: The Mini Nutritional Assessment as part of the geriatric evaluation. Nutrition reviews. 1996;54(1):S59.
Medications	MedsCheck	Ontario Ministry of Health and Long-Term Care. The MedsCheck program guidebook. 2nd edition. Toronto (ON): Ministry of Health and Long-Term Care; 2008
	Tool to Reduce Inappropriate Medications (TRIM)	Niehoff KM, Rajeevan N, Charpentier PA, Miller PL, Goldstein MK, Fried TR. Development of the tool to reduce inappropriate medications (TRIM): a clinical decision support system to improve medication prescribing for older adults. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy. 2016 Jun;36(6):694-701.
Home Environment	Safety Assessment of Function and the Environment for Rehabilitation – Home Outcome Measurement and Evaluation (SAFER-HOME)	Chiu T, Oliver R. Factor analysis and construct validity of the SAFER-HOME. OTJR: Occupation, Participation and Health. 2006 Oct;26(4):132-42.
	Falls and Accidents Screening Tool (HOME FAST)	L. Mackenzie, J. Byles & N. Higginbotham (2002) Reliability of the Home Falls and Accidents Screening Tool (HOME FAST) for identifying older people at increased risk of falls, Disability and Rehabilitation, 24:5, 266-274, DOI: 10.1080/09638280110087089

Supplement Table 2-2: Examples of applications derived from clinical observations included in a multi-dimensional assessment instrument. All examples are taken from interRAI assessment instruments.

Application Type	Assessment Application Example	Applicable References
Severity Scales	Cognitive Performance Scale	Morris JN, Howard EP, Steel K, Perlman C, Fries BE, Garms-Homolová V, Henrard JC, Hirdes JP, Ljunggren G, Gray L, Szczerbińska K. Updating the cognitive performance scale. Journal of geriatric psychiatry and neurology. 2016 Jan;29(1):47-55.
	Depression Rating Scale	Burrows AB, Morris JN, Simon SE, Hirdes JP, Phillips CH. Development of a minimum data set-based depression rating scale for use in nursing homes. Age and ageing. 2000 Mar 1;29(2):165-72.
Risk Scales	Changes in Health, End-Stage Disease, Signs, and Symptoms Scale (CHESS)	Hirdes JP, Frijters DH, Teare GF. The MDS-CHESS Scale: A new measure to predict mortality in institutionalized older people. Journal of the American Geriatrics Society. 2003 Jan;51(1):96-100.
	Detection of Indicators and Vulnerabilities for Emergency Room Trips (DIVERT)	Costa AP, Hirdes JP, Bell CM, Bronskill SE, Heckman GA, Mitchell L, Poss JW, Sinha SK, Stolee P. Derivation and Validation of the Detection of Indicators and Vulnerabilities for Emergency Room Trips Scale for Classifying the Risk of Emergency Department Use in Frail Community-Dwelling Older Adults. Journal of the American Geriatrics Society. 2015 Apr;63(4):763-9.

Application Type	Assessment Application Example	Applicable References
Care Planning or Treatment Prompts	Clinical Assessment Protocols	Morris JM, Berg K, Björkgren M, Finne-Soveri H, Fries BE, Frijters D, Gilgen R, Gray L,Hawes C, Henrard J, Hirdes JP, Ljunggren G, Nonemaker S, Steel K, Szczerbínska K, (2010). interRAI Clinical Assessment Protocols (CAPs): For use with Community and Long-Term Care Assessment Instruments. Version 9.1.2 ISBN 978-1-936065-15-8

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Chapter 3 - *What do Community Paramedics assess? An environmental scan and content analysis of patient assessment in community paramedicine*

Note: The objective for this chapter was to explore existing assessment practices within community paramedicine home visit programs. By analyzing the content of community paramedic assessments, I sought to align efforts to create a conceptual model of a multi-dimensional patient assessment system with existing assessment practices.

I acted as the lead investigator for this study and coordinated analytical activities with the other investigators as indicated within the manuscript. I took the lead role in writing the manuscript and coordinated submission, including response to reviewers prior to its publication.

Although the title of the chapter states "What do community paramedics assess?" the contribution of this chapter is more a reflection of how assessment is practiced in community paramedicine home visit programs in Ontario, Canada. The results from the study informed the conceptualization of a multi-dimensional patient assessment system for community paramedicine home visit programs.

Citation: Leyenaar MS, McLeod B, Penhearow S, Strum R, Brydges M, Mercier E, Brousseau AA, Besserer F, Agarwal G, Tavares W, Costa AP. What do community paramedics assess? An environmental scan and content analysis of patient assessment in community paramedicine. Canadian Journal of Emergency Medicine. 2019 Nov;21(6):766-75.

ABSTRACT

OBJECTIVES

Patient assessment is a fundamental feature of Community Paramedicine, but the absence of a recognized standard for assessment practices contributes to uncertainty about what drives care planning and treatment decisions. My objective was to summarize the content of assessment instruments and describe the state of current practice in Community Paramedicine home visit programs.

METHODS

I performed an environmental scan of all Community Paramedicine programs in Ontario, Canada, and employed content analysis to describe current assessment practices in home visit programs. The International Classification on Functioning, Disability, and Health (ICF) was used to categorize and compare assessments. Each item within each assessment form was classified according to the ICF taxonomy.

RESULTS

A total of 43 of 52 paramedic services in Ontario, Canada, participated in the environmental scan with 24 being eligible for further investigation through content analysis of intake assessment forms. Among the 24 services, 16 met inclusion criteria for content analysis. Assessment forms contained between 13 and 252 assessment items (median 116.5, IQR 134.5). Most assessments included some content from each of the domains outlined in the ICF. At the sub-domain level, only assessment of Impairments of the Functions of the Cardiovascular, Haematological, Immunological and Respiratory systems appeared in all assessments.

CONCLUSION

Although Community Paramedicine home visit programs may differ in design and aim, all complete multi-domain assessments as part of patient intake. If Community Paramedicine home visit programs share similar characteristics but assess patients differently, it is difficult to expect that the resulting referrals, care planning, treatments, or interventions will be similar.

INTRODUCTION

Community paramedicine provides patients with access to scheduled or immediate healthcare in collaboration with other providers across the continuum of care (1). Community paramedicine programs are alternatives to traditional ambulance response and transport (2–6) and aim to address overburdened emergency departments (ED) and fragmented primary care. They are broadly described by their activities, such as supporting transitions from ED (e.g., hospital to home), assessment and referral to community-based programs, and providing direct preventive care and chronic disease management support (7–10). Growing evidence supports the effectiveness of community paramedicine programs in reducing 9-1-1 calls, improving chronic disease management, and enhancing access to community-based care (7–9,11). Despite growing evidence and funding, community paramedicine programs raise important questions about training, knowledge base, consistency of care, scope of care, and paramedic roles in the larger health care system (3,4,6,12,13).

In the course of their duties, community paramedics perform patient assessments - often in a patient's home - to establish physical, psychological and psychosocial health care needs and risks that may have negative impacts on patient health (9–11,14–17). Assessment is the basis for determining an appropriate course of action such as initiating preventative care, treatment, and/or referral. Community paramedics can identify patient health needs that may only be apparent in the home, including neglect and abuse (18,19) and other safety concerns. What is assessed in any patient interaction is closely related to paramedic education and clinical training—thus serving as the basis to guide practice (18). Minimal available information on the assessment content and practices of community paramedicine programs limits training and development of care guidelines.

My objective was to inspect and summarize the content of assessment instruments used at time of patient intake or enrolment in community paramedicine home visit programs to inform efforts to evolve community paramedicine program evaluation, training, continuing education, and care guidelines. I hypothesized that the content of community paramedicine assessments would vary markedly across programs, but that some health domains would be assessed consistently across programs.

METHODS

Study Design

I conducted an environmental scan and content analysis of community paramedicine home visit programs in Ontario, Canada, between December 4, 2017 and March 15, 2018. Environmental scans establish a network of health care stakeholders and scan the network to better understand policies and practices (20–22). Content analysis can be used to draw inferences about documents, picture, audio, and video (23,24). Directed content analysis of community paramedicine home visit assessment instruments was used to investigate the state of assessment content across programs (25). This study was exempt from formal review by the Hamilton Integrated Research Ethics Board based on the lack of direct human participant data collection and low risk.

Setting

I selected the province of Ontario in Canada to conduct the environmental scan given that it has a growing elderly population (26), a fragmented primary care structure (27,28), and I was aware that community paramedicine programs have been implemented across the province by many of the 52 paramedic services. In Ontario, community paramedicine programs are eligible for funding through Local Health Integration Networks (LHIN), which are regional administrative organizations of the Ministry of Health and Long-term Care responsible for funding hospitals, long-term care, and home and community care. In isolated instances

paramedic services may initiate community paramedicine programing through other funding sources (municipal, third-party grants, other health-care partners). There are no mandated or regulated criteria for training, education, or certification for community paramedics. Both Primary Care and Advanced Care Paramedics may be used to staff community paramedicine programs and conduct patient assessments. I focused on home visit programs given that they are a broadly implemented community paramedicine care model, target similar patients (frequent 9-1-1 users), and utilize a formal patient assessment at intake. Generalizations of assessment practices across other models of community paramedicine (such as referral or clinic-based programs) would be limited by a relatively small number of comparisons.

Data collection

A short questionnaire was used to determine basic characteristics of community paramedicine programming at each paramedic service (See Box 1). Two investigators (Brent McLeod and myself) piloted the questionnaire on three services each and revised it after discussing initial responses. The questionnaire was used to request a blank copy of the intake assessment form used for each service's home visit programs (if services operated such a program). I obtained a list of all paramedic services from a roster of recent invitees to a provincial Community Paramedicine Forum (including management, providers, and administrative support) and then contacted each by phone. When required, voicemail messages were left, and follow-up email correspondence were sent. My protocol stipulated that multiple attempts should be made to provide paramedic services with adequate opportunity to answer questions about their community paramedicine programs and to achieve a minimal response rate of 80% for the environmental scan. Responses were recorded in a securely shared Google form (G Suite for Education, Menlo Park, CA, 2018). Three reminder emails were sent to paramedic

services who indicated that they were willing to share their community paramedicine assessment forms but had not done so.

1. Service Name, Contact Name, Contact Position
2. Which statement best reflects community paramedicine programming in your service:
    a. Currently providing, no plans for future expansion in the coming year
    b. Currently providing, and planning future expansion in the coming year
    c. Planning to implement in the coming year, but not presently providing
    d. Not providing and not planning to provide in the coming year
3. If community paramedicine programming is presently implemented, which statement best reflects the type of program(s):
    a. Referral program (referral to care provided by other organizations)
    b. Clinic-based program
    c. Home visit program with remote patient monitoring (example: CPRPM (29))
    d. Home visit program without remote patient monitoring
    e. Other
4. If you are planning new or additional Community Paramedicine programming, which statement best reflects the type of program(s):
    a. Referral program
    b. Clinic-based program
    c. Home visit program with remote patient monitoring
    d. Home visit program without remote patient monitoring
    e. Other
5. In general terms, what level of priority does Community Paramedicine have in your service?
6. Are you willing to share your home visit intake assessment form?

Box 4-1: Content of the questionnaire used to conduct environmental scan.

Content Analysis

My content analysis used the International Classification of Functioning, Disability, and Health (ICF), an internationally recognized taxonomy and common language for patient assessment content. Together with the International Classification of Diseases (ICD), the ICF form the Family of International Classifications of the World Health Organization (30). The ICF is a hierarchical taxonomy that categorizes individual assessment items into discrete domains and sub-domains (31). It includes four primary domains ('Impairments of Body Functions,' 'Impairments of Body Structures,' 'Activity Limitations and Participation Restriction,' and 'Environmental Factors') as well as 'Demographic Information' (31). 'Demographic Information' can include pertinent information about social factors and fits within the ICF framework for providing context to the biopsychosocial model of classification. The domain 'Impairments of Body Functions', for example, is divided into sub-domains based on the

body system involved ('Mental functions,' 'Sensory functions and pain,' 'Voice and speech functions,' etc.). Each sub-domain is further divided into categories according to specific functions of the specific system. For example, 'Mental functions' is further divided into specific categories such as 'Consciousness,' 'Orientation,' 'Memory,' and 'Language' (to name a few). Content from each of the assessment forms was classified at the category level, but for the purposes of this study, results were reported at the domain and sub-domain level to aid in comparison. I used a deductive approach to categorize paramedic assessment forms with the ICF by classifying each assessment item in each form according to the ICF (23).

Three reviewers with expertise in assessment practices (Brent McLeod, Andrew Costa, and myself) completed the content analysis. The most comprehensive community paramedicine assessment form was used to calibrate processes for classification between the reviewers. Each blank fillable field was considered an assessment item except where logic dictated that a field would not be filled (ie, No Known Allergies (NKA) and a list containing medications such as Aspirin, Penicillin, Sulfa, etc.) Any items that were determined to not fit within the ICF framework were then classified as "*other*." After completing the calibration meeting, two reviewers (Brent McLeod and myself) conducted content analysis independently following the same approach on all remaining assessment forms. Any items that were classified as *"other"* were then grouped together under descriptive headings and assigned to an ICF domain. An adjudication meeting was held to resolve any differences in classification by the third reviewer (Andrew Costa), providing a final classification for all assessment items for all assessment forms. Agreement rates were calculated for the content analyzed independently by the two reviewers against the final classification. Basic descriptive statistics were used to report the findings.

RESULTS

Responses from 43 of 52 paramedic services were received to achieve the predetermined response rate for the environmental scan of 80%. Non-responding paramedic services were from a mix of urban and rural areas and of varying sizes. Respondents represented a variety of job classifications from Chief to front-line community paramedic. Responses to the level of priority community paramedicine held within a service were mixed. Thirty-seven paramedic services (86%) indicated that they were operating a community paramedicine program and 28 indicated that they were planning expansion in the coming year. Twenty-six paramedic services indicated that they provided a home visit program (70%). Of these, 24 (92%) indicated that they used a formal intake assessment, with 18 of 26 (69%) providing their intake assessment forms for content analysis. After preliminary screening, it was determined that two forms were actually intake forms that contained solely administrative information from outside referring agencies. Sixteen assessment forms were included for content analysis (see Figure 3-1).

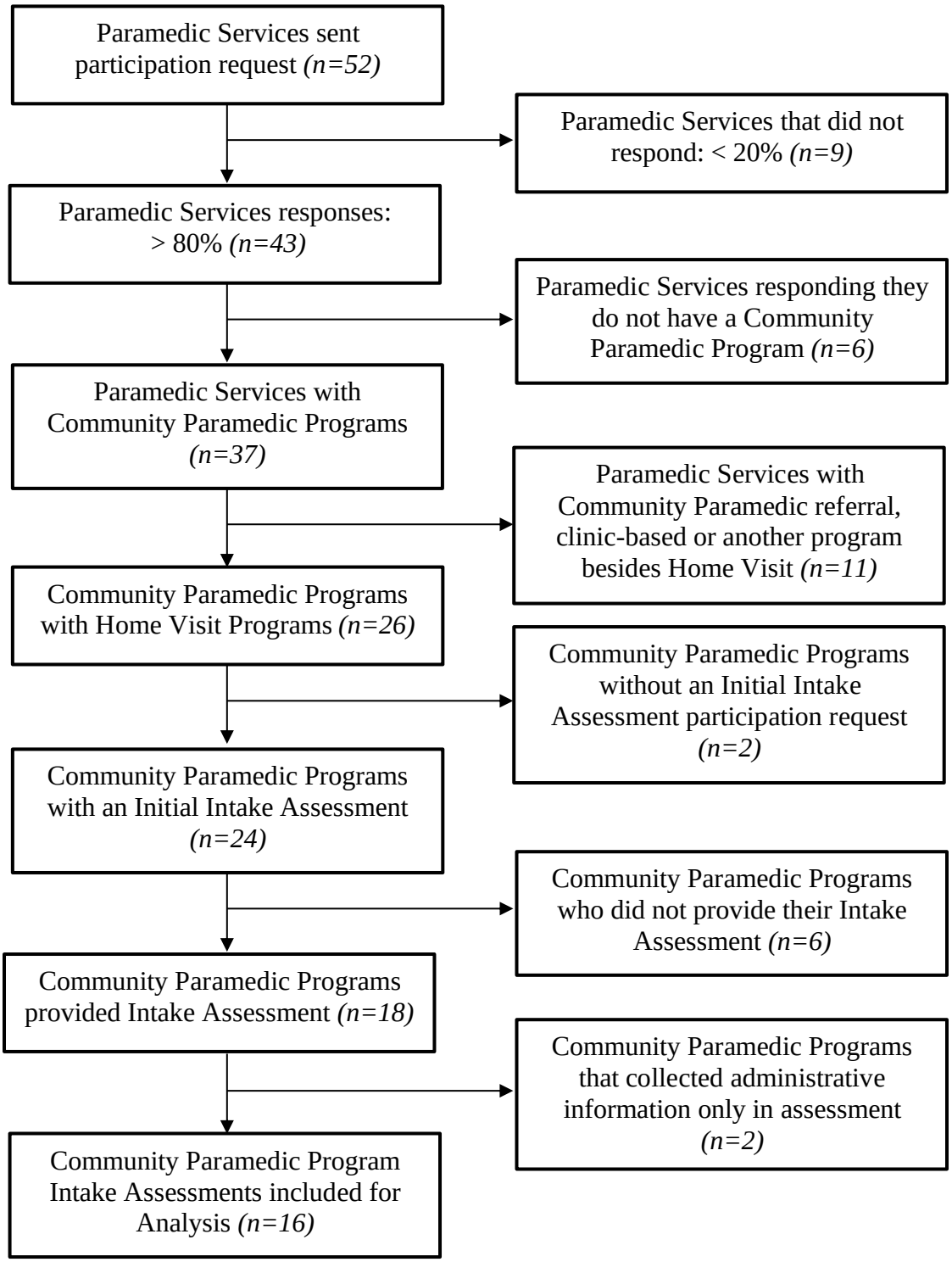

Figure 3-1 Flowchart illustrating results of environmental scan that produced 16 intake assessment forms for content analysis.

Thirteen assessment forms were either paper based or fillable PDF format and three were provided as screenshots from electronic forms. Assessment forms contained between 13 and 252 assessment items (median 116.5, IQR 134.5) (see Table 3-1). Two assessment forms were exact matches for content.

The agreement percentage at the domain and sub-domain levels was high for both raters against the final classification. Rater 1 agreed with the final classification 99.0% and 95.1% of the time at the domain and sub-domain levels respectively. Rater 2 agreed with the final classification 92.6% and 89.1% of the time at the domain and sub-domain levels respectively. Kappa was not calculated because of the adjudication process—I was not interested in the two independent reviewers' agreement with each other, but with the final classification which was discussed (biasing the element of chance).

At the domain level, all assessments included 'Demographic Information' and assessment of 'Impairments of Body Functions' (relating to different organ systems). Fifteen assessments included assessment of 'Environmental Factors' (such as physical living conditions or information about social supports). Fourteen assessments (88%) included assessment of 'Impairments of Body Structures' (relating to different organ systems) and assessment of 'Activity Limitations and Participation Restriction' (such as exercise, hobbies, or taking care of one's health). Table 3-1 includes a summary of content within ICF domains and sub-domains across community paramedicine home visit assessments.

Most assessments included multiple items classified within multiple sub-domains of 'Impairments of Body Functions.' All community paramedicine assessments included 'Function of the cardiovascular, haematological, immunological or respiratory systems,' while no assessments specifically assessed 'Voice and speech function' or 'Functions of the skin and

related structures' and only one included 'Neuromusculoskeletal and movement related functions.' For any specific sub-domain of 'Impairments of Body Structures,' less than half of the community paramedicine assessments included content and the median number of items within this domain was 3.5—lowest for any of the four domains. Within the 'Activity Limitations and Participation Restriction' domain, the sub-domains with the greatest amount of content were items classified under either 'Mobility' or 'Self-care.' 'Environmental Factors' was the domain with the highest median number of items, 25. The sub-domains within 'Environmental Factors' that had the greatest amount of content were 'Services, systems, and policies,' and 'Support and relationships.'

Table 3-2 details the 164 assessment items across the 14 community paramedicine programs that could not be classified at the category level within the ICF (classified as "Other"). Items were assigned to closest acceptable ICF domain wherever possible with any remaining items remaining with as a separate "Other" group. A median of 9 items could not be classified for each assessment across three identified domains, 'Demographic Information,' 'Activity Limitation and Participation Restriction,' and 'Environmental Factors' or the separate "Other" group. Most prevalent in the separate "Other" group was information about medications followed by information pertaining to either 'Do Not Resuscitate or Advance Care Planning.'

Table 3-3 summarizes assessment items found within each ICF sub-domain by prevalence across community paramedicine home visit programs. Assessment items classified under a small number of sub-domains were found to be highly prevalent. These were items pertaining to 'Functions of the cardiovascular, haematological, immunological, and respiratory systems,' 'Mental functions,' 'Functions of the digestive, metabolic, and endocrine systems,' 'Mobility,' 'Self-care,' 'Services, systems, and policies,' and 'Existing medical diagnoses.'

Many more assessment items were found to be inconsistently assessed across ICF sub-domains. The low prevalence for multiple sub-domains is reflected in the bottom two rows of Table 3-3.

Table 3-1 Summary of Community Paramedicine Home Visit Program Assessment Content (by number of items) within International Classification of Functioning, Disability, and Health (ICF) domains.

		Community paramedicine program																	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Median^	Programs assessing content, n (%)*
ICF Domain	**ICF Sub-domain**																		
Demo-graphics	General (not categorized at sub-domain level)																	0	0 (0)
	Name	3	1	2	2	2	1	1	3	1	3	3	2	2	2	1	2	2	16 (100)
	Sex	1		1	1				1			1	1	1	1	1	1	1	10 (63)
	Date of birth	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	2	1	16 (100)
	Address	5	5	8	2		2	2	8	1	5	8	3		5	5	4	4.5	14 (88)
	Years of formal education																	0	0 (0)
	Current marital status			1	1				1									0	3 (19)
	Current occupation																	0	0 (0)
	Existing medical diagnosis	44	8	1	8	4					15	7	16	40	55	60	11	8	12 (75)
	Total items in domain	54	15	14	15	6	4	4	14	3	24	20	23	45	65	68	20	17.5	16 (100)

Table 3-1: continued

		Community paramedicine program																	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Median^	Programs assessing content, n (%)*
ICF Domain	**ICF Sub-domain**																		
Impairments of Body Functions	General (not categorized at sub-domain level)		2	1	1		1	1	5	1		6	1	1	2	1	4	1	13 (81)
	Mental functions		2	1	5	19	1	1	4			25	1	1	4	1	2	1	13 (81)
	Sensory functions and pain	1	2	2	2				1			9	4		13	4		1	9 (56)
	Voice and speech functions																	0	0 (0)
	Functions of the cardiovascular, haematological, immunological, and respiratory systems	6	11	6	19	19	9	9	16	6	8	24	9	11	14	30	24	11	16 (100)
	Functions of the digestive, metabolic, and endocrine systems	2		3	13	5	2	2	2	2	2	7	3	3	2		7	2	14 (88)
	Genitourinary and reproductive functions			1	1	12					2	1	2			1	1	0.5	8 (50)
	Neuromusculoskeletal and movement related functions				1													0	1 (6)
	Functions of the skin and related structures																	0	0 (0)
Total items in domain		9	17	14	42	55	13	13	28	8	12	72	20	16	35	37	38	18.5	16 (100)

Table 3-1: continued

		Community paramedicine program																	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Median^	Programs assessing content, n (%)*
ICF Domain	**ICF Sub-domain**																		
Impairments of Body Structures	General (not categorized at sub-domain level)		3	5		9	1	1	20	1		1	4			4	1	1	11 (69)
	Structure of the nervous system					4												0	1 (6)
	The eye, ear, and related structures		5						4			1						0	3 (19)
	Structures involved in voice and speech																	0	0 (0)
	Structures of the cardiovascular, immunological, and respiratory systems				2	5			3				1		1			0	5 (31)
	Structures related to the digestive, metabolism, and endocrine systems				1	3						1					1	0	4 (25)
	Structure related to genitourinary and reproductive system					4												0	1 (6)
	Structure related to movement				2							1	2	1	1			0	5 (31)
	Skin and related structures		3			8			1				1			1	1	0	6 (38)
Total items in domain		0	11	5	5	33	1	1	28	1	0	4	8	1	2	5	3	3.5	14 (88)

Table 3-1: continued

		Community paramedicine program																	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Median^	Programs assessing content, n (%)
ICF Domain	**ICF Sub-domain**																		
	General (not categorized at sub-domain level)											2			1	1	3	0	4 (25)
	Learning and applying knowledge				6				1								1	0	3 (19)
	General tasks and demands																	0	0 (0)
	Communication		2		1													0	2 (13)
Activity Limitation and Participation Restriction	Mobility	1	7		8	3	2	2	3			18	4		6	3	2	2.5	12 (75)
	Self-care	10	12		13	13	2	2	14		1	14		5		14	4	4.5	12 (75)
	Domestic life		8		4				1			1				4	1	0	6 (38)
	Interpersonal interactions and relationships				1							6						0	2 (13)
	Major life areas		3		3				14			2			2	1		0	6 (38)
	Community, social, and civic life		1		3				2			5						0	4 (25)
Total items in domain		11	33	0	39	16	4	4	35	0	1	48	4	5	9	23	11	10	14 (88)

Table 3-1: continued

		Community paramedicine program																	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Median*	Programs assessing content, n (%)
ICF Domain	**ICF Sub-domain**																		
Environmental Factors	General (not categorized at sub-domain level)	1	6				1	1					1		5	9	1	0.5	8 (50)
	Products and technology		58	3	3	14			2			26	3		24		1	2	9 (56)
	Natural environment and human made changes to environment		4									4			1	8		0	4 (25)
	Support and relationships	7	32		6				24		4	19	5	7	11	9	16	7	11 (69)
	Attitudes					2			1			1						0	3 (19)
	Services, systems, and policies		2	2	16	9	2	2	11		3	24	28	2	17	12	10	6	14 (88)
Total items in domain		8	102	5	25	25	3	3	38	0	7	74	37	9	58	38	28	25	15 (94)
Total Items		82	178	38	126	136	25	25	146	13	44	218	92	76	164	162	100	96	
Grand Total Items (including “Other” from Table 3-2)		87	187	41	138	137	26	26	193	13	44	252	101	86	179	175	117	116.5	

^Median total number of items in each domain and sub-domain

*Proportion of programs assessing at least one item from each category (domain and sub-domain).

Table 3-2 Summary of Community Paramedicine Home Visit Program Assessment Content (by number of items) classified as "Other" by Descriptive Category (not ICF sub-domain).

		Community paramedicine program																		
ICF Domain	**Other group**	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	**Median^**	**Programs assessing content, n (%)***	
Demo-graphics	Recent immigration														1			0	1	(6)
	Ethnicity/culture											1						0	1	(6)
	Family medical history											1		5		1		0	3	(19)
Activity Limitation and Participation Restriction	Gambling								3			3						0	2	(13)
Environ-mental Factors	Pets		8										3		1	1	1	0	5	(31)
	Co-habitant smoker				2							2					1	0	3	(19)
	Co-habitant drinker				2							2					1	0	3	(19)
Other	Do not resuscitate/Advance care planning	4	1		1	1			9			9				1		0	7	(44)
	Medications			1	6		1	1	16			1	6	5	8	2	14	1	11	(69)
	Goals for care	1		2	1				19			15						0	5	(31)
Total "Other" items		5	9	3	12	1	1	1	47	0	0	34	9	10	15	13	17	9	14	(88)

^Median total number of items in each domain and sub-domain

*Proportion of programs assessing at least one item from each category (domain and sub-domain).

Table 3-3 Prevalence of Specific Assessment items found within each International Classification of Functioning, Disability, and Health (ICF) domain across Community Paramedicine Home Visit Assessments

	Demographics	**Impairments of Body Functions**	**Impairments of Body Structures**	**Activity Limitation and Participation Restriction**	**Environmental Factors**	**Other**
Items appeared in all assessments	- Name - Date of birth	- Functions of the cardiovascular, haematological, immunological, and respiratory systems				
Items appeared in => 75% of assessments	- Address - Existing medical diagnosis	- Mental functions - Functions of the digestive, metabolic, and endocrine systems		- Mobility - Self-care	- Services, systems, and policies	
Items appeared in <= 25% of assessments	- Current marital status	- Neuromusculoskeletal and movement related functions	- Structure of the nervous system - The eye, ear, and related structures - Structures related to the digestive, metabolism, and endocrine systems - Structure related to genitourinary and reproductive system	- Learning and applying knowledge - Communication - Interpersonal interactions and relationships - Community, social, and civic life	- Natural environment and human made changes to environment - Attitudes	- Recent immigration - Ethnicity/culture - Family medical history - Gambling - Co-habitant smoker - Co-habitant drinker
Items appeared in no assessments	- Years of formal education - Current occupation	- Voice and speech functions - Functions of the skin and related structures	- Structures involved in voice and speech	- General tasks and demands		

DISCUSSION

I found that most ICF assessment domains are being considered to varying lengths and depths in almost all community paramedicine assessments. The fact that some ICF sub-domains were assessed in some community paramedicine programs with one or two items, whereas others community paramedicine programs assessed most ICF sub-domains with many items demonstrates this variety. That all the included community paramedicine programs had assessment items in the ICF sub-domain 'Functions of the cardiovascular, haematological, immunological, and respiratory systems,' suggests that patients enrolled in community paramedicine home visit programs likely have a high prevalence of diseases and conditions associated with these systems such as diabetes, heart disease, chronic obstructive pulmonary disease, or congestive heart failure. Examples of these assessment items included basic vital signs and other diagnostics within a primary care paramedic scope of practice such as pulse oximetry, 12-lead EKG or blood glucometry. In general, paramedic training and education includes an emphasis on the life-threats associated with these systems which likely also contributed to the prevalence of assessment items aligned with this sub-domain (32).

Limitations

Community paramedicine home visit programs are a new service model for paramedic practice with a relative paucity of clinical guidelines to anchor practice (3). Determining the state of current community paramedicine assessment practice through an investigation of intake assessment forms using content analysis relies on certain assumptions about documentation standards and quality assurance processes which have not necessarily been formalized. By using the ICF as a mechanism to classify content, I also assumed that some baseline criteria for assessment practice could be identified between different paramedic services who may employ paramedics with differing scopes of practice or whose community paramedicine programs may

have different designs or objectives. One characteristic of community paramedicine programs is that they are designed in response to locally identified needs (3,4,13) meaning that finding differences in assessment practices would be likely. While this suggests that inherent differences should be expected, a recent review of case management and care planning in community paramedicine home visit programs found that common attributes existed in the patient populations served by these programs across multiple jurisdictions (13). While my study was conducted in only one province, sampling 16 different community paramedicine home visit programs likely demonstrates many of the differences in scope of paramedic practice and in program design would be expected in a national sample.

My content analysis of assessment items is an investigation of the opportunity to document assessment findings. It is assumed that the intake assessment conducted by a community paramedic in a home visit program should be completed in full and would be comprehensive enough to direct subsequent care planning without requiring secondary or subsequent assessment. Formalizing the assessment training process for community paramedics and developing assessment guidelines may address whether or not this is true. Even so, differences between community paramedicine program assessments at the sub-domain level were observed in many areas. For example, falls prevention is a common focus of community paramedicine programs (1). Falls prevention is a complex and multi-faceted approach where the benefits of assessment of falls risk have been demonstrated (33). I found that most community paramedicine home visit programs included an assessment of mobility (see Table 3-3), suggesting a consistency of focus in this area. However, only one of the community paramedicine home visit programs assessed ‘Structures related to the genitourinary and reproductive system’ and ‘Genitourinary and reproductive functions.’ Urinary incontinence is

associated with increased odds of falling (34–37) and has been identified as an area of falls prevention programs that requires improved assessment and surveillance (33) which means that it is a strong area for guideline development and education in the future. Determining whether or not assessment of continence should or should not be assessed by community paramedics requires further inquiry. Similar arguments can be made about the rationale for many of the ICF sub-domains where items were not assessed consistently across the community paramedicine home visit programs that participated in my study. If community paramedics are indiscriminately conducting assessments based on ICF sub-domains that they perceive as valuable without evidence informed guidelines or education, then it is possible that some may be missing out on key areas which may help to achieve their intended goals for care.

Implications

Community paramedicine home visit assessment forms vary in depth, suggesting that assessment practices and, potentially, care vary across services sampled in Ontario. Previously published studies about community paramedicine programs in Ontario (10,15) suggest that specific program aims likely contribute to this variation. But, if community paramedicine home visit programs do share similar characteristics (in terms of population served and goals for care), yet assess patients differently, it is difficult to expect that the resulting referrals, care planning, treatments, or interventions will be similar. In turn, such differences will also likely result in inequalities in patient care between different locations. General health assessment practices have evolved to consider multiple disease processes across multiple care settings with the ability to integrate with other care providers (38)—all criteria that should guide assessment practices in community paramedicine because patient assessment is foundational to managing care plans, collaborating with other care providers, and providing interventions (39–41). The importance of assessment has been demonstrated in traditional paramedic practice (41) and often underlies

program delivery in community paramedicine (3,4,13,18). Future work regarding the minimum threshold for intake assessments in community paramedicine home visit programs should engage stakeholders to determine the appropriateness of the assessment areas that have been summarized here.

CONCLUSION

Community paramedicine home visit programs assessments cover all domains of the ICF, yet the number of assessment items is often limited and highly variable across services. Relative consistency was observed for the assessment of the 'Functions of the cardiovascular, haematological, immunological or respiratory systems.' Other commonly assessed sub-domains were 'Mental functions,' 'Functions of the digestive, metabolic, and endocrine systems,' 'Mobility,' 'Self-care,' and utilization of support 'Services, systems, and policies.' Identifying a minimum threshold for patient assessment and consolidating assessment practices could promote development of community paramedic training and contribute to clinical guidelines for community paramedic practice. By summarizing the content of assessment instruments and describing the state of current practice in community paramedicine home visit programs it is possible for community paramedicine programs to reflect on specific assessment domains that may be contributing to achieving their goals for patient care.

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Chapter 4 - *Examining Consensus for a Standardized Patient Assessment in Community Paramedicine Home Visits: a RAND/UCLA modified Delphi Study*

Note: Concurrent with other preliminary studies, the study described in this chapter demonstrates further evidence that was used in creating a prototype multi-dimensional patient assessment system for community paramedicine home visit programs. The objective of this work was to gather consensus from a panel of experts about assessment domains that would be appropriate for community paramedics to assess.

Drawing from my professional network at the time (including my involvement with organizations, associations, and groups), I was able to facilitate recruitment of participants, collect and interpret data, and act as the lead investigator for this study.

The results from the study indicated that the concept of a multi-dimensional patient assessment system appeared to be appropriate. The appropriateness extended across community paramedicine experts from multiple jurisdictions and experts in assessment practices from adjacent care settings.

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ABSTRACT

OBJECTIVE

Community paramedicine programs are often designed to address repeated and non-urgent use of paramedic services by providing patients with alternatives to the traditional "treat and transport" ambulance model of care. I sought to investigate the level of consensus that could be found by a panel of experts regarding appropriate health, social, and environmental domains that should be assessed in community paramedicine home visit programs.

DESIGN

I applied the RAND/UCLA appropriateness method in a modified Delphi method to investigate the level of consensus on assessment domains for use in community paramedicine home visit programs.

SETTING & PARTICIPANTS

I included a multi-national panel of experts on community paramedicine and in-home assessment from multiple settings (paramedicine, primary care, mental health, home and community care, geriatric care).

MEASURES

A list of potential assessment categories was established after a targeted literature review and confirmed by panel members. Over multiple rounds, panel members scored the appropriateness of 48 assessment domains on a Likert scale from 0 (not appropriate) to 5 (very appropriate). Scores were then reviewed at an in-person meeting and a finalized list of assessment domains was generated.

RESULTS

After the preliminary round of scoring, all 48 assessment domains had scores that demonstrated consensus. Nine assessment domains (18.8%) demonstrated a wider range of rated appropriateness. The in-person meeting resulted in re-grouping assessment domains and adding an additional domain about urinary continence.

CONCLUSION

An international panel of experts with knowledge about in-home assessment by community paramedics demonstrated a high level of agreement on appropriate patient assessment domains for community paramedicine home visit programs. Community paramedicine home visit programs are likely to have similar patient populations. A standardized assessment instrument may be viable in multiple settings.

INTRODUCTION

Community paramedicine programs are often designed to address repeated and non-urgent use of paramedic services by providing patients with alternatives to the traditional "treat and transport" ambulance model of care (1–8). For example, some community paramedicine programs partner with primary care providers to assist patients with chronic disease management strategies through home visit programs that integrate patient coaching, patient monitoring processes, and point of care diagnostics (2,5). Community paramedicine programs are in the early stages of development and it is not clear whether or not community paramedics are establishing consistent care plans or providing the evidence-based treatment. In order to provide safe, consistent and evidence-based care, paramedics must complete a patient assessment to guide their decision making (9–11). If such an assessment is valid and reliable, then the paramedic is supported in their care planning and provision of treatments. Providing safe, consistent and evidence-based care should improve patient outcomes, but it is also an indicator of a health system that is working well. Standardized assessment instruments play an important role by demonstrating that consistent approaches are followed and by generating the data necessary to establish the evidence-base (12–19).

Community paramedicine home visit programs commonly combine a variety of discrete assessment scales to create comprehensive patient assessment forms (5,20). In this way, the focus of community paramedicine assessments are tailored to suite local clinical decision-making needs, and reflect the goals and target populations for individual community paramedicine home visit programs (21,22). Yet, standardized assessment instruments are used across multiple healthcare settings as a valuable tool for promoting information continuity across the continuum of care (12,19,21,23–25). Other studies have investigated assessment domains in traditional emergency paramedic settings to inform clinical guidelines for paramedics (26).

Without further investigation of the viability for community paramedicine assessment practices, it is difficult to determine whether or not pertinent assessment domains are being included in the community paramedic decision making processes for interventions and care planning in different community paramedicine home visit programs. A standardized assessment or minimum assessment standard might clarify common scopes of practice, facilitate clinical training, and improve patient care, health system utilization, and clinical communication in community paramedicine. To my knowledge no study has examined the viability of standardized patient assessment across community paramedicine home visit programs.

I sought to investigate the level of consensus that could be achieved for standardized assessment content in community paramedicine home visit programs by an international panel of relevant experts. I expected that consensus could be achieved on the relevance of some assessment domains in the community paramedicine setting despite assumed differences in program design between settings because common assessment domains in emergency settings were identified from an international sample of paramedic assessments (26). Should such a consensus be achieved, it would provide an opportunity for future testing of a standardized assessment instrument in community paramedicine.

METHODS

Design

I applied the RAND/UCLA Appropriateness Method (RAM) (developed by the RAND Corporation and the University of California Los Angeles) within a modified Delphi method (27). Multiple rounds of surveys were used to ask a panel of experts to rate the appropriateness of assessment domains for community paramedicine home visit programs. An in-person consensus meeting was held to report on survey results to panel members and discuss the consensus amongst the group. Formal research ethics review was not required for this study

based on non-experimental design and low risk to the panel participants. Panel members were under no obligation (real or perceived) to contribute to the work outlined in this paper and their participation was voluntary. Patients and members of the public were not involved in this study.

Establishing expert panel

My panel of experts represented key backgrounds in paramedic services, primary care, geriatric care, home care, assessment development, and health services research. The panel coordination process involved national and international networks of professionals and researchers with known interests in community paramedicine or patient assessment practices. A panel coordinator sent invitations to individuals who had participated in the International Roundtable on Community Paramedicine, the Canadian EMS Research Network, the Canadian Standards Association Group Technical Committee on Community Paramedicine, the Ontario Community Paramedicine Forum, interRAI, the Canadian Frailty Network, and the Ontario Association of Community Care Access Centres. Panelist selection was based on insuring representation from multiple Canadian and international jurisdictions, multiple research settings, multiple allied health care sectors, and multiple paramedic services

Literature search & identification of assessment domains

I used a targeted literature review to identify assessment domains for consideration in the Delphi process. I included literature about assessment in community paramedicine programs by drawing on a previously conducted scoping review study on case management and care planning in community paramedicine home visit programs (6). Herein, the structure of an assessment was conceptualized to be made up of assessment items pertaining to assessment domains within assessment categories. Any assessment domains described in the studies were compiled into a list and grouped into assessment categories based on broad themes such as social factors, functional abilities, or ongoing health conditions. Where articles named a specific assessment

instrument, the domains included in it were added to the respective categories. Given the lack of published research on the topic, panel members were invited to confirm the relevance of the assessment categories and provide suggestions for any other categories that they felt may warrant inclusion. A final list of assessment domains was generated based on the targeted literature review and any input regarding assessment categories that I received. I used this list of assessment domains for the first Delphi questionnaire.

Finding consensus (Delphi rounds)

The Delphi questionnaire presented panel members with each assessment domain in randomized order with a scale ranging from 0 (not appropriate) to 5 (very appropriate). A 6-point scale was used instead of the traditional 9-point scale in order to promote reproducibility (better differentiation between scale choices) and to avoid ambiguity that can result from having a midpoint in a Likert scale (28). Instructions to panel members were to consider the appropriateness of each domain with respect to the context of where, when, and how patients might be assessed, what other care providers might be involved in care planning or in providing treatment, and what the aims of the community paramedicine program specific to their individual experiences. Results from the preliminary rounds of scoring were compiled and revised surveys were distributed to members where lack of consensus (median scores of two or less on the Likert scale) was found. Andrew Costa and I acted as co-chairs for the in-person meeting where consensus was finalized. At the in-person meeting the domains were grouped into assessment categories, as they had been prior to distribution of the first Delphi questionnaire in order to facilitate discussion.

RESULTS

Panel Characteristics

Fifteen individuals agreed to participate in the panel (see Table 4-1). Many participants were affiliated with multiple professional networks or associations. Experts who had a

background in paramedicine included individuals involved nationally or internationally in paramedic service management, community paramedicine programs, or paramedic education or research. Experts who were familiar with assessment practices in care settings other than community paramedicine had portfolios of primary care, geriatric care, mental health care, and home and community care.

Table 4-1 Distribution of panelists by affiliations and by areas of expertise.

		Affiliation with professional network/association						
Expertise in Paramedicine	**n**	International Roundtable on Community Paramedicine	Canadian EMS Research Network	CSA Group Technical Committee on Community Paramedicine	Ontario Community Paramedicine Forum (Ontario Association of Paramedic Chiefs)	interRAI*	Canadian Frailty Network	Ontario Association of Community Care Access Centres**
Paramedic Service Management (Chief or Deputy Chief)	3	2	1	1	3	0	0	0
Community Paramedicine (Supervisor or Paramedic)	6	4	3	2	3	0	0	0
Paramedic Educator/Researcher	4	2	3	0	1	0	1	0
Expertise in Assessment								
In Primary Care Settings	1	1	0	1	1	0	0	0
In Acute Geriatric Care Settings	1	0	0	0	1	1	1	0
In Home and Community Care Settings	1	0	0	0	0	0	1	1
In Mental Health/Emergency Psychiatric Settings	1	0	0	0	0	1	0	0
Total	17	9	7	4	9	2	3	1

* interRAI is a network of clinicians and researchers who develop standardized assessment instruments.

** The Ontario Associations of Community Care Access Centres was an organization that coordinated provincial agencies who provided home and community care prior to local level restructuring.

Survey creation

Assessment categories reflected in the literature search included lifestyle, dietary, and sleeping habits (29), mobility and social needs (30), home safety (8), and fall risk (31). Physical exam and reported symptoms of chronic diseases were common (2,5,8,29–32). Two studies mentioned specific assessment instruments; the CANRISK tool for diabetes (31) and the EQ-5D-3L for quality of life (2). The nine categories presented to panel members prior to distribution of the Delphi questionnaire were living arrangement, psychosocial well-being, cognition, functional ability, nutrition, past medical history, ongoing health conditions, existing use of health services, and mental health. Panel members confirmed these categories and warranted their responses by indicating that the programs that they were involved with were designed to provide care to community dwelling older adults, palliative care patients, long-term care patients, residents of assisted living, patients with identified mental health issues, or members of the general population. The nine assessment categories were then used to formulate a final list of 48 assessment domains for scoring appropriateness (see Table 4-2).

Delphi Results

Thirteen members of the panel participated in the preliminary round of scoring. All assessment domains had median scores of four or higher indicating that panel members considered them to be appropriate. No item was considered to not be appropriate by the panel and only nine domains (18.8%) had a range of responses greater than or equal to three. Some domains had isolated responses by individual panelists that they were not considered to be appropriate. The three domains (6.3%) that had responses that were lower than two (indicating a degree of inappropriateness) by more than one respondent pertained to marital status, involvement of police in episodes of mental health crisis, and making financial trade-offs. Preventative health measures, urinary continence, driving, social activities, and time spent alone

were other domains (n=5, 10.4%) that had one respondent indicate as not being appropriate. Overall, the high scores for appropriateness of assessment domains achieved on the first round of scoring negated the need for distribution of subsequent rounds of scoring prior to the in-person meeting.

Eight members of the panel were able to attend the in-person meeting. Distance and time-zone differences were factors that prevented attendance by other panelists. Discussion about pre-meeting scoring during the meeting resulted in re-grouping questions about social relationships and activities and adding an additional domain to improve context about the assessment of urinary continence. Assessment domains about making financial trade-offs, preventative health measures, and driving were determined to merit inclusion for testing by sites willing to do so. Table 4-2 has been re-grouped according to the feedback from panel members at the in-person meeting about assessment categories.

Table 4-2 Summary of respondent scores reflecting the appropriateness of assessment domains. Domains were ranked from 0 (inappropriate) to 5 (highly appropriate)

	Question	Median	Max	Min	Range
	Patients should be asked an open-ended question allowing them to express their personal goals for care.	5	5	4	1
Living arrangements and social status	Patients should be asked about their marital status.	4	5	1	4
	Patients should be asked about their living arrangement (alone, with spouse, with family, etc.).	5	5	4	1
	Patients should be asked about changes in their living arrangement.	5	5	3	2
	Patients should be asked about their social relationships.	4	5	2	3
	Patients should be asked about feeling lonely.	5	5	4	1
	Patients should be asked about changes in their social activities.	5	5	2	3
	Patients should be asked about the amount of time they are alone during the day.	5	5	3	2
	Patients should be asked about the amount of time they are alone during the night.	5	5	2	3
	Patients should be asked about major stressors (severe illness, loss of income, victim of crime, loss of license, illness of family, etc).	5	5	3	2
	Patients should be asked whether family or close friends feel overwhelmed by their condition.	4.5	5	3	2
	Patients should be asked about their home environment (disrepair, safety, inadequate heating or cooling, etc.)	5	5	3	2
	Patients should be asked about making trade-offs due to finances (food vs shelter, shelter vs clothing, clothing vs medications, etc).	4	5	0	5
	Patients should be asked whether they have supportive family or close friends.	5	5	4	1
Function and abilities	Patients should be asked about activities of daily living (ADL) (bathing, dressing, hygiene, walking etc).	5	5	4	1
	Patients should be asked about mobility (how they move about).	5	5	4	1
	Patients should be asked about physical activity (exercise).	5	5	4	1
	Patients should be asked about recent changes in ability to perform activities of daily living (ADL) (bathing, dressing, hygiene, walking etc)..	5	5	4	1
	Patients should be asked whether or not they drive.	4.5	5	2	3
	Patients should be asked about changes in their ability to drive.	4	5	2	3
	Patients should be asked about their ability to communicate with others.	4.5	5	3	2
	Patients should be asked about their hearing and vision.	5	5	3	2

Table 4-2: continued

	Question	Median	Max	Min	Range
Cognition, mood, and mental health	Patients should be asked about their memory/recall ability.	5	5	4	1
	Patients should be asked about changes to their mental status.	5	5	3	2
	Patients should be asked about their mood (feeling depressed, anxious, or sad).	5	5	4	1
	Patients should be asked about disordered thought (irritability, inappropriate behaviours, drug or alcohol intoxication).	4.5	5	3	2
	Patients should be asked about insight into their mental health problems (when applicable).	5	5	4	1
	Patients should be asked about police involvement in mental health crisis (when applicable).	4	5	2	3
	Patients should be asked about ideation for harm to self or others (when applicable).	5	5	3	2
Medical history, medications, and ongoing health conditions	Patients should be asked whether they experience medical problems (signs or symptoms of medical conditions that have or have not been diagnosed) (dizziness, fatigue, dyspnea, hallucinations, diarrhea, etc).	5	5	4	1
	Patients should be asked about pain symptoms.	5	5	4	1
	Patients should be asked about the stability of their medical conditions.	5	5	3	2
	Patients should be asked to self-rate their health.	5	5	3	2
	Patients should be asked about tobacco and alcohol use.	5	5	3	2
	Patients should be asked about their diet.	5	5	3	2
	Patients should be asked about weight loss.	5	5	4	1
	Patients should be asked about the prescription medications that they take.	5	5	3	2
	Patients should be asked about adherence to prescription medications.	5	5	4	1
	Patients should be asked about preventative treatments or procedures (eye exam, dental exam, vaccines, mammography, colonoscopy, etc).	4.5	5	2	3
	Patients should be asked about ongoing treatments or procedures (radiation, transfusions, dialysis, etc).	5	5	3	2
	Patients should be asked about their continence (urinary).	5	5	2	3
	Patients should be asked about their medical history (disease diagnoses).	5	5	5	0
	Patients should be asked whether they have recently fallen.	5	5	5	0
Use of health services	Patients should be asked about ongoing formal care (home health aides, homemaking, physical therapy, occupational therapy, etc).	5	5	3	2
	Patients should be asked about use of hospital services (inpatient, outpatient, emergency department visit, etc).	5	5	3	2
	Patients should be asked about use of paramedic services (transport, non-transport, other).	4.5	5	3	2
	Patients should be asked about use of community services (public health, social services, etc.).	5	5	4	1

DISCUSSION

This study conducted a Delphi consensus technique to examine which assessment domains were appropriate areas of inquiry in community paramedicine home visit programs. A panel of experts familiar with community paramedicine assessment had a high level of agreement on appropriate patient assessment domains for community paramedicine home visit programs. The high level of agreement was achieved in-spite of differences in backgrounds of panel members, designs of community paramedicine programs that they were familiar with, or areas of assessment expertise. Although paramedic training and education (and subsequent certification) varies between jurisdictions, their assessment practices in emergency settings are very similar (11,26). Community paramedicine programs represent a new context for assessment that apply paramedic assessment skills outside of traditional emergency settings and care paradigms. My findings suggest that similar to emergency settings, the community paramedicine setting requires that paramedics bring together details about medical history, medications, and social factors so that they can identify circumstances where patients may be at risk.

Implications

A feature of community paramedicine is to include community engagement in adapting program operationalization to local needs (3,33). While this is likely a key component of program success, it has also led to uncertainty about the role community paramedics may play (34,35). My findings illustrate that common approaches to assessment in community paramedicine likely exists and may be realized in spite of differences between settings. Conceptually, paramedics must assess patients before they can determine suitable care planning and interventions that may be beneficial (36). Finding that an international panel of experts found a high level of agreement about the appropriateness of assessment domains can inform both the future standardization of community paramedic education and training as well as the

operationalization of common assessment practices. In turn, improved evaluation of community paramedicine programs may be possible because commonly assessed domains would likely reflect the results of interventions and care plans. Such evaluation would also provide clarity to the community paramedic role in patient care (35).

Strengths and weaknesses

The high level of agreement between experts made it difficult to determine which assessment domains were more important than others. While I purposely included clinicians and researchers with experience in primary care, geriatrics, home care, and mental health care, as well as paramedics with experience in community paramedicine from multiple regions, the expert panel was assembled through a convenience sample and participation was voluntary for each stage of the process. Assembling a panel through other means would likely mean that dissenting views on which domains are appropriate for paramedics to assess in home visit programs would emerge. In turn, this could have created more debate and a longer and more challenging process of finding consensus. However, even if dissenting views had emerged through an alternate strategy for gathering a panel of experts, employing Delphi methods has had demonstrated success when consensus has not been reached immediately due to such evidence of dissent (10,37).

The assessment domains that I presented did not provide detail with respect to the number of assessment items that could be included in a domain or the depth of detail. For example, one of the domains that I asked panel members to rate for appropriateness was pain symptoms. All panel members indicated that this was an appropriate domain to assess (minimum score of 4). However, pain is a very complex condition that can affect different patients in different ways. Community paramedics might be expected to follow the same style of pain mnemonic adapted from emergency practice (26), but the detail involved in determining intensity, duration,

frequency, and severity of pain was not explicitly described in the questionnaire provided. Similar exploration of depth and detail could be ascribed to nearly all of the assessment domains included in the questionnaire.

Future work

Future work should test specific assessment items within the domains evaluated in this study. Such work should consider the role that specific items might have in different community paramedicine settings. An investigation of what assessment items are aligned with the assessment domains that have been described in this study would address the uncertainty about the amount of detail community paramedicine programs are including in their patient assessments and contribute to the development of a validated assessment instrument for community paramedicine.

CONCLUSION

A diverse expert panel (in terms of geographical region, experience, and clinical background) achieved consensus on domains to be included in the assessment of patients in community paramedicine home visit programs. This consensus suggests that similar assessment practices occur in diverse community paramedicine home visit programs in spite of operational differences. Questions remain about the amount of detail and degree of depth that should be included in each assessment domain.

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Chapter 5 - ***Describing and comparing patient characteristics in community paramedicine home visit programs with other community-based care in Ontario with results from the Common Assessments for Repeated Paramedic Encounters (CARPE) study***

Note: A multi-dimensional patient assessment system was created that drew from evidence gathered in the studies described in Chapters Three and Four, as well as a previously published scoping study. The assessment items included for pilot-testing were identical to those included in other standardized multi-dimensional patient assessment systems which enabled comparison to other patient populations. The objective for Chapter Five is to describe the results of the pilot-testing and make comparisons of the response distributions to provide evidence about the types of patients assessed within community paramedicine home visit programs.

I was the lead investigator for the CARPE Study. I developed the study protocol, recruited sites, arranged data sharing agreements, managed the ethics review process, and interpreted the findings from the analysis and comparisons to other patient cohorts. I received funding through the Mitacs Accelerate Internship Program to work directly with Interdev Technologies Inc. on implementing the CARPE assessment instrument within their Radius Electronic Medical Records Software that was used by participating paramedic services. I also received scholarship support from the Hamilton Niagara Haldimand Brant Local Health Integration Network (formerly Community Care Access Centre) to study use of emergency departments and paramedic services by clients of home care and community support services which prompted the comparisons made in this chapter.

Chapter Two of my thesis describes Conceptualization as the first step in developing and evaluating a multi-dimensional patient assessment system. The implication of Chapter Six is an evaluation of the "possibility-of-use" as well as new ways to compare the community paramedicine home visit patient population to other community dwelling older adults that receive care at-home.

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ABSTRACT

OBJECTIVES

The aim for this study was to provide information about how community paramedicine home visit programs best "navigate" their role delivering preventative care to frequent 9-1-1 users by describing demographic and clinical characteristics of their patients and comparing them to existing community care populations.

METHODS

My study used secondary data from standardized assessment instruments used in the delivery of home care, community support services, and community paramedicine home visit programs in Ontario, Canada. Identical assessment items from each instrument enabled comparisons of demographic, clinical, and social characteristics of community-dwelling older adults using descriptive statistics and z-tests.

RESULTS

Data were analyzed for 29,938 home care clients, 13,782 community support services clients, and 136 community paramedicine patients. Differences were observed in proportions of individuals living alone between community paramedicine patients versus home care clients and community support clients (47.8%, 33.8%, and 59.9% respectively). I found higher proportions of community paramedicine patients with multiple chronic disease (87%, compared to 63% and 42%) and mental health-related conditions (43.4%, compared to 26.2% and 18.8% for depression, as an example).

CONCLUSION

When using existing community care populations as a reference group, it appears that patients seen in community paramedicine home visit programs are a distinct sub-group of the community-dwelling older adult population with more complex comorbidities, possibly exacerbated by mental illness and social isolation from living alone. Community paramedicine programs may serve as a sentinel support opportunity for patients whose health conditions are not being addressed through timely access to other existing care providers

INTRODUCTION

Paramedic services implement community paramedicine programs to address barriers to care faced by vulnerable patient populations who may otherwise resort to calling an ambulance or visiting an emergency department (ED) (1). Community paramedicine programs that address social determinants and preventative health needs for community-dwelling older adults (≥ 65 years of age) through healthcare "in-place," (avoiding transport to an ED) are spreading (2–4). Community paramedicine home visit programs have improved access to care for frequent callers through collaboration between primary care providers and community home care and support services agencies (4–9) resulting in patients avoiding ED visits upwards of 78% of the time and higher admission rates when visits are unavoidable (10). Frequent callers use paramedic services for reasons beyond acute medical emergencies including to address personal or social care needs (such as loneliness, food insecurity, or other deficits in quality of life), chronic conditions (such as pain, disease, or ongoing management of mental health), or functional and mobility difficulties related to advanced age (11–16). Across Canada, expansion of community paramedicine from pilot projects to province-wide programs (17–20) has been supported by a growing evidence base (5–7,9,21–24). Community paramedicine programs are attempting to shift from "reactive responses" towards better management of chronic conditions with fewer exacerbations (1) by targeting frequent callers who represent up to 20% of ED visits (12).

Whether community paramedicine home visit programs represent a duplication of services (25–27) to older adult patients requires further exploration (14,28). Studies have found that home care nursing visits are associated with same-day ED visits (29), that home care clients use paramedic services for transportation to the ED for such visits (16), and that paramedic referrals are associated with increased utilization of home care services (30). If home care clients present with lower acuity levels at an ED visit and are not admitted to hospital (29), more

information is needed to determine how community paramedics could better "navigate" their role in the delivery of integrated care (25,27). While community paramedicine home visit programs often incorporate collaborations with other out-of-hospital community care programs (5), an expanded description about the demographic and clinical characteristics of community paramedicine patients that includes comparisons with existing community care populations would generate greater understanding about the unique role community paramedicine programs could play in case-finding individuals for the delivery of out-of-hospital community care and prevention of ED visits. Implementation of the PERIL rule (31) to inform paramedic referrals to home care services demonstrated how paramedic screening at the time of a 9-1-1 call increased appropriate provision of home care services (30). Assessments by community paramedics capturing a wide breadth of clinical observations would mean similar dividends could be achieved in case-finding and care planning in community paramedicine home visit programs, even where patient enrollment is determined by local program design (32) and guide further coordination and collaboration between primary care providers, home care, and community support services (33).

My study proposed to identify characteristics of existing community paramedicine home visit patients across multiple jurisdictions and compare them to characteristics of clients from other community-based care providers. I hypothesized that patients in community paramedicine home visit programs represent a distinct subset of community-dwelling older adults with complex needs and a limited social support structure that contributes to their enrolment in these programs.

METHODS

Overview

My study used routinely collected de-identified secondary data about individuals assessed for their eligibility of home care services or as part of the delivery of community support services or community paramedicine programs across Ontario, Canada. I used identical variables from each data set to compare the home care and community support services client populations to those enrolled in community paramedicine home visit programs. This study was approved by Hamilton Integrated Research Ethics Board (#1650D).

Study settings and population

Home Care Clients

Information about home care clients included all individuals assessed using the interRAI Home Care (HC) assessment (34), between April 1, 2018 and March 31, 2019 in one health region in Ontario, Canada. The interRAI-HC is a standardized assessment instrument used to assess needs for home care on individuals that are expected to receive services for 60-days or more (35) and is mandated by Local Health Integration Networks. The Canadian Institute for Health Information's Home Care Reporting System is a repository of interRAI-HC data used for epidemiologic research and reporting on quality measures (35).

Community Support Services Clients

Information about clients receiving community support services was obtained from individuals who had been assessed using the interRAI Community Health Assessment (CHA) assessment instrument (36), between January 1, 2017 and December 31, 2017 (the most recent year for which data were available) in multiple jurisdictions across Ontario. The interRAI-CHA includes the same assessment domains as the interRAI-HC but uses a modular design (36). For example, assessors could be alerted to the need for a more detailed mental health assessment for some clients thereby completing these assessment items only on those where it was indicated and not others. The interRAI-CHA is used by community support services to assess individuals who

receive services like Meals on Wheels, homemaking, transportation, friendly-visiting or adult day programs (35). Each community support services agency sets their own parameters for their use of the interRAI-CHA and shares data with the interRAI Canada Repository (37). Both the interRAI-HC and interRAI-CHA include severity scales, diagnostic screeners, and risk scales that have undergone extensive testing with demonstrated validity and reliability (35,38–40).

Community Paramedicine Home Visit Program Patients

Data about individuals enrolled in community paramedicine home visit programs were obtained from paramedic services that had implemented a standardized assessment instrument as part of the Common Assessments for Repeated Paramedic Encounters (CARPE) study (ISRCTN #58273216). Several paramedic services participated in development of the assessment instrument through a three-part process that included a literature review, multi-disciplinary expert panel consultation, and an environmental scan of community paramedicine assessment practices.

Six paramedic services implemented the assessment instrument voluntarily as part of a quality improvement process that did not require altering delivery of their existing community paramedicine home visit programs. All paramedic services had similar patient enrollment criteria; a diagnosis of Congestive Heart Failure, Chronic Obstructive Pulmonary Disease, or Diabetes, and health system utilization that included at least three 9-1-1 calls, two ED visits, or one hospital admission in the preceding year (17,42). Each community paramedic involved with these programs received at least one in-person 4-hour training session about assessment practices (delivered by a member of the research team in collaboration with local paramedic service educators), a detailed training manual about the assessment instrument, and could attend regularly scheduled teleconference sessions to clarify any remaining questions. The assessment instrument was embedded within existing community paramedicine home visit program

electronic medical record software and data were provided to the research team for the period from April 1, 2018 to March 31, 2019. The assessment instrument was used to assess any patient enrolled in a community paramedicine home visit program (herein called community paramedicine patients), either at the time of their enrolment or as part of regularly scheduled follow-up visits or reassessments.

Analysis

Data were analyzed using descriptive statistics (including calculation of standard error) for each assessment item that was identical between the respective assessment instruments (see Appendix C Supplemental Table 5-1 for variable list). For reporting purposes, items were grouped by domain and collapsed into dichotomous variables to identify presence of disease, health deficits, or indicators of impairment (according to the nature of the respective assessment item). Comparative analysis for each assessment item tested proportions of responses using z-test (with $\propto$=0.05) to investigate differences between the community paramedicine patients and the other cohorts of community-dwelling older adults according to identical fields from the respective assessment instruments. Analysis was completed using SAS 9.4 (SAS Institute Inc, Cary, NC) and excluded incomplete or partial assessments.

RESULTS

Table 5-1 provides the demographic characteristics, living conditions, and health system utilization data for each group; 29,938 individuals assessed with the interRAI HC, 13,782 individuals assessed with interRAI CHA, and 136 individuals assessed with the assessment instrument. Mean ages were 78.8 (SD ± 13.5), 78.2 (SD ± 13.7), and 75.7 (SD ± 14.2) for home care clients, community support services clients, and community paramedicine patients respectively. The proportions of female patients—60.3%, 68.2%, and 64.0%—suggested scant evidence of differences in gender representation between groups. Differences in proportions of

individuals living alone was evident, with more community support clients (59.9%) and fewer home care clients (33.8%) when compared to community paramedicine patients (47.8%). The proportion of patients admitted to hospital in the past 90 days was not significantly different when comparing community paramedicine patients to home care clients—47.1% and 41.9% respectively—higher than the proportion observed in community support services clients, 13.6%.

Table 5-1 Demographic and Health System Utilization of Community Paramedicine home visit patients, Home Care clients, and Community Support Agency clients.

	Home Care	Community Support Services	Community Paramedicine
	N=28938	N=13782	N=136
	%	%	%
Demographic Characteristics & Living Conditions			
Age*	78.6	78.8	75.7
Gender Female	60.3	68.2	64.0
Lives Alone	***33.8***	***59.9***	***47.8***
Home in disrepair	***4.0***	-	***17.6***
Squalid conditions	***2.4***	-	***14.0***
Inadequate heating or cooling	***0.9***	-	***16.2***
Lack of personal safety	***1.6***	-	***11.0***
Limited access to home or rooms	***17.8***	-	***25.0***
Health System Utilization			
Hospital admission in past 90 days	41.9	***13.6***	***47.1***
Called 9-1-1 past 90 days	-	-	53.7
Called 9-1-1 past 30 days	-	-	33.8
At high risk for future ED visit**	***25.0***	-	***15.0***

Bold italics indicate evidence of statistically significant differences between proportions in comparator groups against community paramedicine patients using z-test at α=0.05.
* Data are reported as mean.
** Determined from the Detection of Indicators and Vulnerabilities for Emergency Room Trips (DIVERT) Scale, values greater than or equal to 5. The DIVERT scale is used to identify risk for an unplanned emergency department visit in the 90 days following assessment.

Clinical characteristics, chronic disease diagnoses and health conditions

Community paramedicine patients demonstrated higher proportions of chronic obstructive pulmonary disease, coronary artery disease, diabetes, or congestive heart failure (64.7%, 50.0%, 42.6%, and 35.3% respectively compared to 14.3%, 34.5%, 28.1%, and 15.0% in home care clients and 8.4%, 20.7%, 25.6%, and 11.2% in community support services clients, see Figure 5-1). They experienced more episodes of dyspnea, dizziness, or chest pain (64.7%, 47.8%, and 27.2% respectively compared to 39.1%, 30.6%, and 7.1% in home care clients and 38.9%, 34.2%, and 9.3% in community support services clients). A higher proportion of community paramedicine patients had multiple chronic diseases (87.5% compared to 63.0% in home care clients and 42.5% in community support services clients). There was a lower proportion of community paramedicine patients who were non-smokers (72.1% compared to 90.9% in home care clients and 90.5% in community support services clients) and a higher proportion who were not adherent with their prescription medications (40.4% compared to 13.6% in home care clients). Statistically significant differences between the community paramedicine patients and the other groups were observed in all of these comparisons.

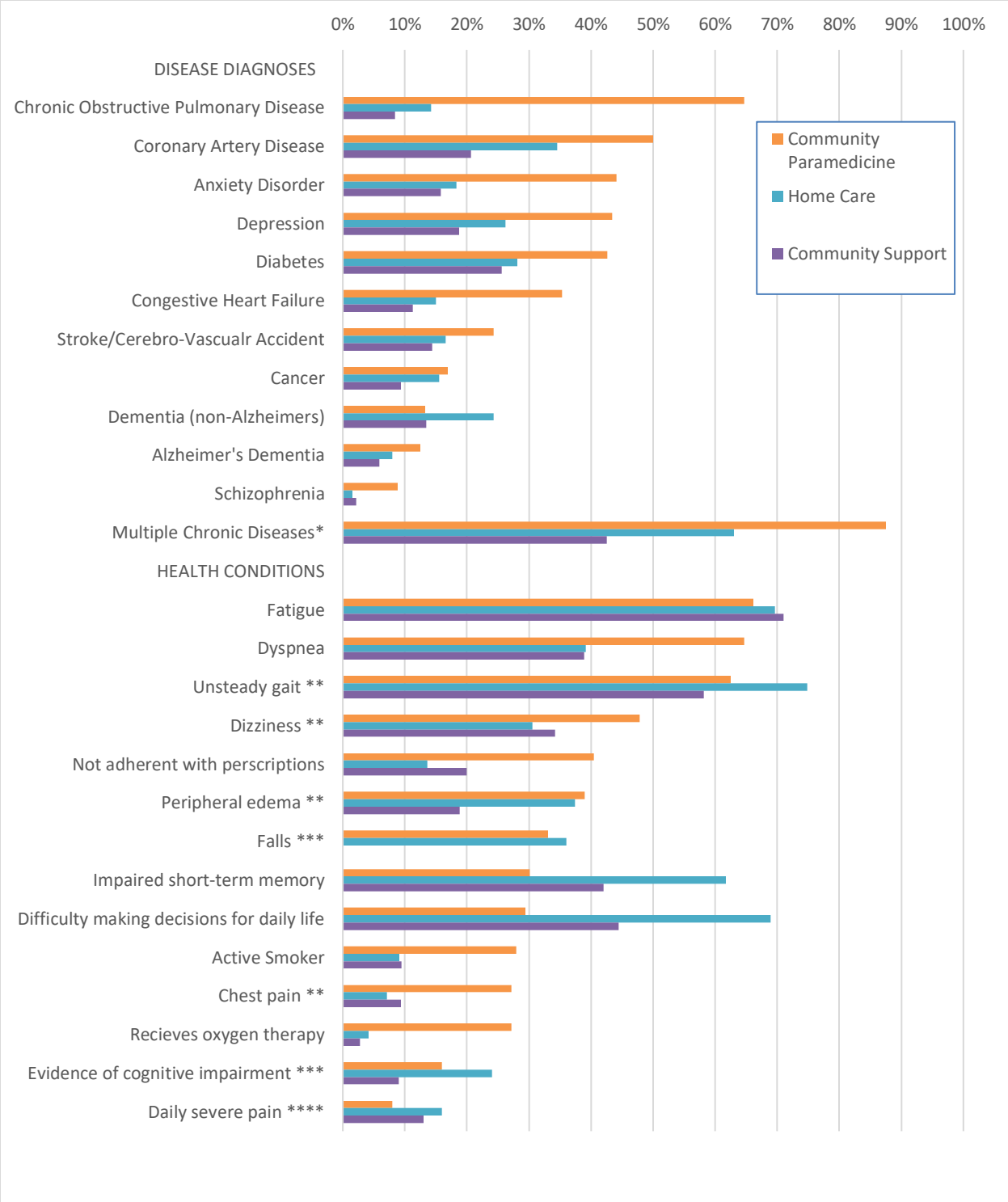

Figure 5-1 Disease diagnoses and health conditions of Community Paramedicine home visit patients, Home Care clients, and Community Support Services Agency clients.

* Multiple chronic diseases indicates patients with more than one of the diseases diagnoses listed. ** Health conditions occurring over 3 days preceding assessment. *** Evidence of cognitive impairment as determined by a score greater than or equal to 2 on the Cognitive Performance Scale. **** Daily severe pain as determined by a combination of responses regarding pain experienced over preceding 3 days.

Mental health related conditions and psycho-social well-being

Higher proportions of anxiety disorder and depression were found in community paramedicine patients (44.1 and 43.4% respectively compared to 18.3%, and 26.2% in home care clients and 15.8% and 18.8% in community services support clients) and they displayed higher proportions of associated symptoms (See Figure 5-2, included in Appendix B)—all of which were statistically significant differences. A higher proportion of community paramedicine patients would meet the criteria for further assessment of their mental health, 29.4% when compared to 12.4% in community support services clients. More community paramedicine patients indicated that they had experienced a major life stressor or a decline in social activities in the past 90 days (52.2% compared to 22.5% in home care clients and 25.7% in community support services clients).

Communication and functional abilities

Each cohort had similar proportions of individuals who had difficulty communicating (see Figure 5-3, included in Appendix B). For example, insignificant evidence of difference was observed in the proportions of individuals who had adequate hearing, 59.6% for community paramedicine patients, 53.6% for home care clients, and 57.3% for community support services clients. When comparing community paramedicine patients to community support services clients, little evidence of difference was observed in the proportions of individuals who had functional deficits for some Activities of Daily Living and Instrumental Activities of Daily Living (specifically personal hygiene, dressing lower body, transportation, and phone use). But the home care client group displayed statistically significant differences, with higher proportions of dependence for all functional items when compared to community paramedicine patients.

DISCUSSION

I found that patients in community paramedicine home visit programs likely represent a distinct sub-group of the community-dwelling older adult population because of numerous differences observed between my cohort groups. My data suggests that the proportion of individuals with mental health needs, complex co-morbidities, and ongoing health conditions or symptoms are often different between community paramedicine programs and home care and community support services agency populations. Higher proportions of health needs in community paramedicine patients suggests they are a complex patient group who could benefit from more integrated care that includes an interface between multiple care providers—reinforcing a characteristic of many community paramedicine home visit or mobile integrated healthcare programs (5,17). By illustrating differences between community paramedicine home visit patients and other community-dwelling older adults, efforts can support case-finding by all care providers to improve patient care access and reduce unnecessary utilization of 9-1-1 or EDs by these individuals.

Duplication of services with other existing community-based health care services is a critique of community paramedicine programs (25) but, to my knowledge, my study is the first to compare the characteristics of the older adults that are receiving these services. While community paramedicine programs looking to serve frail older adults may have targeted enrollment efforts favouring these individuals, the differences I found suggests duplication of services is unlikely because complex comorbidities, likely exacerbated by mental illness, seemed to be less common amongst individuals receiving community support services or home care programs. Even if these other programs or services are providing care to such patients, community paramedicine programs are likely providing a necessary additional level of support to the existing care and support these patients may be receiving from community-based care

providers. For example, remote patient monitoring programs have been broadly implemented in Ontario in an effort to support chronic disease management and identify worsening health conditions or symptoms in enrolled patients prior to exacerbations that require a 9-1-1 response (17,42). At the same time, remote patient monitoring programs complement existing care from other community-based care providers.

Strengths and weaknesses of the study

The inferences drawn from my comparisons should be made cautiously because they are based on a small convenience sample of community paramedicine patients assessed using a prototype assessment instrument. Community paramedicine programs remain relatively small in comparison to the number of clients seen through other existing and established programs that deliver care in the community. While the sizes of the sample cohorts present a limitation to the inferences, they are reflective of the differences in sizes of the patient populations and were large enough to power statistical analyses. To further strengthen my analysis, I excluded small counts (<10) of observations from the community paramedicine cohort.

Implications for clinicians and health policy

Opportunity exists for further collaboration between community-based support services agencies and home care providers, community paramedicine home visit programs, and other parts of the healthcare continuum—particularly primary care provider—to improve coordination of care to medically complex community-dwelling older adults (3,10,43). For example, a risk scale used to determine the likelihood of an ED visit in home care clients is a likely predictor for use of paramedic services for transportation to the ED (16). Shared case-finding to identify at-risk patients could further support a greater level of coordination between hospitals, home care providers, community support services agencies and community paramedicine programs and lead to improved patient safety and reduced unnecessary ED visits and 9-1-1 utilization.

Implications for future research

Anonymized data were obtained for my study meaning that analysis of cross-membership between cohorts was not possible. It is possible that a handful of patients could have been represented in all three groups and questions remain about the likelihood of this. High levels of cross-membership between groups would have lessened the likelihood of observing differences in my analysis. Future research should aim to provide a complete analysis of health system utilization amongst community dwelling older adults.

High proportions of mental health-related conditions were identified in community paramedicine patients. Other research has demonstrated that mental health and social isolation can contribute to repeated 9-1-1 use (11,14,15,44). While I provided a comparison to other cohorts of community-dwelling older adults, further comparisons are needed with additional community and geriatric mental health populations. Community paramedicine programs should explore a greater level of integration with local community support services agencies and home care providers as part of their program design and community paramedics may benefit from greater education about addressing mental health needs, particularly amongst older adults.

CONCLUSION

My analysis showed that community-dwelling older adults that were seen by community paramedics through home visit programs may represent a distinct patient group with a greater proportion of mood symptoms, ongoing health conditions, and complex comorbidities than comparable patient populations that receive home care or community support services. Enrolment into a community paramedicine home visit program may be indicative of a combination of inadequate disease management, inadequate social support structures, or clinical instability and decline of a patient's condition. The role of community paramedicine home visit programs may serve as a sentinel support opportunity for community-dwelling older patients

whose health conditions are not otherwise being addressed through timely access to other existing care providers.

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APPENDIX B: Supplemental Figures

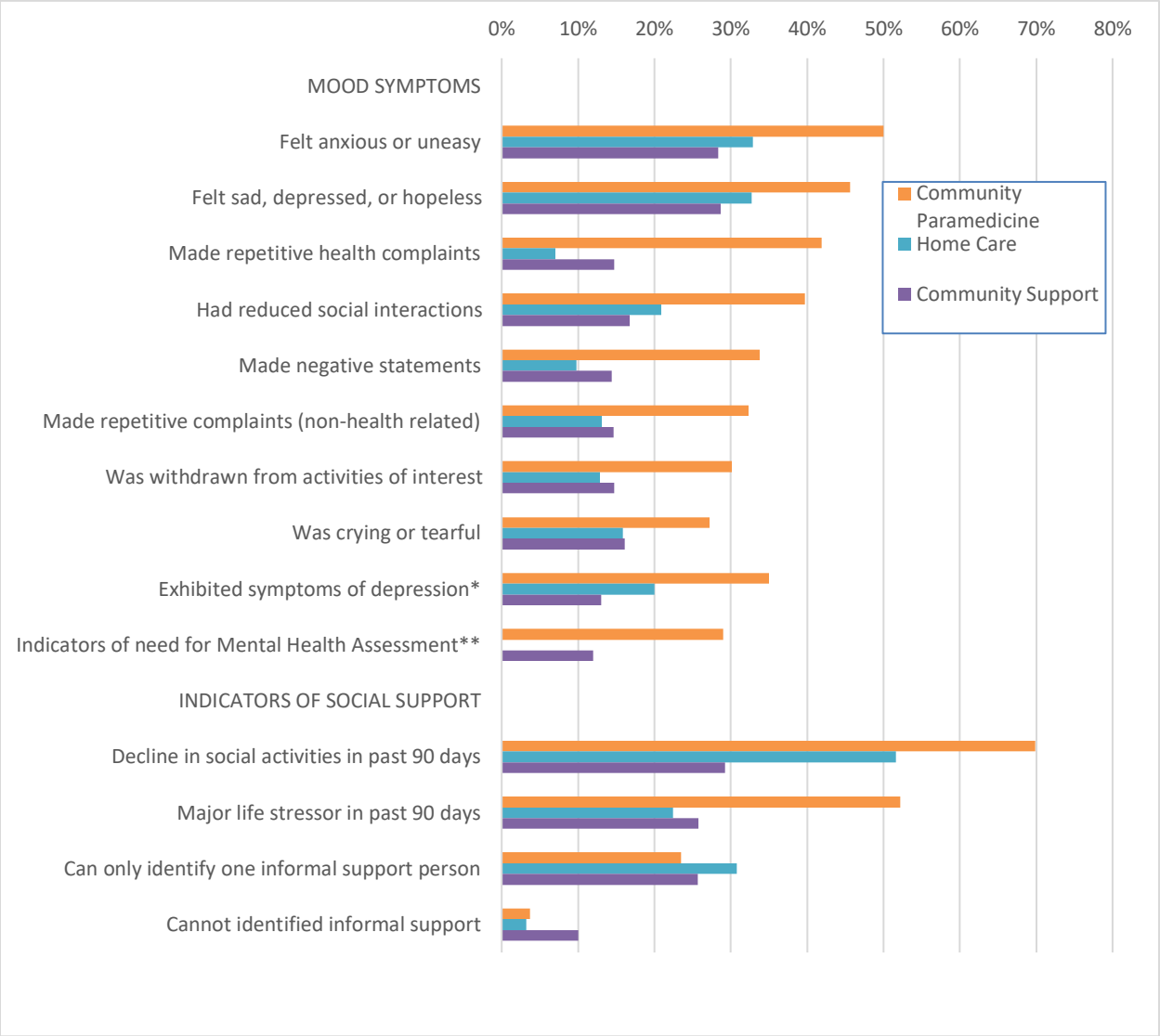

Figure 5-2 Mood symptoms and indicators of social supports of Community Paramedicine home visit patients, Home Care clients, and Community Support Services Agency clients. All mood symptoms as assessed over preceding 3-day period.

* Evidence of symptoms of depression as determined by a score greater than or equal to 3 on the Depression Rating Scale.
** Modular assessment for Mental Health indicated within interCHA parameters.

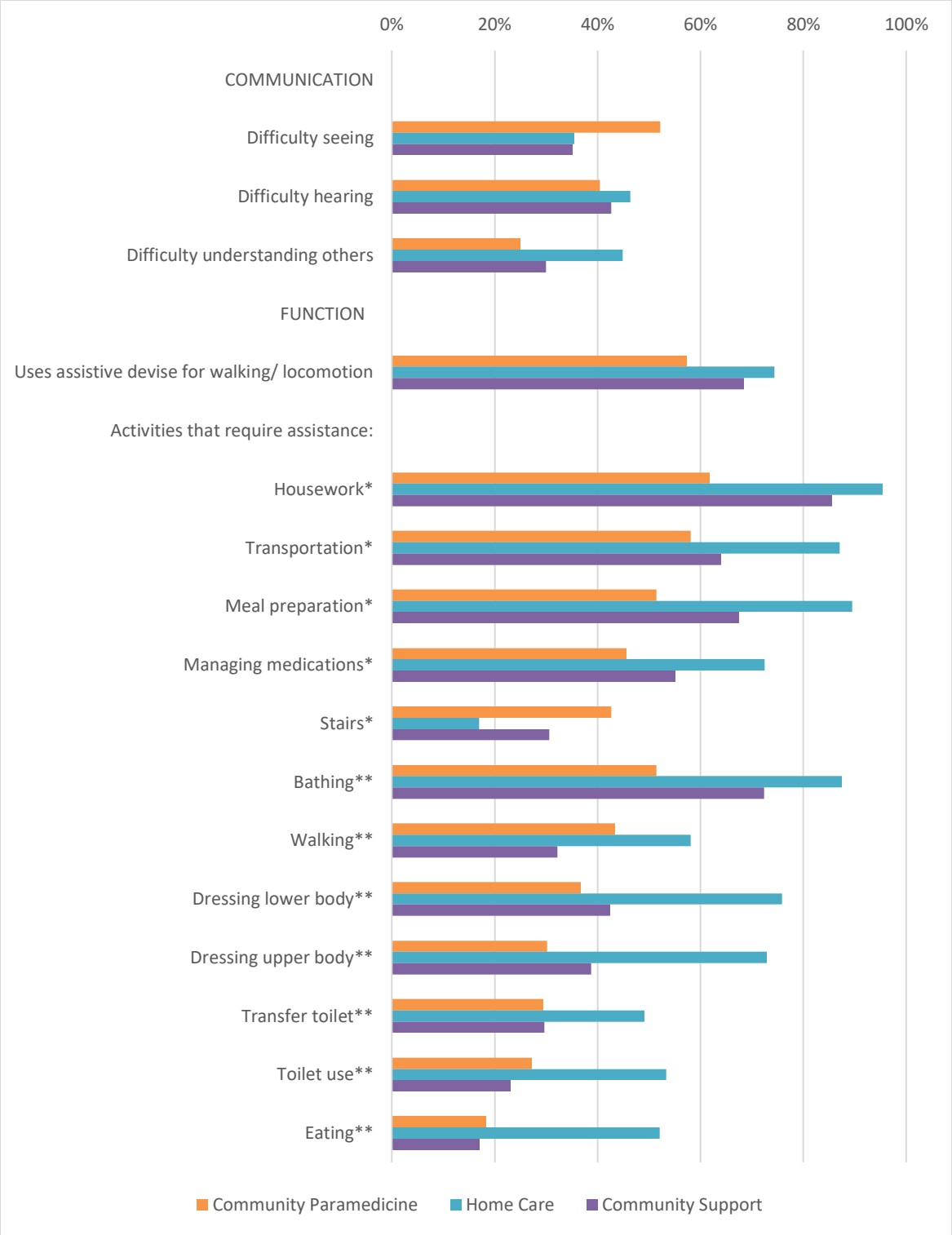

Figure 5-3 Assessment of functional abilities and communication for Community Paramedicine home visit patients, Home Care clients, and Community Support Services clients.

* Instrumental Activities of Daily Living where findings were not "Independent". ** Activities of Daily Living where findings were not "Independent".

APPENDIX C: Supplemental Table

Supplemental Table 5-1: Identical assessment domains and items included in the interRAI HC, interRAI CHA, and Community Paramedicine assessment instruments

Assessment Domains	DEMO-GRAPHICS	LIVING ARRANGEMENT	ENVIRONMENTAL ASSESSMENT		COGNITION	COMMUNI-CATION
Assessment items	Age Gender	Lives Alone	*Home disrepair* *Squalid conditions* *Inadequate heating or cooling* *Lack of personal safety* *Limited access to rooms*	*Emergency assistance available* *Access to grocery store* *Home delivery of groceries available*	Daily decision making Short-term memory	Making self-understood Ability to understand others Hearing Vision
Assessment Domains	MOOD		PSYCHOSOCIAL WELL-BEING	FUNCTIONAL STATUS		
Assessment items	Negative statements Anger Unrealistic fears Repetitive health complaints Repetitive complaints (non-health related) Sad or worried expressions Crying or tearful Withdrawal Reduced social interactions	Self-report - less interest Self-report - anxious Self-report - sad	Social activities Major life stressors Time alone *Family overwhelmed* *Informal support*	IADL Capacity: Meal preparation Housework Managing finances Managing medications Phone use Stairs Shopping Transportation	ADL Self-performance: Bathing Personal hygiene Dressing upper body Dressing lower body Walking Locomotion *Transfer toilet* *Toilet use* *Bed mobility* *Eating*	Mode of locomotion Days went out
Assessment Domains	CONTINENCE	DISEASE DIAGNOSES		HEALTH CONDITIONS		
Assessment items	Bladder continence *Bowels continence*	Alzheimers Dementia Stroke/CVA Cardiac disease COPD CHF	Anxiety Depression Schizophrenia *Pneumonia* *UTI (past 30 days)* Cancer Diabetes Multiple Chronic Diseases	Dizziness Unsteady gait Chest pain Abnormal thoughts Delusions Hallucinations	Acid reflux Constipation Diarrhea Vomiting Unable to sleep Sleeping more than normal *Peripheral edema* *Aphasia*	Falls (past 30 days) Dyspnea Fatigue Unstable health conditions Self-reported health Tobacco use

Assessment Domains	NUTRITION	MEDICATIONS	TREATMENTS		
Assessment items	Weight loss Decreased food/fluid intake	Drug adherence	Dialysis Oxygen therapy Transfusions Wound care	Palliative care Overnight hospital stay ED visit	*Italics* indicate assessment items available as part of the interRAI CHA Functional Supplement (not included in reported analyses)

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Chapter 6 - *Relevance of assessment items in community paramedicine home visit programs: results of a modified Delphi study*

Note: The objective for this chapter is to present the final study regarding the clinical utility of a multi-dimensional assessment system for community paramedicine home visit programs by consulting the clinicians (community paramedics) who could potentially use it. I created a matrix to investigate relevance defined in two dimensions; clarity being free from ambiguity, and utility being provision of actionable information.

Recruitment of study participants was assisted by the Ontario Community Paramedicine Secretariat during my Canadian Institute for Health Research funded Health System Impact Fellowship and the study protocol was approved by the Ontario Community Paramedicine Secretariat Steering Committee. I was the lead investigator and study coordinator.

The final chapter of my thesis is about clinical utility after having completed the pilot testing described in Chapter Five. Findings contributed to final refinements necessary to create a multi-dimensional patient assessment system for community paramedicine home visit programs. It was hoped at the outset of the Common Assessments for Repeated Paramedic Encounters that each participating paramedic service would provide a minimum of 50 patient assessments. When this did not occur, I sought to explore factors that may have limited the use of the instrument that had been pilot-tested.

Citation: Leyenaar MS, Allana A, Sinha SK, Nolan M, Agarwal G, Tavares W, Costa AP. Relevance of assessment items in community paramedicine home visit programs: results of a modified Delphi study. Under Review BMJ Open, December 2020.

ABSTRACT

OBJECTIVE

Guidelines for a structured assessment in community paramedicine home visit programs have not been established and evidence to inform their creation is lacking. I sought to investigate the relevance of assessment items to the practice of community paramedics according to a pre-established clarity-utility matrix.

DESIGN

I designed a modified-Delphi study consisting of predetermined thresholds for achieving consensus, number of rounds of for scoring items, a defined meeting and discussion process, and a sample of participants that was purposefully representative.

SETTING & PARTICIPANTS

I established a panel of 26 community paramedics representing 20 municipal paramedic services in Ontario, Canada. The sample represented a majority of paramedic services within the province that were operating a community paramedicine home visit program.

MEASURES

64 assessment items that had been pilot tested in a standardized assessment instrument were scored according to their clarity (being free from ambiguity and easy to understand) and utility (being valued in care planning or case management activities). To conclude scoring rounds, assessment items that did not achieve consensus for relevance to assessment practices were discussed amongst participants with opportunities to modify assessment items for subsequent rounds of scoring.

RESULTS

Resulting from the first round of scoring, 54 assessment items were identified as being relevant to assessment practices and 3 assessment items were removed from subsequent rounds. The remaining 7 assessment items were modified with some parts removed from the final items that achieved consensus in the final rounds of scoring.

CONCLUSION

A broadly representative panel of community paramedics identified consensus for 61 assessment items that could be included in a structured, multi-domain, assessment instrument for guiding practice in community paramedicine home visit programs.

INTRODUCTION

Paramedics, as mobile healthcare providers with limited access to diagnostic tools, must employ assessment that includes social and environmental observation, physical examination and oral history-taking in order to understand a patients' conditions and make treatment decisions (1). In high-acuity emergencies, paramedics must quickly identify and treat threats to life and limb (1). In lower acuity situations, paramedics must consider multiple pathologies that may be contributing to a patient's condition through a more comprehensive and detailed problem-based approach (2). In all cases, paramedics must assess patients and the surrounding environment thoroughly to deliver appropriate patient care and maintain safety (1,3).

A structured process for patient assessment is common in paramedicine and other emergency settings (1,4). Structured assessment processes have been identified as important to guiding practice, reducing errors or adverse events, and contributing to accuracy needed for improving patient care in many settings (1,5–7). Structured frameworks for assessments might include mnemonics or other tools or prompts to help ensure completeness and that findings are relevant to clinical practice (5). Common terminology and standardized documentation are helpful when communicating assessment findings with other members of the care team (7).

Community paramedicine is an emerging area of paramedic practice where paramedics with a broader skillset are providing low-acuity and preventative care, often in tandem with other members of patients' care teams in a community setting (8,9). In community paramedicine home visit programs, paramedics visit patients at home to identify, treat, and conduct referrals for emerging health and social needs (9,10). This represents an extension of low acuity paramedic practice, with new aspects of patient assessment required for improved care integration, care planning, case management (9). While consistent, structured processes for patient assessment in paramedicine have long been in place (1), how they have been re-directed or altered for

application in community paramedicine settings is not clear. Broad guidelines for structuring patient assessment in community paramedicine settings have not been established and concerns have been identified about potentially inconsistent assessment practices within and across regional jurisdictions (10).

The purpose of the Community Paramedicine Assessment Matters (CPAM) study was to explore consensus on the most relevant assessment items that should be included in structured, multi-dimensional, comprehensive, patient assessment practices for community paramedicine home visit programmes. Such assessment practices should capture the health, social, and environmental considerations needed to direct community paramedic care planning and case management activities. In the absence of other sources of evidence, I expect that determining expert opinion will provide the best source of information (11) needed to identify assessment items that might provide clarity and utility in clinical practice and determine what matters during an assessment conducted by a community paramedic in a community paramedicine home visit program.

METHODS

Study Design

A modified Delphi process was used consisting of multiple iterations of online questionnaires and web-based discussions with an expert panel of community paramedics from one Canadian province. The questionnaires asked participants to evaluate individual assessment items for relevance to practice. Assessment items (as grouped according to assessment domains) were derived from an instrument that had been pilot tested in multiple sites through the CARPE Study (ISRCTN 58273216). Web-based discussions were hosted between each iteration of the questionnaire to discuss results.

Ethics

The Hamilton Integrated Research Ethics Board approved the study.

Patient and public involvement

Patients and members of the public were not involved in this study.

Recruitment and study orientation

All paramedic services in Ontario providing home visit programs, identified in a 2019 provincial report on community paramedicine (12), were invited to participate in the study. Each paramedic service was allowed a maximum of three participants. Participants were asked to identify their paramedic service, their paramedic designation (primary care or advanced care), and their years of experience (in paramedicine and in community paramedicine). A minimum of 24 participants with representation from at least 50% of Ontario paramedic services with home visit programs was considered to be representative. I could allow for a maximum of 36 participants due to logistics and budget. Recruitment of participants was facilitated by the Ontario Community Paramedicine Secretariat. Selection of participants (within the minimum and maximum number) was based on maximizing the number of representative services.

To participate, community paramedics needed to be certified as critical, advanced, or primary care and be working in a community paramedicine home visit program that included patient assessment as part of their regular clinical practice. Exclusion criteria were defined for paramedics who had an organizational rank of commander or higher unless they could demonstrate that patient assessment was a regular component of their assigned duties. Paramedics in acting or temporary administrative roles, or those who assume those roles over the course of the study were not be excluded.

Interested participants were invited to participate in an information and orientation session where they were presented with an outline of the aims and structure for the study. Prior to beginning the first round of scoring, participants provided written consent. Participants received gift cards of increasing value for each round that they participated in.

Finding Consensus

In each round of the modified Delphi process applied in this study, I investigated two dimensions of relevance; clarity and utility. Clarity of an item described the ease to which the information provided through an assessment item could be understood by the community paramedic, free from ambiguity. Utility of an assessment item reflected whether or not the item was considered to be useful to the community paramedic's role in care planning and case management. The question of utility investigated whether or not actionable information would be generated by an assessment item. The rationale for including two dimensions to relevance was to establish a relationship between any individual assessment item included in an assessment instrument and the practice of assessment to inform care planning and case management activities. For example, if an assessment item were clearly understood (high clarity) but did not provide actionable information (low utility) then it is unlikely to contribute to patient assessment. Alternatively, if an assessment item cannot be clearly understood (low clarity), even if it is determined to be actionable (high utility), then how it is acted upon may vary from one situation to another. If an item is neither clearly understood (low clarity) nor actionable (low utility), then it is not considered to be relevant to assessment practice. For any assessment item to be considered relevant, it would need to satisfy the conditions according to the two dimensions identified (illustrated in Figure 6-1).

For an item to reach consensus two-thirds (66.7%) of responses needed to either fall in the relevant or not relevant portions of the table. Assessment items were grouped according to assessment domains. If no items within a domain were identified as being relevant, the domain was removed from subsequent rounds. Secondary analysis was conducted to review assessment

			Clarity		
			Easy to Understand	Moderately Understandable	Difficult to Understand
			3	2	1
Utility	Very Useful	3	Relevant	Relevant	
	Somewhat Useful	2	Relevant		Not Relevant
	Not Useful	1		Not Relevant	Not Relevant

Figure 6-1 Matrix of clarity and utility used to define relevance of assessment items

items where greater than one-third (33.3%) of responses were within the central variable of either of the individual dimensions (somewhat useful or moderately understandable).

Delphi Rounds

To help prevent participant fatigue and ensure ongoing participation, it was decided at the outset of the study that a maximum of three rounds of scoring would be used. Each round began with an online questionnaire to determine the clarity and utility of each assessment item by the participating community paramedics. Participants reviewed each assessment item and scored it on two separate 3-point Likert scales (as illustrated in Figure 6-1) to determine its relevance. After the first round, participants also received the proportion of responses according to each dimension of relevance from the preceding round. Each questionnaire presented assessment items grouped in domains and ordered in the sequence as they appeared in the CARPE Assessment instrument. Questionnaires were pilot tested with a minimum of three participants before each round to determine approximate length of time needed for completion, and to refine the questionnaire if necessary. Participants were sent a web-link to the questionnaire at the beginning of each round of scoring. Each round of scoring was open for two weeks with reminder emails sent 48h-72h prior to closing of each round.

Between each round of scoring a web-conferencing meeting was held to discuss results of the preceding round and introduce the subsequent round. Results were summarized for assessment items that were classified as either relevant, not relevant, or consensus not reached. In the cases where consensus was not reached on the relevance of assessment items, discussions included characteristics of the assessment items that were not actionable in care planning activities or that were not clear. If participants indicated that an assessment item was difficult to understand, discussions explored how it could be modified (condensed or expanded), depending on context for assessment practices, for the next round of scoring. At conclusion of the three rounds of scoring, assessment items would be classified as either relevant, not relevant, modified, or consensus not reached. Any modified multi-part assessment items were reorganized to gather sub-parts into a new multi-part assessment item. Each web conference was recorded and shared with participants who were not able to attend.

RESULTS

Panel & participation

Twenty-six community paramedics from twenty paramedic services agreed to participate in the study. All twenty-six participated in the first survey. Sixteen (62%) participated in the first meeting (12 in real-time, 4 by viewing the recording). Twenty (77%) participated in the second survey. Eleven (42%) participants joined the second meeting. The final survey was completed by 24 (92%) participants. Table 6-1 provides a summary of participation.

Rounds

The first round presented a total of 64 assessment items grouped according to 14 assessment domains (See Figure 6-2 and Table 6-2). No items had responses indicating that they were not relevant to practice but one domain (which included three items) did not yield any responses that achieved consensus for relevance. Fifty-four items from eight domains met criteria for relevance to practice. The remaining seven items were presented to participants for discussion at the

meeting to concluded round one. Secondary analysis identified 25 assessment items where more than one-third of responses were within the central variable in one of the individual dimensions of relevance, clarity or utility.

Table 6-1 Summary of participation rates across three rounds of the modified-Delphi study

Study Stage	Participation	Participants who viewed recorded meeting	%
Round 1 Questionnaire	26	-	100
Round 1 Meeting	16	4	62
Round 2 Questionnaire	20	-	77
Round 2 Meeting	11	5	42
Round 3 Questionnaire	24	-	92

Table 6-2 The number of assessment items according to their respective assessment domains presented to participants for rating in each round.

Assessment Domain	Number of Assessment Items, Round #1	Number of Modified Assessment Items, Round #2	Number of Modified Assessment Items, Round #3
Living Arrangement	3		
Cognition	4		
Communication & Vision	4		
Mood	2		
Psychosocial Well-Being & Social Isolation	13		
Functional Status	7	19	19
Continence	3		
Disease Diagnoses	1	5	
Health Conditions	9	22	3
Nutritional Status	2		
Medications	5		
Treatments & Procedures	6		
Home Environment	4		
Personal Goals	1		
TOTAL	64	46	22

To accommodate the time constraints necessary to discuss the number of assessment items, the discussion was focused specifically on the seven assessment items that did not achieve

consensus. Given that many of these assessment items had multiple parts with multiple categories of potential findings, discussion included options for reducing item complexity; either by reducing categories for responses or by separating multi-part items into single part items. The meeting participants suggested that multi-level responses were more important. As a result, the questionnaire for the second round re-organized the seven items into 46 single-part items (See Table 6-3 for examples).

Resulting from the second-round questionnaire, 22 of the modified assessment items achieved consensus on relevance (See Figure 6-2). Secondary analysis identified that seven assessment items had one-third of responses within the central variable of an individual dimension of relevance. Discussion at the second-round meeting focused on of assessment items that could have simplified response categories. The outcome from the second-round meeting was the removal of two modified parts and the re-organization of the remaining 22 assessment items into simplified response categories (See Table 6-3). The modified assessment items from the second and third round were reorganized into seven items representing edited versions of the seven items that did not achieve consensus after the first round.

In the third round and final round of scoring, one modified assessment item did not achieve consensus on relevance while the remaining 21 did (See Figure 6-2). The outcome from the three rounds of scoring meant that 54 original assessment items and 7 modified assessment items were identified as being relevant to assessments in community paramedicine home visit programs. In the modification process, three parts of assessment items included in the original set of assessment items were removed.

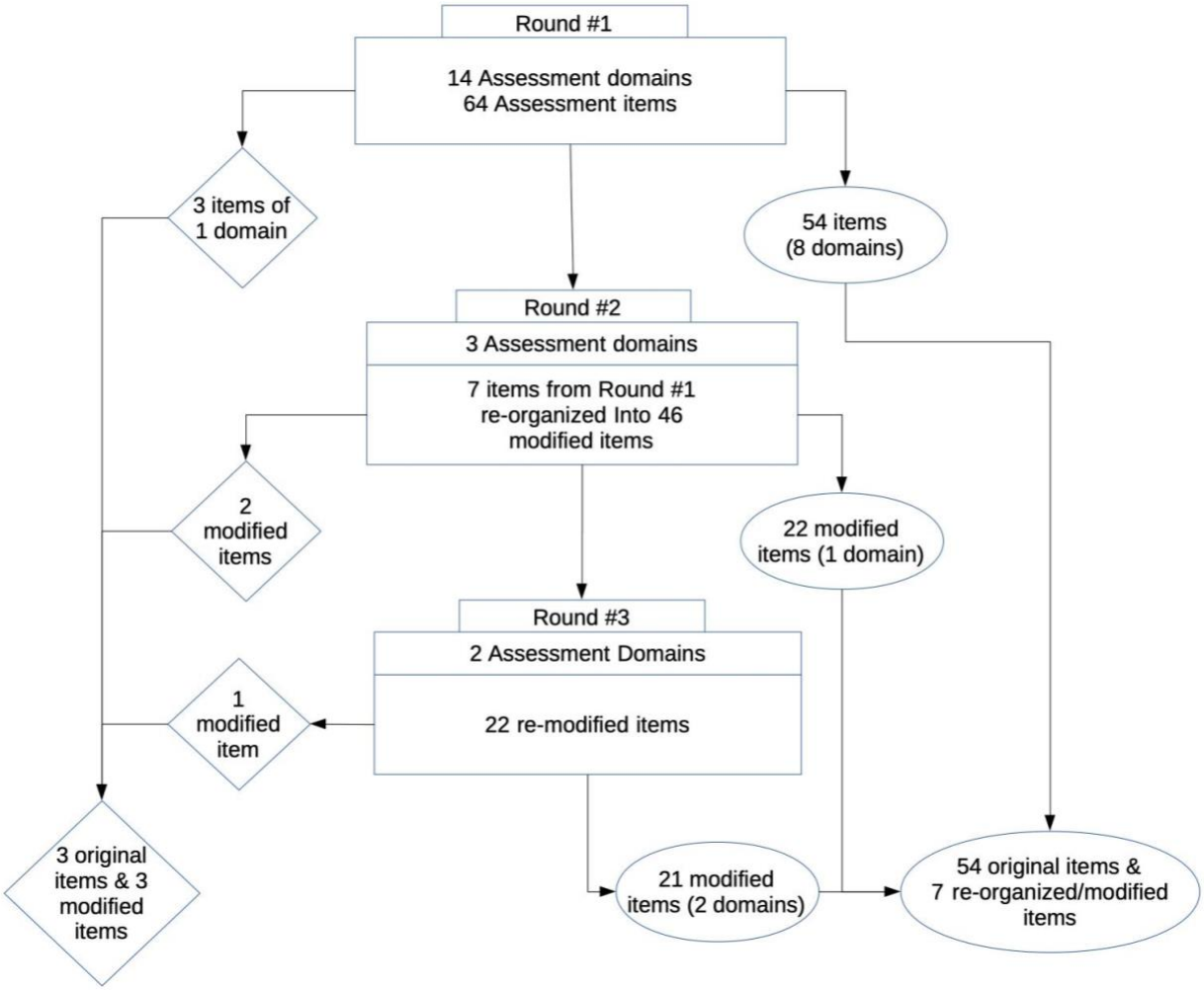

Figure 6-2: Illustration representing outcomes from each round of the study. Diamonds represent consensus for exclusion/removal of assessment items, ellipses represent consensus for relevance of assessment items.

Table 6-3: Summarized presentation and modification of an assessment item across rounds.

Assessment item presented in Round #1	**Modification of assessment item presented in Round #2**	**Modification of assessment item presented in Round #3**	**Final re-organization following scoring**
Assessment of ability to perform activities of daily living (ADLs). Assessment item includes 11 specific ADLs to assess and provides 8 response categories for levels of dependence from fully independent to fully dependent.	Each specific ADL is presented separately to participants while maintaining the original response categories for levels of dependence from fully independent to fully dependent.	Each specific ADL is presented separately to participants with response categories simplified to either independent or not independent.	Those ADLs that were scored as being relevant were reorganized into one new assessment item including 10 ADLs with response categories of independent or not independent. One modified assessment item did not achieve consensus.
Presented as one assessment item.	Presented as 11 modified items.	Presented as 11 modified items	Presented as 1 reorganized item identified as being relevant and 1 modified item as not achieving consensus.

Further details on modifications are presented in Supplemental Table 6-1.

DISCUSSION

Community paramedicine home visit programs represent a relatively new area of practice for paramedics that re-direct their skills towards preventive and integrated patient care (13). Where assessment practices and guidelines have been established for emergency response, assessment practices and guidelines for community paramedics are still being established (9,14,15). Through taking a consensus-based approach with a panel of community paramedics from a cross-section of paramedic services, this study provides new information towards the standardization of assessment practices in community paramedicine home visit programs.

Implications for clinical practice

The relevance of assessment items in domains such as home environment, functional status, and psychosocial wellbeing expand on existing paramedic assessment practices such as physical examination and medical history-taking. This reflects the underlying values and purpose

of community paramedicine as a patient-centered approach that equally prioritizes the biological, psychological, and social determinants of health (13,16). Such comprehensive assessment practices are enabled by the low-acuity and less time-sensitive conditions in which community paramedic home visit programs operate, as opposed to the norms of emergency response paramedicine where assessment focuses on the most emergent short-term medical needs (1).

Paramedic assessment in emergency response is geared towards guiding immediate treatment decisions and relaying pertinent information to emergency department staff, both examples of short-term care planning and treatment (1,2). In contrast, community paramedicine assessments are likely to identify medium- and long-term care needs. The breadth and depth of assessment items that the expert panel considered relevant to practice suggests that the community paramedics who participated recognize their ability to take action on a range of patient needs that would necessitate the involvement of other healthcare providers from disciplines such as family medicine, occupational therapy, social work, pharmacy, and community nursing. Team-based delivery of care introduces a higher level of complexity and uncertainty to assessment practices. How a community paramedic's assessment informs their own care planning in comparison to its utility to a larger care team is unclear. It is also unclear to what extent assessment may be duplicated by other care providers, and whether or not they would be in agreement with the community paramedic's assessment. The degree of integration (functional and professional) between different members of a patient's care team, which community paramedics is a part of, remains an ongoing area of research in integrated care (17).

Previously published studies investigating assessment practices by community paramedics have considered different components of the assessment process (9,10,18). Principles of patient assessment both in paramedicine and other health settings reflect how the

assessment process is a guiding component of any patient care activity (1,6). Assessments should gather the clinical and social information about patient condition (1,6,7,19). Asking community paramedics about the relevance of assessment items reveals what parts of an assessment process inform the delivery of care in their practice setting and is informative to how practice has evolved from the emergency setting. Implications from this study will be identifying what barriers or inconsistencies to community paramedic practice still need to be addressed. Paramedics are well situated to identify these challenges.

Strengths

In the absence of evidence about community paramedic patient assessment practices, it serves well to identify what community paramedics identify as relevant to the care that they are delivering—particularly when the delivery of care is part of an expanded role or extended scope of practice. Asking an expert panel is consistent with best practice when a definite evidence base is lacking. The methodology followed through my investigation is consistent with recommendations for modified Delphi studies (20). Panel selection was outlined in a reproducible way. Consensus was defined a priori. The number of rounds was specified. Criteria were established to guide discussions.

Criticism of modified Delphi studies is often centred around unclear processes, a biased sampling process for establishing participation, or not having clearly established goals (20,21). I established a panel that was broadly representative of practice in Ontario. The process that was outlined and followed suggests that the clarity-utility matrix I established provided a functional method to define relevance of assessment items to assessment practices. The clarity-utility matrix could be broadly applied to future studies exploring paramedic practice or assessment practices in other settings.

Limitations

This study was limited to the Ontario context. While participation levels were adequate across all rounds of scoring and options were available for participants to view recorded meeting proceedings, I did not exclude participants if they were unable to complete one of the scoring rounds or join one of the meetings. For example, it is likely that some participants were less informed entering the third round than others. The structure of the questionnaires and each paramedics familiarity with their individual assessment practices should have been adequate in such circumstances and still provides meaningful insight because individual community paramedic practices can vary widely across different health systems (8,16). While repeating this study in other jurisdictions may yield different or conflicting results, that community paramedicine home visit programs are becoming more ubiquitous, means the results of this study can contribute to establishing assessment practice guidelines across a wider range of jurisdictions.

I did not examine how community paramedic assessment items compare with those used by other members of the patient care team, and the Delphi panel consisted only of paramedics. Given the multi-disciplinary nature of community paramedicine, other work has explored some of these questions (18). It will be useful to know to what extent community paramedic assessment items reflect best practice from other fields of health and social care.

Future Work

Patient-centred care includes reducing barriers to access and better care coordination, consistent with aims of community paramedicine programs. Future studies could expand on my findings by examining multiple aspects of community paramedic assessments, including testing different measures of reliability and validity. Future studies should also examine the patient perspective on what they feel is relevant to be included in a structured assessment process.

As the evidence base grows for community paramedicine assessment practices it will lead to a level of standardization and consistency across jurisdictions and programs. Future work could then examine the efficacy of these assessment practices by examining process- and outcome-based indicators such as access to care, service utilization, and measures of patient health. The development of practice guidelines in community paramedicine will also help develop processes for quality improvement and performance measurement. Evaluating consistent assessment practices in community paramedicine home visit programs presents the opportunity to measure changes in patient condition over time and further improve case management.

CONCLUSION

Uptake of assessment guidelines that are broadly applicable to differing community paramedicine programme design is important step in the growth, evolution, and emergence of new community paramedicine programming. By establishing consensus on the relevance of specific assessment items to detect health and social factors that drive functional decline, social isolation, loss of independence, and ultimately repeated emergency calls, I believe that guidelines for assessment in community paramedicine programmes will be strengthened with improved case-finding and care-planning expected to follow.

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APPENDIX D: Supplemental Table

Supplemental Table 6-1: Example of presentation and modification of an assessment item across rounds (Note: selected sub-parts included in Table for illustrative purposes).

Assessment item presented in Round #1	**Modification of assessment item presented in Round #2**	**Modification of assessment item presented in Round #3**
Considering assessment of ability to perform activities of daily living (ADL). In each of the following areas, assessment determines what a patient's actual ability was over the 3-day period preceding the assessment. If all episodes are performed at the same level, score ADL at that level. If any episodes at level 6, and others less dependent, score ADL as a 5. Otherwise, focus on the three most dependent episodes [or all episodes if performed fewer than 3 times]. If most dependent episode is 1, score ADL as 1. If not, score ADL as least dependent of those episodes in range 2–5. a) Bathing—How takes a full-body bath / shower. Includes how transfers in and out of tub or shower AND how each part of body is bathed: arms, upper and lower legs, chest, abdomen, perineal area—EXCLUDE WASHING OF BACK AND HAIR b) Personal hygiene—How manages personal hygiene, including combing hair, brushing teeth, shaving, applying make-up, washing and drying face and hands—EXCLUDE BATHS AND SHOWERS c) Dressing upper body—How dresses and undresses (street clothes, underwear) above the waist, including prostheses, orthotics, fasteners, pullovers, etc.	Assessment should include determining a patient's <u>self-performance</u> of activities of daily living (ADLs). In your assessment, consider all episodes over 3-day period. Determine if all episodes are performed independently or if any episodes required supervision or assistance. To further explore these responses, we have divided the assessment item into separate ADLs. Please consider each of the following ADLs to include when assessing a patient for the first time, at a first visit: a) Bathing—How takes a full-body bath / shower. Includes how transfers in and out of tub or shower AND how each part of body is bathed: arms, upper and lower legs, chest, abdomen, perineal area—EXCLUDE WASHING OF BACK AND HAIR 0. Independent—No physical assistance, set-up, or supervision in any episode 1. Independent, set-up help only—Article or device provided or placed within reach, no physical assistance or supervision in any episode 2. Supervision—Oversight / cueing 3. Limited assistance—Guided manoeuvring of limbs, physical guidance without taking weight 4. Extensive assistance—Weight-bearing support (including lifting limbs) by 1 helper where person still performs 50% or more of subtasks 5. Maximal assistance—Weight-bearing support (including lifting limbs) by 2+ helpers—OR—Weight-bearing support for more than 50% of subtasks 6. Total dependence—Full performance by others during all episodes 7. Activity did not occur during entire period	Assessment should include determining a patient's <u>self-performance</u> of activities of daily living (ADLs). In your assessment, consider all episodes over 3-day period. Determine if all episodes are performed independently or if any episodes required supervision or assistance. I simplified responses to separate ADL assessment items to two possibilities. Please consider each of the following ADLs to include when assessing a patient for the first time, at a first visit. a) Bathing—How takes a full-body bath / shower. Includes how transfers in and out of tub or shower AND how each part of body is bathed: arms, upper and lower legs, chest, abdomen, perineal area—EXCLUDE WASHING OF BACK AND HAIR 0. Independent or set-up help only 1. Supervision or any physical assistance

d) Dressing lower body—How dresses and undresses (street clothes, underwear) from the waist down including prostheses, orthotics, belts, pants, skirts, shoes, fasteners, etc. 0. Independent—No physical assistance, set-up, or supervision in any episode 1. Independent, set-up help only—Article or device provided or placed within reach, no physical assistance or supervision in any episode 2. Supervision—Oversight / cueing 3. Limited assistance—Guided manoeuvring of limbs, physical guidance without taking weight 4. Extensive assistance—Weight-bearing support (including lifting limbs) by 1 helper where person still performs 50% or more of subtasks 5. Maximal assistance—Weight-bearing support (including lifting limbs) by 2+ helpers—OR—Weight-bearing support for more than 50% of subtasks 6. Total dependence—Full performance by others during all episodes 7. Activity did not occur during entire period	b) Personal hygiene—How manages personal hygiene, including combing hair, brushing teeth, shaving, applying make-up, washing and drying face and hands—EXCLUDE BATHS AND SHOWERS 0. Independent—No physical assistance, set-up, or supervision in any episode 1. Independent, set-up help only—Article or device provided or placed within reach, no physical assistance or supervision in any episode 2. Supervision—Oversight / cueing 3. Limited assistance—Guided manoeuvring of limbs, physical guidance without taking weight 4. Extensive assistance—Weight-bearing support (including lifting limbs) by 1 helper where person still performs 50% or more of subtasks 5. Maximal assistance—Weight-bearing support (including lifting limbs) by 2+ helpers—OR—Weight-bearing support for more than 50% of subtasks 6. Total dependence—Full performance by others during all episodes 7. Activity did not occur during entire period	b) Personal hygiene—How manages personal hygiene, including combing hair, brushing teeth, shaving, applying make-up, washing and drying face and hands—EXCLUDE BATHS AND SHOWERS 0. Independent or set-up help only 1. Supervision or any physical assistance
	c) Dressing upper body—How dresses and undresses (street clothes, underwear) above the waist, including prostheses, orthotics, fasteners, pullovers, etc. 0. Independent—No physical assistance, set-up, or supervision in any episode 1. Independent, set-up help only—Article or device provided or placed within reach, no physical assistance or supervision in any episode 2. Supervision—Oversight / cueing 3. Limited assistance—Guided manoeuvring of limbs, physical guidance without taking weight 4. Extensive assistance—Weight-bearing support (including lifting limbs) by 1 helper where person still performs 50% or more of subtasks 5. Maximal assistance—Weight-bearing support (including lifting limbs) by 2+ helpers—OR—Weight-	c) Dressing upper body—How dresses and undresses (street clothes, underwear) above the waist, including prostheses, orthotics, fasteners, pullovers, etc. 0. Independent or set-up help only 1. Supervision or any physical assistance

	bearing support for more than 50% of subtasks 6. Total dependence—Full performance by others during all episodes 7. Activity did not occur during entire period	
d)	Dressing lower body—How dresses and undresses (street clothes, underwear) from the waist down including prostheses, orthotics, belts, pants, skirts, shoes, fasteners, etc. 0. Independent—No physical assistance, set-up, or supervision in any episode 1. Independent, set-up help only—Article or device provided or placed within reach, no physical assistance or supervision in any episode 2. Supervision—Oversight / cueing 3. Limited assistance—Guided manoeuvring of limbs, physical guidance without taking weight 4. Extensive assistance—Weight-bearing support (including lifting limbs) by 1 helper where person still performs 50% or more of subtasks 5. Maximal assistance—Weight-bearing support (including lifting limbs) by 2+ helpers—OR—Weight-bearing support for more than 50% of subtasks 6. Total dependence—Full performance by others during all episodes 7. Activity did not occur during entire period	d) Dressing lower body—How dresses and undresses (street clothes, underwear) from the waist down including prostheses, orthotics, belts, pants, skirts, shoes, fasteners, etc. 0. Independent or set-up help only 1. Supervision or any physical assistance

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Chapter 7 – *Discussion and Conclusion*

DISCUSSION

I examined assessment practices in community paramedicine home visit programs with consideration for the associated care planning activities that occur, developing and evaluating a conceptual model of a standardized multi-dimensional patient assessment system. The framework provided in Chapter Two serves as a roadmap for the subsequent chapters and describes how individual studies (represented in Chapters Three through Six) contribute to the evidence-base for assessment practices in community paramedicine home visit programs. The findings from a previously published scoping study indicated that a common aspect of community paramedicine programming was to improve access to primary care providers (1). The environmental scan of assessment practices described in Chapter Three demonstrated that there was not a common approach to assessment beyond a consistent inclusion of conditions associated with the function of the cardio-respiratory system. In Chapter Four, I found consensus amongst a purposely diverse group of experts about assessment domains that should be included in assessments carried out by community paramedics. Drawing from the findings of Chapters Three and Four, I set about standardization of clinical observations to develop a conceptual model of a multi-dimensional assessment system for pilot-testing in the Common Assessments for Repeated Paramedic Encounters (CARPE) Study. Chapter Five describes the results from pilot-testing with findings that indicate the patient population in community paramedicine home visit programs was different from populations of community dwelling older adults receiving community-based care due to greater proportions of chronic disease and mental health conditions. Chapter Six describes an additional modified Delphi study that found consensus amongst frontline community paramedics about specific assessment items relevant to their clinical practices in care planning and case management. Determining that community paramedic assessment practices encompass a range of clinical observations about health and

social structures is a primary finding of my thesis as a whole. The accumulation of evidence through the work completed in this thesis was used to create the Community Paramedicine Home Visit Assessment instrument (included in Appendix E). Standardizing common terminology, particularly in collaboration across care settings through delivery of integrated patient-centred care represents an opportunity for implementation of a multi-dimensional patient assessment system in community paramedicine home visit programs that can contribute to improving access to the care patients need.

Comparison to existing literature

Community paramedicine programs are different everywhere. In the early days of community paramedicine program development, the definition that was used referred to paramedics acting in expanded roles with extended scope in non-traditional settings (2). Community paramedicine models have grown internationally, fostered by a congenial attitude amongst paramedic service providers for innovation and improved patient care (3). Community paramedicine programs remain "locally" designed according to identified needs for improved access to care (4). But, common characteristics of program design have started to emerge and been articulated through rigorous study and review (2,5–10). In Appendix E, summarized responses for each variable that were observed in the CARPE Study are included to provide reference to the community paramedic patient population that I observed in Ontario, Canada.

Implementing multi-dimensional assessment in community paramedicine home visit programs is an example of how developing and evaluating multi-dimensional assessment is multi-faceted, complex, and evolves with practice and implementation. Evaluation can occur through multiple experiments—each having specific objectives identified regarding different clinimetric properties to evaluate. The evaluation process requires that assumptions about whether or not the assessment truly reflects patient condition be tested so clinical interventions or

the information communicated to others care providers contributes to improving person-centred, integrated care and informs ongoing judgement of evidence-based practice and refinement as needed. Underlying evaluation is recognition of both assessment domains and assessment applications, particularly as each relates to gathering the baseline information needed to inform care planning activities. Although the studies completed in Chapters Three, Five, and Six each focused on one Canadian province, any jurisdiction can follow the guidance provided in Chapter Two to consider the interpretation and use arguments that have been presented and judge the findings of the evaluation processes included in my thesis.

Multiple recently published scoping studies and systematic reviews indicate ongoing efforts to study and evaluate community paramedicine (2,6–13) which may influence paramedic practice more broadly. Varying levels of community paramedic training and education (8,14) reflect underlying jurisdictional differences for paramedic entry to practice (14–16). This is not a challenge unique to paramedicine. For example, uptake and implementation of standardized multi-domain assessment systems amongst older adults receiving integrated care when living at home is limited in spite of suitable systems being available (17). "Reinventing the wheel" and the inability to make meaningful comparisons hinder opportunities for cooperation between care providers (17). However, recognition of potential benefits of community paramedicine programs to include health promotion and prevent chronic disease exacerbations (18,19) have also contributed to investments in program development (20–22).

Implications of thesis findings

Each chapter of the thesis draws attention to the clinical and research implications from the respective studies. Those who practice in, administer, or research community paramedicine home visit programs are encouraged to consider all of the implications with key findings summarized by the following four implications.

Implication #1

Chapter Two describes a framework for developing and evaluating multi-dimensional patient assessment systems. Multiple clinimetric properties are detailed with potential arguments required to evaluate the connection between assessment practices, standardization of clinical observations, assessment applications (including support for care planning and decision making), and ultimately clinical utility through improvements to patient care. Taking a standardized approach to assessment that covers multiple domains has been described within emergency practice settings for paramedics (23). In an emergency setting, paramedics must rapidly assess both the presenting patient condition as well as the factors that contributed to that condition. If paramedics respond to an emergency incident, the "mechanism of injury" can provide a lot of information that is immediately useful and informative to clinical staff at the receiving hospital. In community paramedicine practice settings, a shift in paramedic assessment skills happens. Community paramedics must still assess multiple domains, but the processing and use of their assessment findings is applied to management over a longer duration of time and with different supporting clinical staff including physicians from specialties other than emergency medicine, most notably family medicine.

In mental health settings, investigations about the "conglomerations of instruments" has provided evidence to support uptake and implementation of a multi-dimensional assessment system (24). The environmental scan completed in Chapter Three provided evidence to support the hypothesis that community paramedic assessments cover multiple domains. The findings from Chapter Three suggest that the challenges of "cobbling together" multiple single dimension assessment instruments which have been observed in mental health and other settings are likely to exist within community paramedicine home visit programs (24,25). My thesis presents an alternative to existing practices by streamlining the assessment process in community

paramedicine home visit programs with evidence to support standardization of assessment practices, and appropriate, reliable, and relevant assessment applications to care planning. The judgement processes—interpreting the evidence from the studies completed over the course of my thesis investigating existing practices—provide an abundance of support for conceptualization of a multi-dimensional patient assessment system for community paramedicine (provided in Appendix E). Future implementation and research can continue to generate evidence for ongoing development and evaluation according to the framework with greatest need to investigate sensitivity or responsiveness (as a property still requiring evaluation).

Implication #2

If paramedicine is seen as an "on-demand" access point for the healthcare system, assessment practices within community paramedicine home visit programs can gather the broad clinical observations of community paramedics to inform what patients are in greatest need of access to. In particular, the findings described in Chapter Five indicated that community paramedicine home visit patients exhibit a complex interaction between multiple chronic diseases and high levels of mental health symptoms and conditions. Although social supports for community paramedicine home visit patients did not appear significantly different from the compared populations, the complex health conditions experienced by community paramedicine patients may create unmanageable situations for those with limited social support. Expansion of community paramedicine programs has been seen to support targeted populations including, mental health and addictions programs, palliative care programs, virtual care and remote monitoring programs, and hospital discharge programs (20). In all of these cases, finding common terminology and sharing information as part of an integrated care team while leveraging the latest technologies will be vital to the "on-demand" needs that patients seek when they call on paramedic services.

Paramedic practice as a mobilized health specialty that reaches outside of setting-specific care can use the findings from my thesis to continue to build and improve on provision of episodic care by using common terminology with other care providers in assessment practices. Clinical practice guidelines (or their local variants) are required to provide context for the care planning and treatments provided by community paramedics. For example, community paramedicine home visit programs that focus on chronic disease management with enhanced paramedic skills that expand diagnostic capabilities or therapeutic medication administration (26,27) could employ a multi-dimensional patient assessment system to direct these activities. In addition, paramedic education will need to revisit factors that contribute to patients seeking on-demand care through the 9-1-1 system (28). We have already seen that chronic disease is a leading factor in this area (29,30). The interactions between mental health and social supports have impacts both within emergency response and community paramedicine (as was demonstrated in Chapter Five). All paramedics, on entering practice, should recognize that their role includes multiple characteristics in addition to first responder (14,16). All paramedics should enact characteristics of compassion, adaptability, communicator, and advocate within their clinical practice (16). In addition, opportunities to "specialize" through advanced education in vulnerable populations would further strengthen community paramedicine practice settings (14).

Implication #3

Where assessment practices are not well defined or established, or standardization of assessment practices hasn't been cultivated, my thesis provides a format for addressing efforts to improve cooperation amongst stakeholders and the potential to realize additional benefits such as program evaluation or improved clinical skills. For example, others have noted that implementation of standardized multi-dimensional assessment systems has had a secondary

benefit of improved assessment practices (31). Given that structured assessment processes are already practiced in emergency settings (23,32), redirecting assessment skills towards a standardized multi-dimensional assessment system is a concept with demonstrated "plausibility." While the acuity of a patient's presenting condition within primary care settings that community paramedics support is not as high as emergency settings, the expertise of paramedics to complete in-depth and comprehensive assessment in emergency settings and "distill" their findings for a rapid report to clinicians at receiving emergency departments should not be difficult to adapt such that assessment findings can be presented to primary care providers in a similar fashion. This means that the community paramedic becomes the "assessment expert," able to complete a multi-dimensional patient assessment, interpret the findings, and succinctly communicate them to primary care providers or other members of the care team while also initiating care according to clinical practice guidelines.

Community paramedicine is a practice setting with extensive coordination across the healthcare continuum suggesting that the use of terminology between care settings could present challenges in the absence of standardization (1). By exploring the appropriateness of community paramedic assessment practices with an intentionally diverse group of informants from multiple jurisdiction and clinical backgrounds, I have contributed evidence that aligns with a concept described in process standardization where cooperation between corporate structures is valued over competition (33). In an industrial or commercial enterprise, competition is the norm and the mechanisms needed to foster cooperation can be great (33). The same should not be said about healthcare where transitions between care settings are expected (25). Finding the path forward with respect to standardization in the face of setting-specific needs should not be negated because of issues like practitioner preferences in terminology used during assessment processes.

Herein lies the potential benefit of testing the framework described in Chapter Two—by explicitly stating hypotheses and assumptions about conceptualization, reliability, validity, sensibility, and clinical utility of a multi-dimensional assessment system followed by systematic evaluation, settings other than community paramedicine home visit programs can find ways to enact cooperative approaches to care-planning for patients assessed with a standardized process.

Implication #4

Patient assessment is often completed at the outset of patient care in order to inform care planning activities and can mark the first interaction between a patient and a healthcare provider. Although the focus of my thesis was not to evaluate the cultural sensitivity of community paramedics nor the impact of patient reported outcome measures within community paramedicine home visit programs, a final implication from my thesis is how the results demonstrate alignment of patient-centredness within multi-dimensional patient assessment. In both Chapter Four and Chapter Six, participants endorsed the concept that patients should be asked about their goals for care during the assessment process. Patient values, influenced by their cultural, ethnic, or spiritual backgrounds, contribute to goals of care and require clinicians (assessors) to consider care planning that acknowledges patient workload above disease-centred approaches (34,35). Where multiple chronic diseases are impacting a patient's health, as was demonstrated in Chapter Five for patients in community paramedicine home visit programs, incorporating patient outcome goals within the care planning process could eliminate potentially contradictory disease-specific goals, help to reduce fragmented delivery of care, and improve patient-clinician trust and satisfaction (34). Future studies about patient goals of care may benefit from implementation of multi-dimensional patient assessment systems because they incorporate domains that influence quality of life and self-reported health in addition to disease, functional, cognitive, and social domains.

Limitations

My thesis represents an in-depth exploration of assessment practices in community paramedicine home visit programs. The studies that I completed to date investigate how community paramedics transfer the comprehensive but rapid head-to-toe assessment skills they are taught for emergency response to (what should be) a less chaotic and scheduled practice setting focusing largely on addressing barriers to care that have resulted in their patients repeatedly calling 9-1-1. Community paramedicine is a new way for paramedics to operate. Interpretation of the inferences I have made (including from adjacent settings) by studying the development of assessment practices in community paramedicine are reflected in the following limitations.

Tensions will always exist between broad standardization and local variation or individualized context. One way to describe the standards development process is that interests for cooperation outweigh individual or local competing interests (33). In many ways, standardization is about sharing (36). The thesis does not address peripheral factors beyond assessment practices such as community paramedicine program design or integration between community paramedics and traditional emergency response paramedics which could contribute to multi-dimensional assessment system implementation. For example, if a multi-dimensional assessment system identified a particular risk factor but community paramedicine program design within a local setting was not operationalized to provide care related to such a condition, paramedics could be in an awkward or even potentially liable position. Any implementation of standardized assessment practices in the absence of supportive care planning could undermine the evidence supporting the concepts established in my thesis. Continued community paramedicine program development may address this limitation.

I have presented the development and evaluation of a multi-dimensional patient assessment

system for community paramedicine home visit programs in a sequence that aligns with formulating logical step in the judgement processes I outlined in Chapter Two. While presenting my thesis sequentially, certain studies happened concurrently and iterations between formulating hypotheses, exploring assumptions, and drawing evidence from one study to contribute to another were natural aspects of the work involved in constructing my thesis as a whole. The framework described in Chapter Two states that development, evaluation, and judgement are iterative processes. The iterations between steps taken in my thesis were limited by a defined amount of time, restricting the number of iterations described herein. Although highest regard was placed on the scientific process throughout each study and the work was completed with a high degree of objectivity, replicating the entirety of my thesis at any point in the future would be unlikely because of inevitable changes to practice (the current COVID-19 pandemic serving as an example). At each step that I followed new evidence was uncovered. The same would be expected in the future, with new and different impacts on the iterations and sequencing of subsequent studies that would follow.

There are many approaches to measuring clinimetric and psychometric properties of assessment. Too often the question, "Does it work?" is stated using the words, "has it been validated?" What gets developed during conceptualization and is pilot-tested is usually different than what is prepared for broader implementation. Developing and following a systematic approach beginning with conceptualization, through establishment of reliability, validity arguments, determining sensitivity, and evaluating clinical utility that retains evidence established from preliminary tests while contributing to other clinimetric and psychometric properties which promote subsequent implementation is a lengthy and complicated process. The work will always require judgement, some of which will be better made in hindsight. The

arguments presented in my thesis are a limited number, largely reflective of the steps taken to conceptualize a multi-dimensional assessment system for use in community paramedicine home visit programs. A limited number of inferences about interpretation and use of the assessment system are possible, but little has been established about leveraging the multi-dimensional assessment system to determine validity, sensitivity, or clinical utility—particularly with regards to identifying improvements in patient care.

Next steps in research

Reflecting on the stated implications and limitations, opportunities for further evaluation are apparent. One of the significant motivating factors for paramedic services to develop community paramedicine programming is a concern about sustainability of continually using the 9-1-1 system as a "one-way" street to the emergency department. Often, paramedic services identify patients for enrollment in community paramedicine programs because of repeated use of the emergency response system (20). However, further work is needed to evaluate changes in patient condition, particularly regarding multiple chronic disease management and mental health issues. More information is needed to evaluate long-term patient outcomes and experience following care provided by community paramedics. Measurement of changes in patient condition requires expanded implementation of structured assessment practices. The assistance offered by the multi-dimensional assessment system conceptualized and evaluated in my thesis should guide future research—contributing to evaluation of its clinical utility as well as enabling evidence to be generated about patient outcomes. Implementation of the Community Paramedicine Home Visit Assessment (included in Appendix E) will facilitate future research.

At the time of writing the conclusion for my thesis, the COVID-19 pandemic is putting pressure on the health system, including reconsideration of the processes individuals take to access care. The pandemic has precipitated a shift in primary care to mobile technologies and

"virtual visits." For patients that have adequate access to technology or are "technologically literate" such a move can provide the access to primary care that they require. However, for vulnerable patient populations including, low income, recently displaced (refugee or disaster evacuees), housing insecure, impairments (either functional or cognitive), the barriers that they already experience in accessing primary care may be further exacerbated by the pandemic and virtual visits are not an option or do not offer any opportunity for improved access. Within this context, it may be worthwhile to consider the utility of the paramedic for providing care in the community and supporting other community-based care providers (for which there are often shortages). A concept used to describe community paramedics has been their utility as a "physician extender." That means that they can be an extra set of eyes, ears, and hands, for physicians who are not otherwise able or available to complete house-calls.

While the CARPE assessment instrument was being developed, a separate group of researchers affiliated with interRAI was developing a multi-dimensional assessment system for use in primary care settings called the interRAI Check-up (37). Comparing these two instruments demonstrated over 90% overlap in assessment items. The developers of the interRAI Check-up recognized that the constraints of the primary care clinic setting presented challenges for implementation and proceeded to adapt the interRAI Check-up for Self-report (37,38). The idea being that patients could complete the interRAI Check-up Self-report prior to a primary care visit. The assessment items and structure of the self-assessment would then allow a quick review by a primary care provider and a focus on identified problems at the primary care visit. The clinical utility of this approach continues to be investigated by interRAI researchers (37,38). In instances where vulnerable patient populations are unable to complete a self-report, opportunity may exist for community paramedics to complete a home visit and similar

assessment, thereby facilitating the assessment practices necessary for the primary care providers. Already, community paramedicine programs are demonstrating alignment with primary care and this approach may improve patient care further.

For stakeholders across the continuum of care, a collective effort is required to work towards first agreeing on best practices in assessment, then agreeing on common terminology and consistent measurements. The role of information systems in supporting communication regarding the delivery of patient care across the healthcare continuum provides opportunity for greater focus on coordination, cooperation, and interoperability that can draw from process standardization, on which assessment practices are built (33). If this is the case, then other approaches to evaluation that re-orient objectives of evaluation from a question like, "Is it valid?" to consider whether or not inferences can be made to determine if an assessment instrument is generalizable are needed (39). Future research should consider this distinction, particularly if the expressly stated goal of the whole of the healthcare system is to achieve the Quadruple Aim (40,41). Prioritization of the Quadruple Aim for improving the delivery of healthcare according to patient, provider, system, and population needs (40,41) means that where the health system that was once focused on setting-specific care, it now aims to provide care that is person-specific or person-centred (25,42). The advent of community paramedic practice and its focus on integrated care (5,43) is an example of how assessments in paramedic practice can adapt to this new reality (6).

Finally, another challenge has emerged regarding safe patient discharge from hospital to community settings experiencing pandemic-related pressures. Before the COVID-19 pandemic, community paramedicine programs were beginning to assist hospitals with transitions of inpatients back to their homes in the community. The challenges noted above for vulnerable

populations apply here as well. Remote monitoring programs and mobilized "physician extenders" provide a safety net around patients transitioning out of hospital settings to monitor symptoms and ensure that health conditions improve or are maintained.

CONCLUSION

I set out to explore assessment practices in community paramedicine home visit programs and their associated application to care planning activities in order to develop a multi-dimensional patient assessment system that was "fit-for-purpose." Paramedics, by training, are adept problem solvers that use multi-dimensional assessment skills to inform their decision making and care planning. Community paramedicine represents a new area for application of paramedic assessment skills. I was able to determine what clinical observations community paramedics use to inform delivery of care in community paramedicine home visit programs, complete a number of evaluations about their impact on care planning activities, and provide evidence supporting the standardization of clinical observations for a multi-dimensional patient assessment system. The whole of my thesis serves as a guidance for those interested in developing and evaluating assessment practices in clinical settings that follow standardized processes intending to cover multiple domains of patient health and share findings with other care team members in the delivery of person-centred integrated care.

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APPENDIX E: Community Paramedicine Home Visit Assessment

Each section of the Community Paramedicine Home Visit Assessment presented in the following tables includes assessment items and their corresponding response variables. In Sections B through M, responses to each item observed in the CARPE Study are provided.

SECTION A: Identification Information

Assessment Item	Details	Response Variables
1	Copyright of interRAI 2020	
2		
3		
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12		
13		
14		

SECTION B: Living Arrangement and Background

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		78% First assessment 12% Routine reassessment 5% Return assessment 1% Significant change in status reassessment 4% Not recorded/missing

2	Copyright of interRAI 2020	90%	Private home / apartment / rented room
		4%	Assisted living or semi-independent living
		1%	Other
		5%	Not recorded/missing
3		48%	Alone
		29%	With spouse / partner only
		6%	With spouse / partner and other(s)
		8%	With child (not spouse / partner)
		1%	With parent(s) or guardian(s)
		1%	With sibling(s)
		3%	With other relative(s)
		5%	Not recorded/missing
4		7%	Never married
		32%	Married
		5%	Partner / Significant other
		40%	Widowed
		2%	Separated
		8%	Divorced
		6%	Not recorded/missing

SECTION C: Cognition

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		71% Independent 22% Modified independence or any impairment 7% Not recorded/missing
2			70% Yes, memory OK 23% Memory problem 7% Not recorded/missing
3			1% Improved 89% No change 5% Declined 5% Uncertain
4			88% No 5% Yes 7% Not recorded/missing

SECTION D: Communication and Vision

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		81% Understood 9% Usually understood 1% Often understood 2% Sometimes understood 0% Rarely or never understood 7% Not recorded/missing
2	Copyright of interRAI 2020		75% Understands

		14% Usually understands 3% Often understands 1% Sometimes understands 7% Not recorded/missing
3		60% Adequate 32% Not adequate 1% No hearing 7% Not recorded/missing
4		48% Adequate 45% Not adequate 0% No vision 7% Not recorded/missing

SECTION E: Mood

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		Responses indicating presence of mood symptoms a. Made negative statements—26% b. Persistent anger with self or others—30% c. Expressions of unrealistic fears—10% d. Repetitive health complaints—35% e. Repetitive complaints (non-health related)—24% f. Sad or worried—32% g. Crying, tearful—18%

2	Copyright of interRAI 2020	Responses indicating presence of mood symptoms in last 3 days a. Little interest—29% b. Anxious—40% c. Sad—35%
3		Responses indicating presence of symptoms (* over past 3 days) a. Abnormal thoughts—3% b. Delusions—4% c. Hallucinations—3%

SECTION F: Psychosocial Well-Being and Indicators of Social Isolation

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		52% No 38% Yes 10% Not recorded/missing
2			60% No 30% Yes 10% Not recorded/missing
	Copyright of interRAI 2020		56% Not lonely 9% Only in certain situations 15% Occasionally 10% Frequently 1% Daily

		10% Not recorded/missing
3a		28% Less than 1 hour 10% 1–2 hours 16% More than 2 hours but less than 8 hours 38% 8 hours or more 8% Not recorded/missing
3b		39% Less than 1 hour 2% 1–2 hours 4% More than 2 hours but less than 8 hours 46% 8 hours or more 8% Not recorded/missing
4		11% No contact 13% Less than 1 hour 20% 1 to 4 hours 47% More than 4 hours 10% Not recorded/missing
5		Responses indicating: a. No helper (1 or 2)—20% b. Only one helper (no helper 2)—4%

SECTION G: Functional Status

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		Responses of "Supervision or any assistance during task"

		a. Meal preparation – 43% b. Ordinary housework—54% c. Managing finances—29% d. Managing medications – 38% e. Phone use—13% f. Stairs—49% g. Shopping—48% h. Transportation—49%
2		Responses of "Supervision or any physical assistance" a. Bathing – 43% b. Personal hygiene—23% c. Dressing upper body—21% d. Dressing lower body – 28% e. Walking—35% f. Locomotion—32% g. Transfer toilet—21% h. Toilet use—18% i. Eating—10%

3	Copyright of interRAI 2020	43% Walking, no assistive device 45% Walking, uses assistive Device 2% Wheelchair, scooter 1% Bed-bound

		9% Not recorded/missing
4		21% None 33% Less than 1 hour 25% 1–2 hours 10% 3–4 hours 2% More than 4 hours 9% Not recorded/missing
		24% No days out 11% Did not go out in last 3 days 31% 1–2 days 22% 3 days 12% Not recorded/missing
5		1% Improved 88% No change 10% Declined 1% Uncertain
6		Not capable of improved performance, belief of: a. Person—40% b. Paramedic—43%

7	Copyright of interRAI 2020	62% No 29% Yes 9% Not recorded/missing
		86% No, or does not drive 4% Yes

		10% Not recorded/missing

SECTION H: Disease Diagnoses

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		Disease present: a. Alzheimer's disease—3% b. Dementia other than Alzheimer's disease—4% c. Stroke / CVA—14% d. Coronary heart disease—41% e. Chronic obstructive pulmonary disease—56% f. Congestive heart failure—26% g. Anxiety—35% h. Depression—35% i. Schizophrenia—0% j. Pneumonia—8% k. Urinary tract infection in last 30 days—10% l. Cancer—8% m. Diabetes mellitus—34% n. Renal Failure—9%

SECTION I: Health Conditions

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		Condition present in past 3 days or normally exhibited: a. Dizziness—39% b. Unsteady gait—54% c. Chest pain—18% d. Acid reflux—26%

		e. Constipation—27% f. Diarrhea—16% g. Vomiting—2% h. Difficulty sleeping—42% i. Too much sleep—15% j. Peripheral edema—30%
2		67% No falls 15% One fall 10% Two or more falls
3		35% Absence of symptom 26% Present when performed moderate activities 20% Present when performed normal day-to-day Activities 10% Present at rest 9% Not recorded/missing

4	Copyright of interRAI 2020	34% None 26% Minimal 18% Moderate 8% Severe 4% Unable to commence any normal day-to-day activities 10% Not recorded/missing
5		50% No pain

		8%	Present but not exhibited in last 3 days
		11%	Exhibited on 1–2 of last 3 days
		22%	Exhibited daily in last 3 days
		9%	Not recorded/missing
		43%	No pain
		11%	Mild
		28%	Moderate
		6%	Severe
		3%	Times when pain is horrible or excruciating
		10%	Not recorded/missing
		43%	No pain
		3%	Single episode
		29%	Intermittent
		17%	Constant
		9%	Not recorded/missing
		77%	No
		14%	Yes
		9%	Not recorded/missing
	Copyright of interRAI 2020	40%	No issue of pain
		12%	Pain intensity acceptable to person
		19%	Controlled adequately by therapeutic regimen
		6%	Controlled when

		therapeutic regimen followed 13% Therapeutic regimen followed, but pain control not adequate 1% Pain not adequately controlled 9% Not recorded/missing
6		1% Excellent 22% Good 43% Fair 21% Poor 13% Could not (would not) respond
7		Not included
8		72% No 2% Usually a daily smoker 17% Yes 9% Not recorded/missing
	Copyright of interRAI 2020	71% None 9% 1 7% 2–4 4% 5 or more 9% Not recorded/missing

SECTION J: Nutritional Status

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		

2		Nutritional issues identified a. Weight loss—13% b. Fluid intake—not included c. Fewer meals—12% d. Decreased consumption—6%

SECTION K: Medications

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		
2			42% No known drug allergies 49% Yes 9% Not recorded/missing
3			59% Always adherent 23% Adherent 80% of time or more 9% Adherent less than 80% of time 1% No medications prescribed 9% Not recorded/missing
4			85% No, or no medications 7% Yes

		9% Not recorded/missing
5		90% No, or no medications 1% Yes 9% Not recorded/missing

SECTION L: Treatment and Procedures

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		{Coding error in CARPE form}
2			Treatments or Programs ordered or implemented: a. Dialysis—0% b. Oxygen therapy—18% c. Wound care—7% d. Palliative care program—2%
3			

4	Copyright of interRAI 2020	53% No hospitalization within 90 days 8% 31 to 90 days ago 10% 15 to 30 days ago 10% 8 to 14 days ago 10% In the last 7 days 0% Now in hospital 9% Not recorded/missing
5		46% No use within 90 days 11% 31 to 90 days ago

		15% 15 to 30 days ago 10% 8 to 14 days ago 10% In the last 7 days 0% Requires emergency response 9% Not recorded/missing
6		
7		63% No 26% Yes 3% Living in institutional setting 9% Not recorded/missing

SECTION M: Environmental Assessment

Assessment Item	Details	Response Variables	Responses observed in the CARPE Study
1	Copyright of interRAI 2020		Hazards identified: a. Disrepair of the home—8% b. Squalid condition—4% c. Inadequate heating or cooling—7% d. Lack of personal safety—1% e. Limited access to home or rooms in home—15%
2			73% No 18% Yes

		9% Not recorded/missing
3		Resources not available/accessible: a. Emergency assistance—2% b. Groceries—29% c. Grocery delivery—16% d.
4		65% No 9% Yes 18% Patient indicates sufficient level of funds 9% Not recorded/missing

SECTION N: Disposition

Assessment Item	Details	Response Variables
1	Copyright of interRAI 2020	
2		

SECTION O: Discharge [Note: Complete Section O at Discharge only]

Assessment Item	Details	Response Variables
1	Copyright of interRAI 2020	
2		
3		

	Risk or Severity Scales:	Clinical Action Points:

DECISION SUPPORT TOOLS	Depression Rating Scale Pain Scale The Changes in Health, End-stage disease and Symptoms and Signs (CHESS) Scale	Cardio-respiratory symptoms Falls Mood symptoms Pain

* * *